



Berechnung der Schattenwurfdauer für die Errichtung
und den Betrieb von drei Windenergieanlagen

am Standort Bostelwiebeck II

Bericht Nr.: I17-SCHATTEN-2019-47

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drei Windenergieanlagen am Standort Bostelwiebeck II

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Haftungsausschluss und Urheberrecht

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Revisionsnummer	Revisionsdatum	Änderung	Bearbeiter
0	24.06.2019	Erstellung des Gutachtens	Gloy

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1 Aufgabenstellung

Der Auftraggeber plant die Errichtung von drei Windenergieanlagen (WEA) des Herstellers Vestas Wind Systems A/S vom Typ V162-5.6 MW auf einer Nabenhöhe von 166 m zzgl. einer Fundamenterrhöhung von 3 m. Das Standortzentrum liegt ca. 3.5 km nord-östlich der Gemeinde Altenmedingen im Landkreis Uelzen in Niedersachsen. In der näheren Umgebung des Standortes sind bereits 11 weitere Windenergieanlagen errichtet, geplant oder im Genehmigungsverfahren befindlich, welche als Vorbelastung in die Betrachtung mit aufzunehmen sind [6].

Eine WEA mit einer Gesamthöhe von mehr als 50 Metern stellt nach der 4. BImSchV eine genehmigungsbedürftige Anlage dar, welche das Genehmigungsverfahren nach dem Bundes-Immissionsschutzgesetz (BImSchG) [2] zu durchlaufen hat. Für das Genehmigungsverfahren nach dem BImSchG [2] ist der Nachweis der Einhaltung der gesetzlichen Grenzwerte für die Schattenwurfimmissionen zu führen. Die Berechnungen sollen Auskunft darüber geben, ob schädliche Umwelteinwirkungen durch Schattenwurf von den geplanten Anlagen ausgehen können.

2 Örtliche Beschreibung

Die Standorte der geplanten WEA befinden ca. 3.5 km nord-östlich der Gemeinde Altenmedingen Landkreis Uelzen in Niedersachsen.

Im näheren Umfeld des geplanten Windparks befinden sich einzelne Wohnbebauungen im Außenbereich der umliegenden Gemeinden. Die nächstgelegenen Ortslagen sind die Ortsteile Becklingen und Gienau der Gemeinde Dahlenburg ca. 2 km nördlich bzw. nord-östlich der geplanten Anlagenstandorte. Die Ortschaft Bostelwiebeck liegt in ca. 1 km Entfernung östlich der geplanten WEA W2 bzw. W3. Südwestlich der WEA W2 in ca. 1 km bzw. 2 km Entfernung liegen die Ortschaften Vorwerk und Haaßel. Die Ortschaft Eddelsdorf befindet sich ca. 1.5 km westlich der WEA W1.

In der näheren Umgebung der geplanten WEA im Windpark Bostelwiebeck II sind 11 weitere Windenergieanlagen in Betrieb, geplant oder im Genehmigungsverfahren befindlich, welche als Vorbelastung im vorliegenden Gutachten berücksichtigt werden [6]. Im ca. 2 km südlich der geplanten WEA gelegenen Windpark Haaßel werden insgesamt vier Anlagen des Typs Enercon E-70 E4 / 2300 kW auf einer Nabenhöhe von 64 m betrieben. Des Weiteren werden nördlich des geplanten Standorts fünf WEA des Typs GE 3.6-137 auf einer Nabenhöhe von 164.5 m, eine Anlage des Typs GE 5.3-158 mit einer Nabenhöhe von 161 m und eine weitere Anlage des Typs Vestas V162-5.6MW auf 169 m Nabenhöhe berücksichtigt.

Das Gelände des Windparks ist eben und variiert in der Höhe nur geringfügig um ca. 65 m über NN. Die Angaben zu den Geländehöhen wurden auf Basis von topografischen Kartenmaterial ermittelt [3]. Die Landschaft in unmittelbarer Umgebung des geplanten Windparks besteht vornehmlich aus landwirtschaftlich genutzten Ackeranbauflächen. Im Nordwesten und Südosten erstrecken sich im weiteren Umfeld größere Waldgebiete.

Für die Koordinatenangaben in diesem Gutachten findet das System UTM ETRS 89 Zone 32 Anwendung. Die Windenergieanlagenpositionen sind in der nachfolgenden Abbildung 2.1 dargestellt.

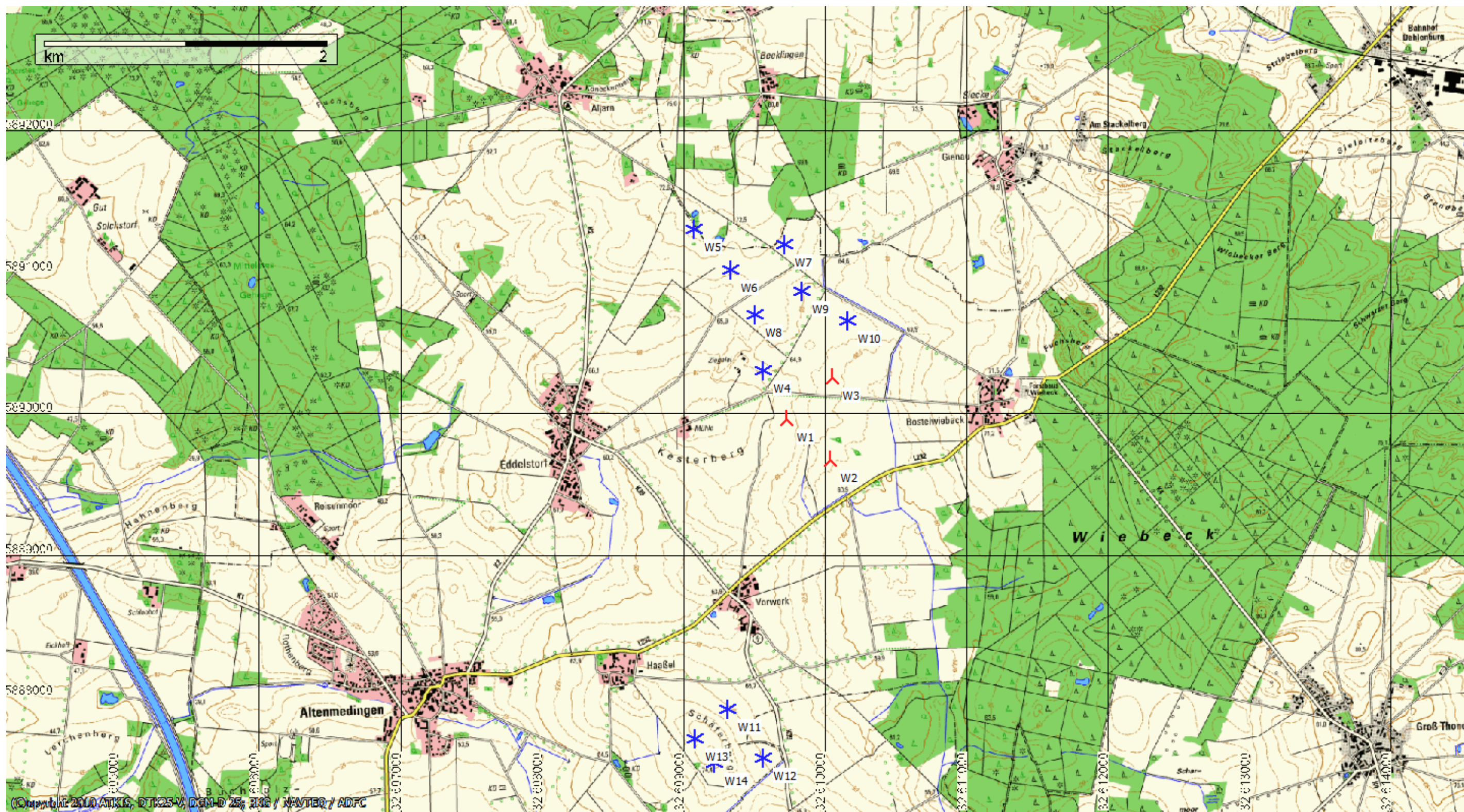


Abbildung 2.1: WEA Standorte, Kartenmaterial [3]

- ▲ = neu geplante WEA
- * = Bestehende WEA

3 Beurteilungsgrundlagen

3.1 Berechnungs- und Beurteilungsverfahren

Die hier zu untersuchenden Immissionen durch direkten Schattenwurf des Rotors können bei drehendem Rotor störend wirken. Aus der Anzahl der Rotorblätter und der Drehzahl des Rotors ergibt sich die jeweilige Frequenz mit der wechselnde Lichtverhältnisse im Schattenbereich auftreten können. Bei den gegenwärtigen Anlagengrößen handelt es sich um niedrige Frequenzen im Bereich von ca. 0.5 bis 3 Hz. Die Bund-Länder-Arbeitsgemeinschaft für Immissionsschutz (LAI) [1] hat die federführend vom staatlichen Umweltamt Schleswig unter Mitarbeit von Fachleuten, Gutachtern, Gewerbeaufsichtsdirektoren und Weiteren erarbeiteten *Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen (WEA-Schattenwurf-Hinweise)* [1] im Jahr 2002 als Standard anerkannt. Die WEA-Schattenwurf-Hinweise enthalten folgende Grenzwerte:

- Die astronomisch maximal mögliche Beschattungsdauer darf maximal 30 Stunden im Jahr und maximal 30 Minuten am Tag betragen.
- Ein Schattenwurf bei Sonnenständen unter 3° ist nicht zu berücksichtigen.
- Wenn am Immissionsort aufgrund der Entfernung zur WEA die Sonne zu weniger als 20 % durch das Rotorblatt verdeckt wird, können die dadurch entstehenden Helligkeitsschwankungen (Schatten) vernachlässigt werden.
- Um die Vergleichbarkeit der Ergebnisse zu ermöglichen, wird die Berechnung für einen punktförmigen Rezeptor von 0.1 m x 0.1 m in ca. 2 m Höhe durchgeführt.

Die Beschattungsdauer an der umgebenden Bebauung kann für eine oder mehrere WEA in Abhängigkeit von Nabenhöhe und Rotordurchmesser ermittelt werden. Der Berechnung der astronomisch möglichen Beschattungsdauer - dem worst case - liegen folgende Annahmen zu Grunde:

- Es herrscht durchgehender Sonnenschein von Sonnenaufgang bis Sonnenuntergang.
- Die Sonnenstrahlung steht senkrecht zur Rotorkreisfläche.
- Die WEA befindet sich permanent in Betrieb.
- Der Immissionsort empfängt Schatten aus allen Richtungen („Gewächshaus“-Modus)

Zyklische Lichtblitze / Discoeffekte sowie periodischer Schattenwurf sind Immissionen im Sinne des Bundes-Immissionsschutzgesetzes [2]. Durch Verwendung mittelreflektierender Farben (z.B. RAL 7035-HR) und matten Glanzgraden gemäß DIN 67530/ISO 2813 [8] kann Lichtblitzen vorgebeugt werden.

4 Beschreibung der geplanten Windenergieanlagen

4.1 Anlagenbeschreibung

Der Auftraggeber plant am Standort Bostelwiebeck II die Errichtung und den Betrieb von drei Windenergieanlagen des Herstellers Vestas Wind Systems A/S [6]. Nachfolgend werden die Eckdaten der geplanten Windenergieanlagen zusammengefasst:

Hersteller:	Vestas Wind Systems A/S
Anlagentyp:	V162-5.6 MW
Nabenhöhe:	166 m zzgl. 3 m Fundamenterhöhung
Rotordurchmesser:	162 m
Nennleistung:	5.600 kW
Drehzahlbereich:	4.3 - 12.3 U/min
Maximale Blatttiefe [5]:	4.30 m
Blatttiefe bei 90% Radius [5]:	1.57 m

4.2 Positionen der geplanten Windenergieanlagen

Die Angaben zu den Koordinaten wurden vom Auftraggeber übermittelt [6]. Der nachfolgenden Tabelle 4.1 sind die Positionen und der jeweilige Anlagentyp mit Nabenhöhe der geplanten Windenergieanlagen zu entnehmen.

W-Nr.	Bez. Kunde	Typ	Nabenhöhe [m]	Rotordurchmesser [m]	Koordinaten UTM ETRS 89 Zone 32 Ost	Koordinaten UTM ETRS 89 Zone 32 Nord	Höhe über NN [m]
1	UKA 02	V162-5.6 MW	166.0 + 3.0	162.0	609729	5889960	64
2	UKA 03	V162-5.6 MW	166.0 + 3.0	162.0	610042	5889672	62
3	UKA 04	V162-5.6 MW	166.0 + 3.0	162.0	610054	5890253	63

Tabelle 4.1: Positionen der geplanten WEA [6]

4.3 Vorbelastung

In der näheren Umgebung der geplanten WEA im Windpark Bostelwiebeck II sind 11 weitere Windenergieanlagen errichtet, geplant oder im Genehmigungsverfahren. Diese WEA werden im vorliegenden Gutachten als Vorbelastung berücksichtigt. In Tabelle 4.2 sind die Windenergieanlagen mit Typ, Nabenhöhe und Position [6] aufgeführt.

Bemerkung:

Die bestehenden WEA im Windpark Haaßel (W11 – W14) verursachen an keinem Immissionsort im Einwirkungsbereich der geplanten WEA einen Beitrag zum Schattenwurf, siehe Anhang 2 Vorbelastung (Gesamtmenge der max. mögl. Beschattung an Rezeptoren pro WEA). Daher kann auf eine Berücksichtigung dieser Bestandsanlagen im Rahmen der Gesamtbelastung verzichtet werden.

W-Nr.	Bez. Kunde	Typ	Rotordurchmesser [m]	Nabenhöhe [m]	Koordinaten UTM ETRS 89 Zone 32 Ost	Koordinaten UTM ETRS 89 Zone 32 Nord	Höhe über NN [m]
4	UKA 01	V162-5.6MW	162.0	169.0	609566	5890307	64
5	BWP 01	GE 3.6-137	137.0	164.5	609077	5891308	73
6	BWP 02	GE 3.6-137	137.0	164.5	609333	5891020	68
7	BWP 03	GE 3.6-137	137.0	164.5	609713	5891198	69
8	BWP 04	GE 3.6-137	137.0	164.5	609505	5890698	66
9	BWP 05	GE 3.6-137	137.0	164.5	609841	5890865	65
10	BWP 06	GE 5.3-158	158.0	161.0	610162	5890660	64
11	WP Haaßel 1	E-70 E4/2.300kW	71.0	64.0	609312	5887912	70
12	WP Haaßel 2	E-70 E4/2.300kW	71.0	64.0	609563	5887565	70
13	WP Haaßel 3	E-70 E4/2.300kW	71.0	64.0	609085	5887701	75
14	WP Haaßel 4	E-70 E4/2.300kW	71.0	64.0	609220	5887525	75

Tabelle 4.2: Positionen der Bestandsanlagen am Standort [6]

5 Einwirkungsbereich der Windenergieanlagen und Immissionsorte

Als repräsentative, kritische Immissionsorte wurden die nächstgelegenen Bebauungen gewählt. Laut den WEA-Schattenwurf-Hinweisen des Länderausschusses für Immissionsschutz (LAI) [1] sind maßgebliche Immissionsorte u.a.:

- Wohnräume
- Schlafräume, einschließlich Übernachtungsräume in Beherbergungsstätten und Bettenräume in Krankenhäusern und Sanatorien
- Unterrichtsräume in Schulen, Hochschulen und ähnlichen Einrichtungen
- Büroräume, Praxisräume, Arbeitsräume, Schulungs- und ähnliche Arbeitsräume

Die nächstgelegenen Bebauungen, welche diese Kriterien erfüllen, sind der nachfolgenden Abbildung 5.1 sowie der Tabelle 5.1 zu entnehmen. Es wurden insgesamt 161 Immissionsorte untersucht und berücksichtigt. Während einer Standortbesichtigung am 16.06.2019 durch einen Mitarbeiter der I17-Wind GmbH & Co. KG wurde die Lage der Immissionsorte mittels GPS überprüft. Abweichungen wurden dokumentiert und korrigiert.

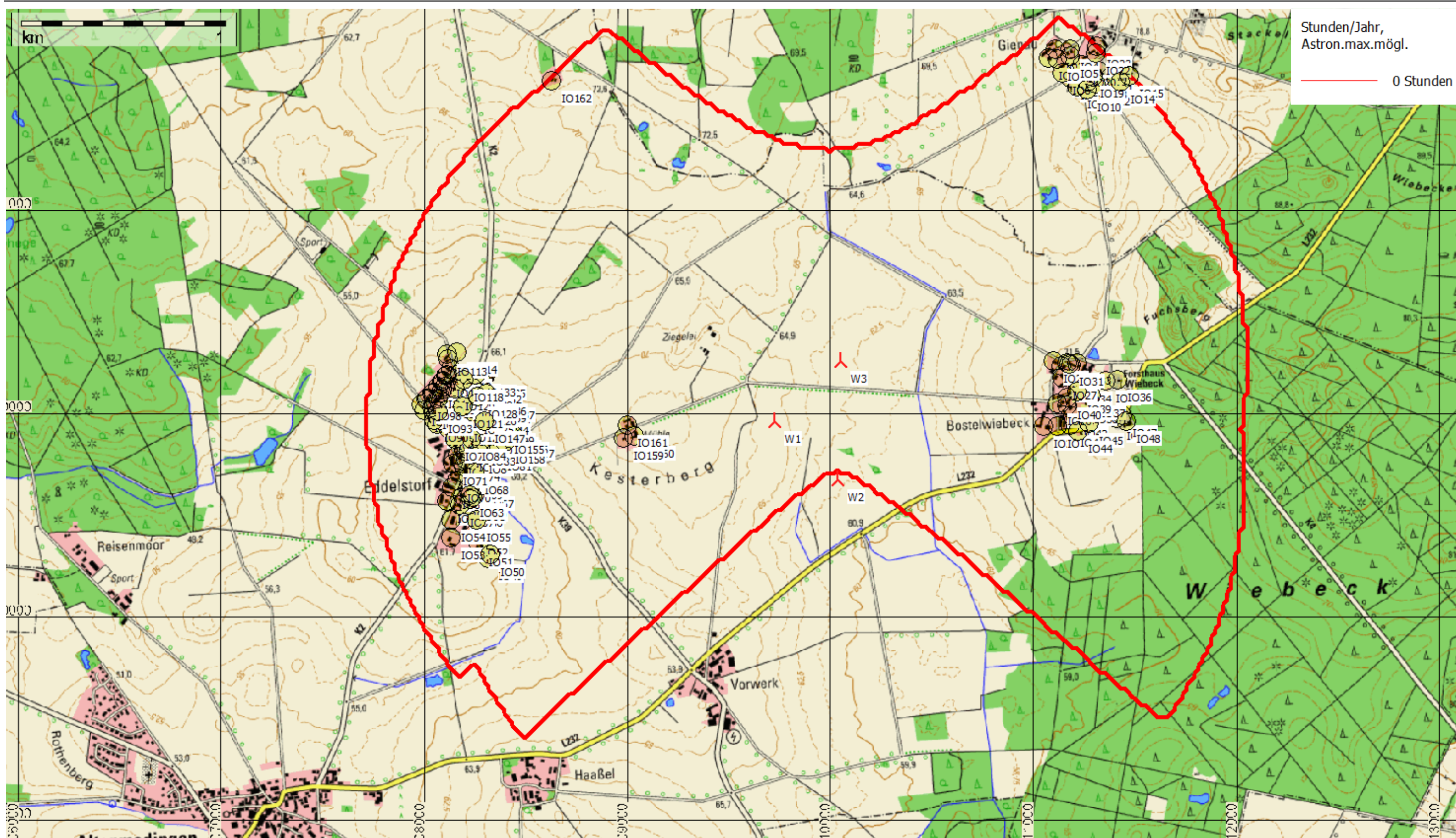


Abbildung 5.1: Einwirkungsbereich der neu geplanten WEA und Lage der Schattenrezeptoren, Kartenmaterial [3]

- ▲ = neu geplante WEA
- = Schattenrezeptor bzw. Immissionsort

Die Lage und Bezeichnung der Immissionsorte sind in Tabelle 5.1 zusammengefasst.

Nr.	Bezeichnung	Koordinaten UTM ETRS 89 Zone 32 Ost	Koordinaten UTM ETRS 89 Zone 32 Nord	Höhe über NN [m]
IO1	Katenweg 6, 21368 Dahlenburg (Gienau)	611082	5891745	78
IO2	Katenweg 4, 21368 Dahlenburg (Gienau)	611112	5891786	78
IO3	Katenweg 3, 21368 Dahlenburg (Gienau)	611126	5891741	78
IO4	Wiebecker Str. 2, 21368 Dahlenburg (Gienau)	611189	5891787	78
IO5	Wiebecker Str. 4, 21368 Dahlenburg (Gienau)	611186	5891752	78
IO6	An der Alten Schule 4, 21368 Dahlenburg (Gienau)	611150	5891672	78
IO7	An der Alten Schule 1, 21368 Dahlenburg (Gienau)	611189	5891648	78
IO8	Wiebecker Str. 8, 21368 Dahlenburg (Gienau)	611223	5891628	78
IO9	Wiebecker Str. 10, 21368 Dahlenburg (Gienau)	611222	5891605	78
IO10	Wiebecker Str. 9, 21368 Dahlenburg (Gienau)	611269	5891589	78
IO11	Wiebecker Str. 7, 21368 Dahlenburg (Gienau)	611275	5891628	78
IO12	Wiebecker Str. 17, 21368 Dahlenburg (Gienau)	611315	5891619	77
IO13	An der Ziegelei 15, 21368 Dahlenburg (Gienau) - unbebaut	611417	5891638	77
IO14	An der Ziegelei 13, 21368 Dahlenburg (Gienau)	611436	5891626	77
IO15	An der Ziegelei 6, 21368 Dahlenburg (Gienau)	611476	5891659	78
IO16	An der Ziegelei 12, 21368 Dahlenburg (Gienau)	611386	5891650	77
IO17	An der Ziegelei 11, 21368 Dahlenburg (Gienau)	611308	5891649	76
IO18	An der Ziegelei 9, 21368 Dahlenburg (Gienau)	611297	5891654	77
IO19	An der Ziegelei 7, 21368 Dahlenburg (Gienau)	611286	5891658	77
IO20	Wiebecker Str. 5, 21368 Dahlenburg (Gienau)	611244	5891712	78
IO21	An der Ziegelei 14, 21368 Dahlenburg (Gienau)	611326	5891681	76
IO22	Mittelstr. 8, 21368 Dahlenburg (Gienau)	611311	5891770	78
IO23	Mittelstr. 6, 21368 Dahlenburg (Gienau)	611319	5891803	78
IO24	Bostelwiebeck 1, 29575 Altenmedingen OT Bostelwiebeck	611058	5889934	71
IO25	Bostelwiebeck 2, 29575 Altenmedingen OT Bostelwiebeck	611126	5889935	71
IO26	Bostelwiebeck 26, 29575 Altenmedingen OT Bostelwiebeck	611126	5890046	71
IO27	Bostelwiebeck 24, 29575 Altenmedingen OT Bostelwiebeck	611146	5890172	71
IO28	Bostelwiebeck 22, 29575 Altenmedingen OT Bostelwiebeck	611142	5890231	71
IO29	Bostelwiebeck 23, 29575 Altenmedingen OT Bostelwiebeck	611104	5890254	70
IO30	Bostelwiebeck 21, 29575 Altenmedingen OT Bostelwiebeck	611174	5890244	71
IO31	Bostelwiebeck 20, 29575 Altenmedingen OT Bostelwiebeck	611183	5890239	71
IO32	Bostelwiebeck 19, 29575 Altenmedingen OT Bostelwiebeck	611190	5890235	71
IO33	Bostelwiebeck 18, 29575 Altenmedingen OT Bostelwiebeck	611221	5890246	72
IO34	Bostelwiebeck 17, 29575 Altenmedingen OT Bostelwiebeck	611220	5890151	71
IO35	Bostelwiebeck 16, 29575 Altenmedingen OT Bostelwiebeck	611362	5890157	71
IO36	Bostelwiebeck 15, 29575 Altenmedingen OT Bostelwiebeck	611418	5890164	73
IO37	Bostelwiebeck 32, 29575 Altenmedingen OT Bostelwiebeck	611287	5890083	71

Nr.	Bezeichnung	Koordinaten UTM ETRS 89 Zone 32 Ost	Koordinaten UTM ETRS 89 Zone 32 Nord	Höhe über NN [m]
IO38	Bostelwiebeck 31, 29575 Altenmedingen OT Bostelwiebeck	611254	5890056	71
IO39	Bostelwiebeck 34, 29575 Altenmedingen OT Bostelwiebeck	611220	5890104	71
IO40	Bostelwiebeck 27, 29575 Altenmedingen OT Bostelwiebeck	611172	5890077	71
IO41	Bostelwiebeck 28, 29575 Altenmedingen OT Bostelwiebeck	611173	5890035	71
IO42	Bostelwiebeck 7, 29575 Altenmedingen OT Bostelwiebeck	611203	5889985	71
IO43	Bostelwiebeck 3, 29575 Altenmedingen OT Bostelwiebeck	611185	5889938	71
IO44	Bostelwiebeck 4, 29575 Altenmedingen OT Bostelwiebeck	611228	5889910	71
IO45	Bostelwiebeck 8, 29575 Altenmedingen OT Bostelwiebeck	611277	5889950	71
IO46	Bostelwiebeck 12, 29575 Altenmedingen OT Bostelwiebeck	611413	5889973	71
IO47	Bostelwiebeck 13, 29575 Altenmedingen OT Bostelwiebeck	611442	5889986	71
IO48	Bostelwiebeck 14, 29575 Altenmedingen OT Bostelwiebeck	611465	5889960	71
IO49	In den Wiesen 6b, 29575 Altenmedingen OT Eddelstorf	608323	5889288	60
IO50	In den Wiesen 6a, 29575 Altenmedingen OT Eddelstorf	608330	5889303	60
IO51	In den Wiesen 4, 29575 Altenmedingen OT Eddelstorf	608270	5889354	60
IO52	In den Wiesen 1, 29575 Altenmedingen OT Eddelstorf	608250	5889401	60
IO53	In den Wiesen 2, 29575 Altenmedingen OT Eddelstorf	608134	5889389	61
IO54	Alte Dorfstr. 2, 29575 Altenmedingen OT Eddelstorf	608137	5889473	60
IO55	In den Wiesen 1a, 29575 Altenmedingen OT Eddelstorf	608261	5889477	60
IO56	In den Wiesen 5, 29575 Altenmedingen OT Eddelstorf	608225	5889548	61
IO57	Alte Dorfstr. 4, 29575 Altenmedingen OT Eddelstorf	608182	5889548	60
IO58	Alte Dorfstr. 1, 29575 Altenmedingen OT Eddelstorf	608116	5889568	60
IO59	In den Wiesen 5, 29575 Altenmedingen OT Eddelstorf	608226	5889546	61
IO60	In den Wiesen 7a, 29575 Altenmedingen OT Eddelstorf	608242	5889585	61
IO61	In den Wiesen 7b, 29575 Altenmedingen OT Eddelstorf	608234	5889577	61
IO62	In den Wiesen 9a, 29575 Altenmedingen OT Eddelstorf	608235	5889605	61
IO63	In den Wiesen 9b, 29575 Altenmedingen OT Eddelstorf	608229	5889597	61
IO64	In den Wiesen 11, 29575 Altenmedingen OT Eddelstorf	608221	5889628	61
IO65	Alte Dorfstr. 6, 29575 Altenmedingen OT Eddelstorf	608197	5889592	60
IO66	Alte Dorfstr. 3, 29575 Altenmedingen OT Eddelstorf	608141	5889633	61
IO67	In den Wiesen 10, 29575 Altenmedingen OT Eddelstorf	608278	5889641	61
IO68	Immenweg 3, 29575 Altenmedingen OT Eddelstorf	608251	5889707	62
IO69	Immenweg 1, 29575 Altenmedingen OT Eddelstorf	608225	5889685	61
IO70	Alte Dorfstr. 5, 29575 Altenmedingen OT Eddelstorf	608166	5889671	61
IO71	Zum Sportplatz 1, 29575 Altenmedingen OT Eddelstorf	608146	5889751	62
IO72	Alte Dorfstr. 8, 29575 Altenmedingen OT Eddelstorf	608199	5889736	62
IO73	Alte Dorfstr. 7, 29575 Altenmedingen OT Eddelstorf	608183	5889768	62
IO74	Alte Dorfstr. 10, 29575 Altenmedingen OT Eddelstorf	608209	5889773	62
IO75	Alte Dorfstr. 7a, 29575 Altenmedingen OT Eddelstorf	608168	5889795	62
IO76	Alte Dorfstr. 9, 29575 Altenmedingen OT Eddelstorf	608198	5889813	62
IO77	Alte Dorfstr. 12, 29575 Altenmedingen OT Eddelstorf	608226	5889818	62
IO78	Alte Dorfstr. 11, 29575 Altenmedingen OT Eddelstorf	608207	5889839	63

Nr.	Bezeichnung	Koordinaten UTM ETRS 89 Zone 32 Ost	Koordinaten UTM ETRS 89 Zone 32 Nord	Höhe über NN [m]
IO79	Zum Sportplatz 5, 29575 Altenmedingen OT Eddelstorf	608158	5889872	63
IO80	Vorwerker Str. 4, 29575 Altenmedingen OT Eddelstorf	608274	5889810	62
IO81	Vorwerker Str. 7, 29575 Altenmedingen OT Eddelstorf	608363	5889825	62
IO82	Vorwerker Str. 5, 29575 Altenmedingen OT Eddelstorf	608326	5889830	63
IO83	Vorwerker Str. 3, 29575 Altenmedingen OT Eddelstorf	608287	5889848	63
IO84	Vorwerker Str. 1, 29575 Altenmedingen OT Eddelstorf	608238	5889871	63
IO85	Zum Sportplatz 2, 29575 Altenmedingen OT Eddelstorf	608183	5889897	63
IO86	Zum Sportplatz 4, 29575 Altenmedingen OT Eddelstorf	608156	5889908	63
IO87	Zum Sportplatz 6, 29575 Altenmedingen OT Eddelstorf	608120	5889927	62
IO88	Zum Sportplatz 8, 29575 Altenmedingen OT Eddelstorf	608106	5889958	61
IO89	Zum Sportplatz 7, 29575 Altenmedingen OT Eddelstorf	608068	5889945	61
IO90	Zum Sportplatz 9, 29575 Altenmedingen OT Eddelstorf	608052	5889964	61
IO91	Zum Sportplatz 10, 29575 Altenmedingen OT Eddelstorf	608073	5889982	60
IO92	Zum Sportplatz 12, 29575 Altenmedingen OT Eddelstorf	608062	5889996	60
IO93	Zum Sportplatz 12a, 29575 Altenmedingen OT Eddelstorf	608074	5890007	61
IO94	Zum Sportplatz 14, 29575 Altenmedingen OT Eddelstorf	608044	5890028	61
IO95	Zum Sportplatz 11, 29575 Altenmedingen OT Eddelstorf	608004	5890015	60
IO96	Zum Sportplatz 13, 29575 Altenmedingen OT Eddelstorf	607992	5890041	60
IO97	Am Sportplatz 16, 29575 Altenmedingen OT Eddelstorf	608016	5890066	61
IO98	Am Kleukerberg 1, 29575 Altenmedingen OT Eddelstorf	608022	5890074	61
IO99	Am Kleukerberg 2, 29575 Altenmedingen OT Eddelstorf	608057	5890058	62
IO100	Am Kleukerberg 3, 29575 Altenmedingen OT Eddelstorf	608042	5890097	62
IO101	Am Kleukerberg 4b, 29575 Altenmedingen OT Eddelstorf	608074	5890070	62
IO102	Am Kleukerberg 4, 29575 Altenmedingen OT Eddelstorf	608083	5890080	62
IO103	Am Kleukerberg 5, 29575 Altenmedingen OT Eddelstorf	608048	5890102	62
IO104	Am Kleukerberg 6, 29575 Altenmedingen OT Eddelstorf	608087	5890103	62
IO105	Am Kleukerberg 8, 29575 Altenmedingen OT Eddelstorf	608094	5890116	62
IO106	Am Kleukerberg 7, 29575 Altenmedingen OT Eddelstorf	608071	5890131	63
IO107	Am Kleukerberg 10, 29575 Altenmedingen OT Eddelstorf	608107	5890132	63
IO108	Am Kleukerberg 9, 29575 Altenmedingen OT Eddelstorf	608091	5890154	63
IO109	Am Kleukerberg 11, 29575 Altenmedingen OT Eddelstorf	608096	5890161	63
IO110	Am Kleukerberg 13, 29575 Altenmedingen OT Eddelstorf	608114	5890183	64
IO111	Am Kleukerberg 15, 29575 Altenmedingen OT Eddelstorf	608119	5890189	64
IO112	Am Kleukerberg 17, 29575 Altenmedingen OT Eddelstorf	608135	5890218	64
IO113	Alte Salzstr. 11, 29575 Altenmedingen OT Eddelstorf	608115	5890290	65
IO114	Alte Salzstr. 12, 29575 Altenmedingen OT Eddelstorf	608164	5890300	65
IO115	Alte Salzstr. 9, 29575 Altenmedingen OT Eddelstorf	608120	5890267	65
IO116	Alte Salzstr. 7, 29575 Altenmedingen OT Eddelstorf	608153	5890171	64
IO117	Alte Salzstr. 6, 29575 Altenmedingen OT Eddelstorf	608180	5890191	64
IO118	Alte Salzstr. 4, 29575 Altenmedingen OT Eddelstorf	608200	5890166	64
IO119	Alte Salzstr. 2, 29575 Altenmedingen OT Eddelstorf	608201	5890133	64
IO120	Alte Salzstr. 5, 29575 Altenmedingen OT Eddelstorf	608157	5890119	63
IO121	Alte Salzstr. 3, 29575 Altenmedingen OT Eddelstorf	608194	5890032	62
IO122	Alte Salzstr. 1, 29575 Altenmedingen OT Eddelstorf	608197	5889998	62
IO123	Alte Dorfstr. 13, 29575 Altenmedingen OT Eddelstorf	608200	5889944	63

Nr.	Bezeichnung	Koordinaten UTM ETRS 89 Zone 32 Ost	Koordinaten UTM ETRS 89 Zone 32 Nord	Höhe über NN [m]
IO124	Alte Dorfstr. 15, 29575 Altenmedingen OT Eddelstorf	608199	5889964	62
IO125	Alte Dorfstr. 14, 29575 Altenmedingen OT Eddelstorf	608250	5890003	62
IO126	Alte Dorfstr. 16, 29575 Altenmedingen OT Eddelstorf	608261	5890049	63
IO127	Alte Dorfstr. 17, 29575 Altenmedingen OT Eddelstorf	608234	5890086	63
IO128	Alte Dorfstr. 18, 29575 Altenmedingen OT Eddelstorf	608269	5890080	63
IO129	Alte Dorfstr. 19, 29575 Altenmedingen OT Eddelstorf	608241	5890125	64
IO130	Alte Dorfstr. 20, 29575 Altenmedingen OT Eddelstorf	608280	5890133	64
IO131	Alte Dorfstr. 21, 29575 Altenmedingen OT Eddelstorf	608247	5890158	64
IO132	Alte Dorfstr. 22, 29575 Altenmedingen OT Eddelstorf	608289	5890156	64
IO133	Alte Dorfstr. 23, 29575 Altenmedingen OT Eddelstorf	608256	5890190	64
IO134	Alte Dorfstr. 23a, 29575 Altenmedingen OT Eddelstorf	608221	5890190	64
IO135	Alte Dorfstr. 24, 29575 Altenmedingen OT Eddelstorf	608304	5890184	65
IO136	Am Berg 3, 29575 Altenmedingen OT Eddelstorf	608313	5890096	63
IO137	Am Berg 6, 29575 Altenmedingen OT Eddelstorf	608352	5890079	64
IO138	Am Berg 4, 29575 Altenmedingen OT Eddelstorf	608330	5890054	64
IO139	Am Berg 2a, 29575 Altenmedingen OT Eddelstorf	608311	5890064	63
IO140	Am Berg 2, 29575 Altenmedingen OT Eddelstorf	608295	5890073	63
IO141	Am Berg 18, 29575 Altenmedingen OT Eddelstorf	608269	5890080	63
IO142	Boomstück 15, 29575 Altenmedingen OT Eddelstorf	608301	5890037	63
IO143	Boomstück 22, 29575 Altenmedingen OT Eddelstorf	608328	5890028	64
IO144	Boomstück 20, 29575 Altenmedingen OT Eddelstorf	608323	5889999	63
IO145	Boomstück 13, 29575 Altenmedingen OT Eddelstorf	608275	5889998	63
IO146	Boomstück 11, 29575 Altenmedingen OT Eddelstorf	608271	5889976	63
IO147	Boomstück 16, 29575 Altenmedingen OT Eddelstorf	608303	5889959	63
IO148	Boomstück 14, 29575 Altenmedingen OT Eddelstorf	608329	5889960	63
IO149	Boomstück 12, 29575 Altenmedingen OT Eddelstorf	608349	5889948	62
IO150	Boomstück 7, 29575 Altenmedingen OT Eddelstorf	608332	5889901	63
IO151	Boomstück 10, 29575 Altenmedingen OT Eddelstorf	608363	5889930	62
IO152	Boomstück 8, 29575 Altenmedingen OT Eddelstorf	608380	5889917	62
IO153	Boomstück 5, 29575 Altenmedingen OT Eddelstorf	608344	5889882	62
IO154	Boomstück 3, 29575 Altenmedingen OT Eddelstorf	608369	5889880	62
IO155	Boomstück 6, 29575 Altenmedingen OT Eddelstorf	608401	5889908	61
IO156	Boomstück 4, 29575 Altenmedingen OT Eddelstorf	608420	5889906	61
IO157	Boomstück 2, 29575 Altenmedingen OT Eddelstorf	608449	5889886	61
IO158	Boomstück 1, 29575 Altenmedingen OT Eddelstorf	608403	5889860	61
IO159	Zur Mühle 2, 29575 Altenmedingen OT Eddelstorf	608985	5889879	72
IO160	Zur Mühle 4, 29575 Altenmedingen OT Eddelstorf	609038	5889885	73
IO161	Zur Mühle 1, 29575 Altenmedingen OT Eddelstorf	609008	5889941	73
IO162	Zum Uhlenbusch 2, 29575 Altenmedingen	608631	5891636	73

Tabelle 5.1: Immissionsorte

6 Rechenergebnisse und Beurteilungen

In den nachfolgenden Tabellen ist das Ergebnis der Analyse für die Vor-, Zusatz- und Gesamtbelastung der im Einwirkungsbereich befindlichen Immissionsorte dargestellt. Überschreitungen der Grenzwerte sind **fett** gekennzeichnet. Im Anhang befinden sich die Ausdrücke der Berechnung der Vor-, Zusatz- und Gesamtbelastung. Die Angabe zu der meteorologisch wahrscheinlichen Beschattungsdauer ist für die Genehmigung eines Vorhabens nicht relevant, kann jedoch Betreibern, Betroffenen und Behörden einen Eindruck über die zu erwartende tatsächliche Schattenwurfbelastung an den Immissionsorten geben. Hierzu wurden die Sonnenscheinwahrscheinlichkeit der Wetterstation Hamburg / Sasel [4] und eine repräsentative Windverteilung vom Kunden [7] herangezogen.

6.1 Vorbelastung

Vorbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO1	Katenweg 6, 21368 Dahlenburg (Gienau)	51:44	157	0:28	7:12
IO2	Katenweg 4, 21368 Dahlenburg (Gienau)	49:05	155	0:28	6:43
IO3	Katenweg 3, 21368 Dahlenburg (Gienau)	47:33	159	0:27	6:46
IO4	Wiebecker Str. 2, 21368 Dahlenburg (Gienau)	41:48	156	0:26	5:57
IO5	Wiebecker Str. 4, 21368 Dahlenburg (Gienau)	40:00	149	0:26	5:55
IO6	An der Alten Schule 4, 21368 Dahlenburg (Gienau)	41:30	140	0:27	6:27
IO7	An der Alten Schule 1, 21368 Dahlenburg (Gienau)	37:46	129	0:27	6:06
IO8	Wiebecker Str. 8, 21368 Dahlenburg (Gienau)	35:17	124	0:27	5:49
IO9	Wiebecker Str. 10, 21368 Dahlenburg (Gienau)	35:32	123	0:27	5:55
IO10	Wiebecker Str. 9, 21368 Dahlenburg (Gienau)	32:53	120	0:26	5:36
IO11	Wiebecker Str. 7, 21368 Dahlenburg (Gienau)	32:10	118	0:25	5:23
IO12	Wiebecker Str. 17, 21368 Dahlenburg (Gienau)	30:18	113	0:25	5:09
IO13	An der Ziegelei 15, 21368 Dahlenburg (Gienau) - un- bebaut	25:45	105	0:24	4:28
IO14	An der Ziegelei 13, 21368 Dahlenburg (Gienau)	25:05	105	0:24	4:25
IO15	An der Ziegelei 6, 21368 Dahlenburg (Gienau)	23:12	102	0:23	4:03
IO16	An der Ziegelei 12, 21368 Dahlenburg (Gienau)	26:56	107	0:24	4:36
IO17	An der Ziegelei 11, 21368 Dahlenburg (Gienau)	30:54	115	0:25	5:11
IO18	An der Ziegelei 9, 21368 Dahlenburg (Gienau)	31:02	116	0:25	5:10
IO19	An der Ziegelei 7, 21368 Dahlenburg (Gienau)	31:34	118	0:25	5:14
IO20	Wiebecker Str. 5, 21368 Dahlenburg (Gienau)	34:06	127	0:26	5:24
IO21	An der Ziegelei 14, 21368 Dahlenburg (Gienau)	29:32	115	0:24	4:54
IO22	Mittelstr. 8, 21368 Dahlenburg (Gienau)	30:14	122	0:24	4:44
IO23	Mittelstr. 6, 21368 Dahlenburg (Gienau)	29:51	123	0:24	4:34
IO24	Bostelwiebeck 1, 29575 Altenmedingen OT Bostel- wiebeck	38:29	118	0:25	9:26
IO25	Bostelwiebeck 2, 29575 Altenmedingen OT Bostel- wiebeck	38:06	121	0:24	9:19
IO26	Bostelwiebeck 26, 29575 Altenmedingen OT Bostel- wiebeck	44:48	132	0:28	11:01

Vorbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage / Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO27	Bostelwiebeck 24, 29575 Altenmedingen OT Bostelwiebeck	<u>66:05</u>	146	<u>0:43</u>	<u>16:17</u>
IO28	Bostelwiebeck 22, 29575 Altenmedingen OT Bostelwiebeck	<u>80:26</u>	151	<u>0:50</u>	<u>19:51</u>
IO29	Bostelwiebeck 23, 29575 Altenmedingen OT Bostelwiebeck	<u>84:39</u>	155	<u>0:53</u>	<u>20:54</u>
IO30	Bostelwiebeck 21, 29575 Altenmedingen OT Bostelwiebeck	<u>81:27</u>	155	<u>0:50</u>	<u>20:08</u>
IO31	Bostelwiebeck 20, 29575 Altenmedingen OT Bostelwiebeck	<u>80:29</u>	153	<u>0:49</u>	<u>19:54</u>
IO32	Bostelwiebeck 19, 29575 Altenmedingen OT Bostelwiebeck	<u>79:29</u>	153	<u>0:49</u>	<u>19:39</u>
IO33	Bostelwiebeck 18, 29575 Altenmedingen OT Bostelwiebeck	<u>75:21</u>	156	<u>0:50</u>	<u>18:43</u>
IO34	Bostelwiebeck 17, 29575 Altenmedingen OT Bostelwiebeck	<u>65:42</u>	147	<u>0:44</u>	<u>16:10</u>
IO35	Bostelwiebeck 16, 29575 Altenmedingen OT Bostelwiebeck	<u>55:38</u>	148	<u>0:36</u>	<u>13:48</u>
IO36	Bostelwiebeck 15, 29575 Altenmedingen OT Bostelwiebeck	<u>50:22</u>	152	<u>0:35</u>	<u>12:34</u>
IO37	Bostelwiebeck 32, 29575 Altenmedingen OT Bostelwiebeck	<u>55:08</u>	140	<u>0:39</u>	<u>13:34</u>
IO38	Bostelwiebeck 31, 29575 Altenmedingen OT Bostelwiebeck	<u>49:41</u>	137	<u>0:33</u>	<u>12:14</u>
IO39	Bostelwiebeck 34, 29575 Altenmedingen OT Bostelwiebeck	<u>55:58</u>	141	<u>0:36</u>	<u>13:48</u>
IO40	Bostelwiebeck 27, 29575 Altenmedingen OT Bostelwiebeck	<u>50:49</u>	136	<u>0:34</u>	<u>12:30</u>
IO41	Bostelwiebeck 28, 29575 Altenmedingen OT Bostelwiebeck	<u>45:15</u>	134	0:30	<u>11:07</u>
IO42	Bostelwiebeck 7, 29575 Altenmedingen OT Bostelwiebeck	<u>39:20</u>	128	0:26	<u>9:38</u>
IO43	Bostelwiebeck 3, 29575 Altenmedingen OT Bostelwiebeck	<u>35:23</u>	124	0:23	<u>8:40</u>
IO44	Bostelwiebeck 4, 29575 Altenmedingen OT Bostelwiebeck	<u>34:16</u>	123	0:23	<u>8:22</u>
IO45	Bostelwiebeck 8, 29575 Altenmedingen OT Bostelwiebeck	<u>38:14</u>	126	0:26	<u>9:19</u>
IO46	Bostelwiebeck 12, 29575 Altenmedingen OT Bostelwiebeck	<u>43:57</u>	132	<u>0:31</u>	<u>10:47</u>
IO47	Bostelwiebeck 13, 29575 Altenmedingen OT Bostelwiebeck	<u>46:24</u>	135	<u>0:33</u>	<u>11:24</u>
IO48	Bostelwiebeck 14, 29575 Altenmedingen OT Bostelwiebeck	<u>43:55</u>	134	<u>0:32</u>	<u>10:46</u>
IO49	In den Wiesen 6b, 29575 Altenmedingen OT Eddelstorf	0:00	0	0:00	0:00
IO50	In den Wiesen 6a, 29575 Altenmedingen OT Eddelstorf	0:00	0	0:00	0:00
IO51	In den Wiesen 4, 29575 Altenmedingen OT Eddelstorf	8:55	35	0:19	2:22
IO52	In den Wiesen 1, 29575 Altenmedingen OT Eddelstorf	16:04	48	0:24	4:19

Vorbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO53	In den Wiesen 2, 29575 Altenmedingen OT Eddelstorf	21:30	62	0:24	5:51
IO54	Alte Dorfstr. 2, 29575 Altenmedingen OT Eddelstorf	25:19	73	0:24	6:59
IO55	In den Wiesen 1a, 29575 Altenmedingen OT Eddelstorf	22:54	61	0:26	6:14
IO56	In den Wiesen 5, 29575 Altenmedingen OT Eddelstorf	28:11	76	0:26	7:47
IO57	Alte Dorfstr. 4, 29575 Altenmedingen OT Eddelstorf	27:44	80	0:25	7:41
IO58	Alte Dorfstr. 1, 29575 Altenmedingen OT Eddelstorf	24:30	88	0:24	6:51
IO59	In den Wiesen 5, 29575 Altenmedingen OT Eddelstorf	28:10	75	0:26	7:46
IO60	In den Wiesen 7a, 29575 Altenmedingen OT Eddelstorf	29:13	80	0:27	8:06
IO61	In den Wiesen 7b, 29575 Altenmedingen OT Eddelstorf	28:45	79	0:26	7:58
IO62	In den Wiesen 9a, 29575 Altenmedingen OT Eddelstorf	30:08	83	0:27	8:22
IO63	In den Wiesen 9b, 29575 Altenmedingen OT Eddelstorf	29:38	82	0:26	8:13
IO64	In den Wiesen 11, 29575 Altenmedingen OT Eddelstorf	28:13	88	0:26	7:53
IO65	Alte Dorfstr. 6, 29575 Altenmedingen OT Eddelstorf	28:38	84	0:26	7:58
IO66	Alte Dorfstr. 3, 29575 Altenmedingen OT Eddelstorf	26:27	94	0:25	7:26
IO67	In den Wiesen 10, 29575 Altenmedingen OT Eddelstorf	31:49	85	0:28	8:51
IO68	Immenweg 3, 29575 Altenmedingen OT Eddelstorf	29:44	96	0:27	8:22
IO69	Immenweg 1, 29575 Altenmedingen OT Eddelstorf	28:33	96	0:27	8:02
IO70	Alte Dorfstr. 5, 29575 Altenmedingen OT Eddelstorf	27:55	98	0:25	7:51
IO71	Zum Sportplatz 1, 29575 Altenmedingen OT Eddelstorf	31:38	105	0:25	8:54
IO72	Alte Dorfstr. 8, 29575 Altenmedingen OT Eddelstorf	30:47	102	0:26	8:40
IO73	Alte Dorfstr. 7, 29575 Altenmedingen OT Eddelstorf	32:18	105	0:26	9:06
IO74	Alte Dorfstr. 10, 29575 Altenmedingen OT Eddelstorf	32:30	103	0:27	9:09
IO75	Alte Dorfstr. 7a, 29575 Altenmedingen OT Eddelstorf	33:27	107	0:26	9:25
IO76	Alte Dorfstr. 9, 29575 Altenmedingen OT Eddelstorf	34:04	107	0:27	9:35
IO77	Alte Dorfstr. 12, 29575 Altenmedingen OT Eddelstorf	34:23	108	0:27	9:41
IO78	Alte Dorfstr. 11, 29575 Altenmedingen OT Eddelstorf	35:17	110	0:27	9:55
IO79	Zum Sportplatz 5, 29575 Altenmedingen OT Eddelstorf	36:29	114	0:26	10:12
IO80	Vorwerker Str. 4, 29575 Altenmedingen OT Eddelstorf	33:48	106	0:28	9:32
IO81	Vorwerker Str. 7, 29575 Altenmedingen OT Eddelstorf	34:41	105	0:30	9:49
IO82	Vorwerker Str. 5, 29575 Altenmedingen OT Eddelstorf	34:30	105	0:29	9:45

Vorbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO83	Vorwerker Str. 3, 29575 Altenmedingen OT Eddelstorf	<u>35:54</u>	108	0:28	<u>10:06</u>
IO84	Vorwerker Str. 1, 29575 Altenmedingen OT Eddelstorf	<u>37:04</u>	112	0:28	<u>10:24</u>
IO85	Zum Sportplatz 2, 29575 Altenmedingen OT Eddelstorf	<u>37:43</u>	115	0:27	<u>10:31</u>
IO86	Zum Sportplatz 4, 29575 Altenmedingen OT Eddelstorf	<u>37:02</u>	117	0:26	<u>10:19</u>
IO87	Zum Sportplatz 6, 29575 Altenmedingen OT Eddelstorf	<u>34:08</u>	120	0:25	<u>9:30</u>
IO88	Zum Sportplatz 8, 29575 Altenmedingen OT Eddelstorf	<u>31:59</u>	123	0:25	<u>8:55</u>
IO89	Zum Sportplatz 7, 29575 Altenmedingen OT Eddelstorf	<u>30:51</u>	122	0:25	<u>8:36</u>
IO90	Zum Sportplatz 9, 29575 Altenmedingen OT Eddelstorf	<u>31:39</u>	123	0:24	<u>8:49</u>
IO91	Zum Sportplatz 10, 29575 Altenmedingen OT Eddelstorf	<u>32:17</u>	122	0:25	<u>9:00</u>
IO92	Zum Sportplatz 12, 29575 Altenmedingen OT Eddelstorf	<u>32:59</u>	122	0:25	<u>9:12</u>
IO93	Zum Sportplatz 12a, 29575 Altenmedingen OT Eddelstorf	<u>33:35</u>	124	0:25	<u>9:21</u>
IO94	Zum Sportplatz 14, 29575 Altenmedingen OT Eddelstorf	<u>34:18</u>	126	0:24	<u>9:32</u>
IO95	Zum Sportplatz 11, 29575 Altenmedingen OT Eddelstorf	<u>34:02</u>	123	0:24	<u>9:28</u>
IO96	Zum Sportplatz 13, 29575 Altenmedingen OT Eddelstorf	<u>35:52</u>	125	0:23	<u>9:57</u>
IO97	Am Sportplatz 16, 29575 Altenmedingen OT Eddelstorf	<u>37:09</u>	125	0:24	<u>10:18</u>
IO98	Am Kleukerberg 1, 29575 Altenmedingen OT Eddelstorf	<u>37:36</u>	129	0:24	<u>10:25</u>
IO99	Am Kleukerberg 2, 29575 Altenmedingen OT Eddelstorf	<u>36:03</u>	127	0:25	<u>10:00</u>
IO100	Am Kleukerberg 3, 29575 Altenmedingen OT Eddelstorf	<u>39:03</u>	129	0:25	<u>10:49</u>
IO101	Am Kleukerberg 4b, 29575 Altenmedingen OT Eddelstorf	<u>36:32</u>	127	0:25	<u>10:08</u>
IO102	Am Kleukerberg 4, 29575 Altenmedingen OT Eddelstorf	<u>37:09</u>	126	0:25	<u>10:18</u>
IO103	Am Kleukerberg 5, 29575 Altenmedingen OT Eddelstorf	<u>39:09</u>	129	0:24	<u>10:50</u>
IO104	Am Kleukerberg 6, 29575 Altenmedingen OT Eddelstorf	<u>38:45</u>	128	0:25	<u>10:44</u>
IO105	Am Kleukerberg 8, 29575 Altenmedingen OT Eddelstorf	<u>39:33</u>	129	0:25	<u>10:57</u>
IO106	Am Kleukerberg 7, 29575 Altenmedingen OT Eddelstorf	<u>40:34</u>	130	0:25	<u>11:12</u>
IO107	Am Kleukerberg 10, 29575 Altenmedingen OT Eddelstorf	<u>40:29</u>	128	0:26	<u>11:12</u>
IO108	Am Kleukerberg 9, 29575 Altenmedingen OT Eddelstorf	<u>42:06</u>	132	0:26	<u>11:37</u>

Vorbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO109	Am Kleukerberg 11, 29575 Altenmedingen OT Eddelstorf	<u>42:26</u>	133	0:27	<u>11:42</u>
IO110	Am Kleukerberg 13, 29575 Altenmedingen OT Eddelstorf	<u>43:37</u>	134	0:27	<u>12:00</u>
IO111	Am Kleukerberg 15, 29575 Altenmedingen OT Eddelstorf	<u>44:02</u>	135	0:28	<u>12:06</u>
IO112	Am Kleukerberg 17, 29575 Altenmedingen OT Eddelstorf	<u>45:43</u>	136	0:28	<u>12:30</u>
IO113	Alte Salzstr. 11, 29575 Altenmedingen OT Eddelstorf	<u>50:35</u>	145	0:30	<u>13:35</u>
IO114	Alte Salzstr. 12, 29575 Altenmedingen OT Eddelstorf	<u>51:39</u>	143	<u>0:31</u>	<u>13:52</u>
IO115	Alte Salzstr. 9, 29575 Altenmedingen OT Eddelstorf	<u>49:14</u>	142	0:30	<u>13:17</u>
IO116	Alte Salzstr. 7, 29575 Altenmedingen OT Eddelstorf	<u>42:51</u>	132	0:27	<u>11:49</u>
IO117	Alte Salzstr. 6, 29575 Altenmedingen OT Eddelstorf	<u>43:58</u>	133	0:28	<u>12:06</u>
IO118	Alte Salzstr. 4, 29575 Altenmedingen OT Eddelstorf	<u>41:57</u>	132	0:28	<u>11:35</u>
IO119	Alte Salzstr. 2, 29575 Altenmedingen OT Eddelstorf	<u>39:57</u>	128	0:27	<u>11:03</u>
IO120	Alte Salzstr. 5, 29575 Altenmedingen OT Eddelstorf	<u>39:08</u>	128	0:27	<u>10:50</u>
IO121	Alte Salzstr. 3, 29575 Altenmedingen OT Eddelstorf	<u>35:55</u>	127	0:27	<u>10:01</u>
IO122	Alte Salzstr. 1, 29575 Altenmedingen OT Eddelstorf	<u>37:25</u>	123	0:27	<u>10:25</u>
IO123	Alte Dorfstr. 13, 29575 Altenmedingen OT Eddelstorf	<u>39:17</u>	120	0:27	<u>10:55</u>
IO124	Alte Dorfstr. 15, 29575 Altenmedingen OT Eddelstorf	<u>38:52</u>	120	0:27	<u>10:48</u>
IO125	Alte Dorfstr. 14, 29575 Altenmedingen OT Eddelstorf	<u>41:55</u>	123	0:28	<u>11:39</u>
IO126	Alte Dorfstr. 16, 29575 Altenmedingen OT Eddelstorf	<u>40:58</u>	128	0:29	<u>11:24</u>
IO127	Alte Dorfstr. 17, 29575 Altenmedingen OT Eddelstorf	<u>38:07</u>	128	0:28	<u>10:37</u>
IO128	Alte Dorfstr. 18, 29575 Altenmedingen OT Eddelstorf	<u>39:11</u>	130	0:28	<u>10:55</u>
IO129	Alte Dorfstr. 19, 29575 Altenmedingen OT Eddelstorf	<u>39:57</u>	128	0:28	<u>11:06</u>
IO130	Alte Dorfstr. 20, 29575 Altenmedingen OT Eddelstorf	<u>40:52</u>	130	0:29	<u>11:21</u>
IO131	Alte Dorfstr. 21, 29575 Altenmedingen OT Eddelstorf	<u>41:52</u>	131	0:28	<u>11:35</u>
IO132	Alte Dorfstr. 22, 29575 Altenmedingen OT Eddelstorf	<u>42:02</u>	131	0:29	<u>11:39</u>
IO133	Alte Dorfstr. 23, 29575 Altenmedingen OT Eddelstorf	<u>43:36</u>	132	0:29	<u>12:01</u>
IO134	Alte Dorfstr. 23a, 29575 Altenmedingen OT Eddelstorf	<u>43:25</u>	133	0:29	<u>11:58</u>
IO135	Alte Dorfstr. 24, 29575 Altenmedingen OT Eddelstorf	<u>43:43</u>	133	0:29	<u>12:05</u>
IO136	Am Berg 3, 29575 Altenmedingen OT Eddelstorf	<u>43:45</u>	130	0:30	<u>12:09</u>
IO137	Am Berg 6, 29575 Altenmedingen OT Eddelstorf	<u>47:47</u>	127	<u>0:31</u>	<u>13:15</u>
IO138	Am Berg 4, 29575 Altenmedingen OT Eddelstorf	<u>46:16</u>	126	0:30	<u>12:50</u>
IO139	Am Berg 2a, 29575 Altenmedingen OT Eddelstorf	<u>45:14</u>	127	0:30	<u>12:34</u>

Vorbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO140	Am Berg 2, 29575 Altenmedingen OT Eddelstorf	<u>43:20</u>	128	0:29	<u>12:03</u>
IO141	Am Berg 18, 29575 Altenmedingen OT Eddelstorf	<u>39:11</u>	130	0:28	<u>10:55</u>
IO142	Boomstück 15, 29575 Altenmedingen OT Eddelstorf	<u>44:35</u>	125	0:29	<u>12:23</u>
IO143	Boomstück 22, 29575 Altenmedingen OT Eddelstorf	<u>45:32</u>	122	0:30	<u>12:38</u>
IO144	Boomstück 20, 29575 Altenmedingen OT Eddelstorf	<u>44:05</u>	121	0:30	<u>12:15</u>
IO145	Boomstück 13, 29575 Altenmedingen OT Eddelstorf	<u>42:48</u>	122	0:29	<u>11:53</u>
IO146	Boomstück 11, 29575 Altenmedingen OT Eddelstorf	<u>41:53</u>	118	0:29	<u>11:38</u>
IO147	Boomstück 16, 29575 Altenmedingen OT Eddelstorf	<u>41:32</u>	117	0:29	<u>11:34</u>
IO148	Boomstück 14, 29575 Altenmedingen OT Eddelstorf	<u>41:55</u>	117	0:30	<u>11:42</u>
IO149	Boomstück 12, 29575 Altenmedingen OT Eddelstorf	<u>40:41</u>	114	0:30	<u>11:23</u>
IO150	Boomstück 7, 29575 Altenmedingen OT Eddelstorf	<u>38:02</u>	110	0:30	<u>10:41</u>
IO151	Boomstück 10, 29575 Altenmedingen OT Eddelstorf	<u>39:26</u>	113	<u>0:31</u>	<u>11:04</u>
IO152	Boomstück 8, 29575 Altenmedingen OT Eddelstorf	<u>38:52</u>	110	<u>0:31</u>	<u>10:56</u>
IO153	Boomstück 5, 29575 Altenmedingen OT Eddelstorf	<u>37:19</u>	109	0:30	<u>10:31</u>
IO154	Boomstück 3, 29575 Altenmedingen OT Eddelstorf	<u>37:07</u>	109	<u>0:31</u>	<u>10:28</u>
IO155	Boomstück 6, 29575 Altenmedingen OT Eddelstorf	<u>38:19</u>	110	<u>0:32</u>	<u>10:48</u>
IO156	Boomstück 4, 29575 Altenmedingen OT Eddelstorf	<u>38:21</u>	109	<u>0:32</u>	<u>10:50</u>
IO157	Boomstück 2, 29575 Altenmedingen OT Eddelstorf	<u>38:01</u>	107	<u>0:33</u>	<u>10:46</u>
IO158	Boomstück 1, 29575 Altenmedingen OT Eddelstorf	<u>36:16</u>	106	<u>0:31</u>	<u>10:16</u>
IO159	Zur Mühle 2, 29575 Altenmedingen OT Eddelstorf	22:41	58	0:28	6:09
IO160	Zur Mühle 4, 29575 Altenmedingen OT Eddelstorf	19:16	51	0:28	5:11
IO161	Zur Mühle 1, 29575 Altenmedingen OT Eddelstorf	<u>31:56</u>	66	<u>0:40</u>	<u>8:43</u>
IO162	Zum Uhlenbusch 2, 29575 Altenmedingen	<u>128:27</u>	175	<u>1:22</u>	<u>17:04</u>

Tabelle 6.1: Analyseergebnisse Vorbelastung

Der Grenzwert für die astronomisch maximal mögliche Schattenwurfdauer von 30 Stunden pro Jahr und/oder 30 Minuten pro Tag wird an den Immissionsorten IO1 – IO12, IO17 – IO20, IO22, IO24 – IO48, IO62, IO67, IO71 – IO158, IO161 und IO162 überschritten oder ausgeschöpft.

6.2 Zusatzbelastung

Zusatzbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO1	Katenweg 6, 21368 Dahlenburg (Gienau)	9:58	38	0:20	0:55
IO2	Katenweg 4, 21368 Dahlenburg (Gienau)	8:40	34	0:19	0:48
IO3	Katenweg 3, 21368 Dahlenburg (Gienau)	12:17	42	0:21	1:09

Zusatzbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO4	Wiebecker Str. 2, 21368 Dahlenburg (Gienau)	12:01	42	0:21	1:08
IO5	Wiebecker Str. 4, 21368 Dahlenburg (Gienau)	13:53	46	0:22	1:19
IO6	An der Alten Schule 4, 21368 Dahlenburg (Gienau)	17:14	52	0:23	1:41
IO7	An der Alten Schule 1, 21368 Dahlenburg (Gienau)	19:22	58	0:23	1:56
IO8	Wiebecker Str. 8, 21368 Dahlenburg (Gienau)	19:48	62	0:22	2:02
IO9	Wiebecker Str. 10, 21368 Dahlenburg (Gienau)	19:55	66	0:23	2:04
IO10	Wiebecker Str. 9, 21368 Dahlenburg (Gienau)	17:34	70	0:22	1:53
IO11	Wiebecker Str. 7, 21368 Dahlenburg (Gienau)	18:14	66	0:22	1:55
IO12	Wiebecker Str. 17, 21368 Dahlenburg (Gienau)	15:46	70	0:22	1:43
IO13	An der Ziegelei 15, 21368 Dahlenburg (Gienau) - un bebaut	11:10	48	0:21	1:17
IO14	An der Ziegelei 13, 21368 Dahlenburg (Gienau)	10:30	46	0:21	1:13
IO15	An der Ziegelei 6, 21368 Dahlenburg (Gienau)	0:00	0	0:00	0:00
IO16	An der Ziegelei 12, 21368 Dahlenburg (Gienau)	12:29	57	0:21	1:24
IO17	An der Ziegelei 11, 21368 Dahlenburg (Gienau)	17:04	66	0:22	1:48
IO18	An der Ziegelei 9, 21368 Dahlenburg (Gienau)	17:44	66	0:22	1:52
IO19	An der Ziegelei 7, 21368 Dahlenburg (Gienau)	18:10	64	0:22	1:53
IO20	Wiebecker Str. 5, 21368 Dahlenburg (Gienau)	17:42	56	0:22	1:45
IO21	An der Ziegelei 14, 21368 Dahlenburg (Gienau)	16:51	64	0:21	1:46
IO22	Mittelstr. 8, 21368 Dahlenburg (Gienau)	16:28	54	0:21	1:38
IO23	Mittelstr. 6, 21368 Dahlenburg (Gienau)	0:00	0	0:00	0:00
IO24	Bostelwiebeck 1, 29575 Altenmedingen OT Bostel wiebeck	<u>69:36</u>	158	<u>0:37</u>	<u>16:55</u>
IO25	Bostelwiebeck 2, 29575 Altenmedingen OT Bostel wiebeck	<u>58:43</u>	142	<u>0:35</u>	<u>14:15</u>
IO26	Bostelwiebeck 26, 29575 Altenmedingen OT Bostel wiebeck	<u>53:15</u>	128	<u>0:35</u>	<u>12:39</u>
IO27	Bostelwiebeck 24, 29575 Altenmedingen OT Bostel wiebeck	<u>48:09</u>	120	<u>0:34</u>	<u>10:58</u>
IO28	Bostelwiebeck 22, 29575 Altenmedingen OT Bostel wiebeck	<u>47:15</u>	119	<u>0:34</u>	<u>10:34</u>
IO29	Bostelwiebeck 23, 29575 Altenmedingen OT Bostel wiebeck	<u>50:04</u>	123	<u>0:35</u>	<u>11:06</u>
IO30	Bostelwiebeck 21, 29575 Altenmedingen OT Bostel wiebeck	<u>44:41</u>	116	<u>0:33</u>	<u>9:54</u>
IO31	Bostelwiebeck 20, 29575 Altenmedingen OT Bostel wiebeck	<u>44:15</u>	115	<u>0:33</u>	<u>9:50</u>
IO32	Bostelwiebeck 19, 29575 Altenmedingen OT Bostel wiebeck	<u>43:47</u>	114	<u>0:33</u>	<u>9:45</u>
IO33	Bostelwiebeck 18, 29575 Altenmedingen OT Bostel wiebeck	<u>41:21</u>	109	<u>0:32</u>	<u>9:08</u>
IO34	Bostelwiebeck 17, 29575 Altenmedingen OT Bostel wiebeck	<u>43:05</u>	116	<u>0:32</u>	<u>9:49</u>
IO35	Bostelwiebeck 16, 29575 Altenmedingen OT Bostel wiebeck	<u>34:32</u>	102	0:29	7:48
IO36	Bostelwiebeck 15, 29575 Altenmedingen OT Bostel wiebeck	<u>31:35</u>	98	0:27	7:06

Zusatzbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO37	Bostelwiebeck 32, 29575 Altenmedingen OT Bostelwiebeck	<u>39:33</u>	110	0:30	<u>9:11</u>
IO38	Bostelwiebeck 31, 29575 Altenmedingen OT Bostelwiebeck	<u>42:24</u>	113	<u>0:31</u>	<u>9:57</u>
IO39	Bostelwiebeck 34, 29575 Altenmedingen OT Bostelwiebeck	<u>43:52</u>	116	<u>0:32</u>	<u>10:08</u>
IO40	Bostelwiebeck 27, 29575 Altenmedingen OT Bostelwiebeck	<u>48:21</u>	122	<u>0:34</u>	<u>11:21</u>
IO41	Bostelwiebeck 28, 29575 Altenmedingen OT Bostelwiebeck	<u>49:14</u>	125	<u>0:33</u>	<u>11:42</u>
IO42	Bostelwiebeck 7, 29575 Altenmedingen OT Bostelwiebeck	<u>48:15</u>	123	<u>0:33</u>	<u>11:33</u>
IO43	Bostelwiebeck 3, 29575 Altenmedingen OT Bostelwiebeck	<u>51:30</u>	132	<u>0:33</u>	<u>12:29</u>
IO44	Bostelwiebeck 4, 29575 Altenmedingen OT Bostelwiebeck	<u>48:25</u>	128	<u>0:32</u>	<u>11:48</u>
IO45	Bostelwiebeck 8, 29575 Altenmedingen OT Bostelwiebeck	<u>42:52</u>	116	0:30	<u>10:20</u>
IO46	Bostelwiebeck 12, 29575 Altenmedingen OT Bostelwiebeck	<u>34:05</u>	105	0:28	<u>8:07</u>
IO47	Bostelwiebeck 13, 29575 Altenmedingen OT Bostelwiebeck	<u>32:35</u>	102	0:27	7:43
IO48	Bostelwiebeck 14, 29575 Altenmedingen OT Bostelwiebeck	<u>31:45</u>	100	0:27	7:34
IO49	In den Wiesen 6b, 29575 Altenmedingen OT Eddelstorf	<u>37:02</u>	94	<u>0:38</u>	<u>10:23</u>
IO50	In den Wiesen 6a, 29575 Altenmedingen OT Eddelstorf	<u>36:52</u>	95	<u>0:39</u>	<u>10:22</u>
IO51	In den Wiesen 4, 29575 Altenmedingen OT Eddelstorf	22:24	75	0:25	6:20
IO52	In den Wiesen 1, 29575 Altenmedingen OT Eddelstorf	20:50	70	0:25	5:51
IO53	In den Wiesen 2, 29575 Altenmedingen OT Eddelstorf	17:26	63	0:23	4:52
IO54	Alte Dorfstr. 2, 29575 Altenmedingen OT Eddelstorf	17:01	62	0:23	4:35
IO55	In den Wiesen 1a, 29575 Altenmedingen OT Eddelstorf	29:15	80	<u>0:41</u>	<u>8:12</u>
IO56	In den Wiesen 5, 29575 Altenmedingen OT Eddelstorf	26:52	78	<u>0:40</u>	7:20
IO57	Alte Dorfstr. 4, 29575 Altenmedingen OT Eddelstorf	17:40	61	0:24	4:38
IO58	Alte Dorfstr. 1, 29575 Altenmedingen OT Eddelstorf	15:57	58	0:23	4:09
IO59	In den Wiesen 5, 29575 Altenmedingen OT Eddelstorf	26:55	78	<u>0:39</u>	7:21
IO60	In den Wiesen 7a, 29575 Altenmedingen OT Eddelstorf	27:11	78	<u>0:40</u>	7:20
IO61	In den Wiesen 7b, 29575 Altenmedingen OT Eddelstorf	27:00	76	<u>0:39</u>	7:18
IO62	In den Wiesen 9a, 29575 Altenmedingen OT Eddelstorf	26:32	79	<u>0:38</u>	7:06
IO63	In den Wiesen 9b, 29575 Altenmedingen OT Eddelstorf	26:25	76	<u>0:38</u>	7:05

Zusatzbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage / Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO64	In den Wiesen 11, 29575 Altenmedingen OT Eddelstorf	25:52	76	<u>0:37</u>	6:51
IO65	Alte Dorfstr. 6, 29575 Altenmedingen OT Eddelstorf	25:24	76	<u>0:38</u>	6:48
IO66	Alte Dorfstr. 3, 29575 Altenmedingen OT Eddelstorf	16:15	58	0:23	4:09
IO67	In den Wiesen 10, 29575 Altenmedingen OT Eddelstorf	27:55	78	<u>0:39</u>	7:25
IO68	Immenweg 3, 29575 Altenmedingen OT Eddelstorf	26:26	79	<u>0:36</u>	6:49
IO69	Immenweg 1, 29575 Altenmedingen OT Eddelstorf	25:35	79	<u>0:36</u>	6:39
IO70	Alte Dorfstr. 5, 29575 Altenmedingen OT Eddelstorf	23:41	76	<u>0:34</u>	6:09
IO71	Zum Sportplatz 1, 29575 Altenmedingen OT Eddelstorf	22:31	75	0:30	5:39
IO72	Alte Dorfstr. 8, 29575 Altenmedingen OT Eddelstorf	24:15	76	<u>0:33</u>	6:09
IO73	Alte Dorfstr. 7, 29575 Altenmedingen OT Eddelstorf	23:33	75	0:30	5:54
IO74	Alte Dorfstr. 10, 29575 Altenmedingen OT Eddelstorf	24:20	77	<u>0:32</u>	6:06
IO75	Alte Dorfstr. 7a, 29575 Altenmedingen OT Eddelstorf	23:12	76	0:30	5:46
IO76	Alte Dorfstr. 9, 29575 Altenmedingen OT Eddelstorf	23:48	78	0:30	5:54
IO77	Alte Dorfstr. 12, 29575 Altenmedingen OT Eddelstorf	24:44	79	0:30	6:08
IO78	Alte Dorfstr. 11, 29575 Altenmedingen OT Eddelstorf	24:02	78	0:29	5:55
IO79	Zum Sportplatz 5, 29575 Altenmedingen OT Eddelstorf	22:10	75	0:26	5:21
IO80	Vorwerker Str. 4, 29575 Altenmedingen OT Eddelstorf	26:27	82	<u>0:33</u>	6:36
IO81	Vorwerker Str. 7, 29575 Altenmedingen OT Eddelstorf	29:54	86	<u>0:37</u>	7:28
IO82	Vorwerker Str. 5, 29575 Altenmedingen OT Eddelstorf	28:13	82	<u>0:34</u>	7:01
IO83	Vorwerker Str. 3, 29575 Altenmedingen OT Eddelstorf	26:40	81	<u>0:32</u>	6:35
IO84	Vorwerker Str. 1, 29575 Altenmedingen OT Eddelstorf	24:50	80	0:29	6:03
IO85	Zum Sportplatz 2, 29575 Altenmedingen OT Eddelstorf	22:50	76	0:25	5:27
IO86	Zum Sportplatz 4, 29575 Altenmedingen OT Eddelstorf	21:54	74	0:24	5:12
IO87	Zum Sportplatz 6, 29575 Altenmedingen OT Eddelstorf	20:52	76	0:23	4:53
IO88	Zum Sportplatz 8, 29575 Altenmedingen OT Eddelstorf	20:40	74	0:23	4:45
IO89	Zum Sportplatz 7, 29575 Altenmedingen OT Eddelstorf	13:49	52	0:23	3:01
IO90	Zum Sportplatz 9, 29575 Altenmedingen OT Eddelstorf	8:16	29	0:22	1:51
IO91	Zum Sportplatz 10, 29575 Altenmedingen OT Eddelstorf	8:28	29	0:23	1:52

Zusatzbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO92	Zum Sportplatz 12, 29575 Altenmedingen OT Eddelstorf	8:17	28	0:22	1:49
IO93	Zum Sportplatz 12a, 29575 Altenmedingen OT Eddelstorf	8:26	30	0:23	1:50
IO94	Zum Sportplatz 14, 29575 Altenmedingen OT Eddelstorf	8:06	28	0:22	1:44
IO95	Zum Sportplatz 11, 29575 Altenmedingen OT Eddelstorf	7:36	27	0:21	1:38
IO96	Zum Sportplatz 13, 29575 Altenmedingen OT Eddelstorf	7:34	27	0:21	1:36
IO97	Am Sportplatz 16, 29575 Altenmedingen OT Eddelstorf	7:49	28	0:22	1:38
IO98	Am Kleukerberg 1, 29575 Altenmedingen OT Eddelstorf	7:43	27	0:22	1:37
IO99	Am Kleukerberg 2, 29575 Altenmedingen OT Eddelstorf	8:14	29	0:22	1:44
IO100	Am Kleukerberg 3, 29575 Altenmedingen OT Eddelstorf	7:52	27	0:22	1:38
IO101	Am Kleukerberg 4b, 29575 Altenmedingen OT Eddelstorf	14:01	50	0:22	3:09
IO102	Am Kleukerberg 4, 29575 Altenmedingen OT Eddelstorf	14:12	52	0:23	3:11
IO103	Am Kleukerberg 5, 29575 Altenmedingen OT Eddelstorf	8:02	28	0:22	1:40
IO104	Am Kleukerberg 6, 29575 Altenmedingen OT Eddelstorf	14:10	52	0:23	3:09
IO105	Am Kleukerberg 8, 29575 Altenmedingen OT Eddelstorf	14:17	51	0:23	3:10
IO106	Am Kleukerberg 7, 29575 Altenmedingen OT Eddelstorf	13:52	51	0:23	3:03
IO107	Am Kleukerberg 10, 29575 Altenmedingen OT Eddelstorf	19:54	77	0:23	4:10
IO108	Am Kleukerberg 9, 29575 Altenmedingen OT Eddelstorf	13:55	52	0:22	3:02
IO109	Am Kleukerberg 11, 29575 Altenmedingen OT Eddelstorf	14:11	52	0:23	3:05
IO110	Am Kleukerberg 13, 29575 Altenmedingen OT Eddelstorf	14:23	53	0:23	3:05
IO111	Am Kleukerberg 15, 29575 Altenmedingen OT Eddelstorf	19:59	77	0:23	4:05
IO112	Am Kleukerberg 17, 29575 Altenmedingen OT Eddelstorf	20:16	77	0:23	4:04
IO113	Alte Salzstr. 11, 29575 Altenmedingen OT Eddelstorf	14:03	52	0:22	2:49
IO114	Alte Salzstr. 12, 29575 Altenmedingen OT Eddelstorf	20:47	76	0:23	3:58
IO115	Alte Salzstr. 9, 29575 Altenmedingen OT Eddelstorf	14:16	53	0:23	2:54
IO116	Alte Salzstr. 7, 29575 Altenmedingen OT Eddelstorf	20:49	78	0:23	4:17
IO117	Alte Salzstr. 6, 29575 Altenmedingen OT Eddelstorf	21:35	80	0:23	4:24
IO118	Alte Salzstr. 4, 29575 Altenmedingen OT Eddelstorf	22:17	80	0:24	4:36
IO119	Alte Salzstr. 2, 29575 Altenmedingen OT Eddelstorf	22:24	81	0:24	4:41

Zusatzbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO120	Alte Salzstr. 5, 29575 Altenmedingen OT Eddelstorf	21:19	79	0:24	4:29
IO121	Alte Salzstr. 3, 29575 Altenmedingen OT Eddelstorf	22:37	80	0:24	4:58
IO122	Alte Salzstr. 1, 29575 Altenmedingen OT Eddelstorf	22:50	79	0:24	5:08
IO123	Alte Dorfstr. 13, 29575 Altenmedingen OT Eddelstorf	23:11	78	0:25	5:24
IO124	Alte Dorfstr. 15, 29575 Altenmedingen OT Eddelstorf	23:00	78	0:24	5:17
IO125	Alte Dorfstr. 14, 29575 Altenmedingen OT Eddelstorf	24:27	81	0:25	5:30
IO126	Alte Dorfstr. 16, 29575 Altenmedingen OT Eddelstorf	24:39	82	0:25	5:23
IO127	Alte Dorfstr. 17, 29575 Altenmedingen OT Eddelstorf	23:24	82	0:25	5:00
IO128	Alte Dorfstr. 18, 29575 Altenmedingen OT Eddelstorf	24:36	82	0:25	5:17
IO129	Alte Dorfstr. 19, 29575 Altenmedingen OT Eddelstorf	23:40	82	0:25	4:58
IO130	Alte Dorfstr. 20, 29575 Altenmedingen OT Eddelstorf	24:51	85	0:25	5:12
IO131	Alte Dorfstr. 21, 29575 Altenmedingen OT Eddelstorf	23:49	83	0:25	4:56
IO132	Alte Dorfstr. 22, 29575 Altenmedingen OT Eddelstorf	24:50	85	0:25	5:09
IO133	Alte Dorfstr. 23, 29575 Altenmedingen OT Eddelstorf	23:49	84	0:25	4:51
IO134	Alte Dorfstr. 23a, 29575 Altenmedingen OT Eddelstorf	22:42	81	0:24	4:38
IO135	Alte Dorfstr. 24, 29575 Altenmedingen OT Eddelstorf	25:12	84	0:26	5:09
IO136	Am Berg 3, 29575 Altenmedingen OT Eddelstorf	26:11	85	0:26	5:34
IO137	Am Berg 6, 29575 Altenmedingen OT Eddelstorf	27:39	87	0:27	5:57
IO138	Am Berg 4, 29575 Altenmedingen OT Eddelstorf	26:54	86	0:27	5:52
IO139	Am Berg 2a, 29575 Altenmedingen OT Eddelstorf	26:12	85	0:26	5:41
IO140	Am Berg 2, 29575 Altenmedingen OT Eddelstorf	25:31	83	0:26	5:30
IO141	Am Berg 18, 29575 Altenmedingen OT Eddelstorf	24:36	82	0:25	5:17
IO142	Boomstück 15, 29575 Altenmedingen OT Eddelstorf	25:58	84	0:26	5:44
IO143	Boomstück 22, 29575 Altenmedingen OT Eddelstorf	27:08	85	0:27	6:02
IO144	Boomstück 20, 29575 Altenmedingen OT Eddelstorf	27:06	84	0:27	6:09
IO145	Boomstück 13, 29575 Altenmedingen OT Eddelstorf	25:29	82	0:26	5:46
IO146	Boomstück 11, 29575 Altenmedingen OT Eddelstorf	25:22	82	0:26	5:49
IO147	Boomstück 16, 29575 Altenmedingen OT Eddelstorf	26:32	82	0:27	6:10
IO148	Boomstück 14, 29575 Altenmedingen OT Eddelstorf	27:27	84	0:28	6:23
IO149	Boomstück 12, 29575 Altenmedingen OT Eddelstorf	28:32	86	0:30	6:42
IO150	Boomstück 7, 29575 Altenmedingen OT Eddelstorf	28:04	84	0:31	6:47
IO151	Boomstück 10, 29575 Altenmedingen OT Eddelstorf	29:06	86	0:31	6:55
IO152	Boomstück 8, 29575 Altenmedingen OT Eddelstorf	29:55	88	0:33	7:11

Zusatzbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO153	Boomstück 5, 29575 Altenmedingen OT Eddelstorf	28:29	84	<u>0:33</u>	6:58
IO154	Boomstück 3, 29575 Altenmedingen OT Eddelstorf	29:40	86	<u>0:35</u>	7:17
IO155	Boomstück 6, 29575 Altenmedingen OT Eddelstorf	<u>31:00</u>	88	<u>0:35</u>	7:30
IO156	Boomstück 4, 29575 Altenmedingen OT Eddelstorf	<u>31:48</u>	89	<u>0:36</u>	7:44
IO157	Boomstück 2, 29575 Altenmedingen OT Eddelstorf	<u>33:18</u>	91	<u>0:38</u>	<u>8:12</u>
IO158	Boomstück 1, 29575 Altenmedingen OT Eddelstorf	<u>31:23</u>	88	<u>0:38</u>	7:47
IO159	Zur Mühle 2, 29575 Altenmedingen OT Eddelstorf	<u>94:49</u>	144	<u>1:14</u>	<u>24:58</u>
IO160	Zur Mühle 4, 29575 Altenmedingen OT Eddelstorf	<u>110:20</u>	156	<u>1:20</u>	<u>29:10</u>
IO161	Zur Mühle 1, 29575 Altenmedingen OT Eddelstorf	<u>94:06</u>	147	<u>1:12</u>	<u>23:51</u>
IO162	Zum Uhlenbusch 2, 29575 Altenmedingen	13:06	64	0:20	1:11

Tabelle 6.2: Analyseergebnisse Zusatzbelastung

Der Grenzwert für die astronomisch maximal mögliche Schattenwurfdauer von 30 Stunden pro Jahr und/oder 30 Minuten pro Tag wird an den Immissionsorten IO24 – IO50, IO55, IO56, IO67 – IO77, IO80 – IO83, IO149 - IO161 überschritten oder ausgeschöpft.

6.3 Gesamtbelastung

Gesamtbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO1	Katenweg 6, 21368 Dahlenburg (Gienau)	<u>61:42</u>	157	<u>0:42</u>	<u>8:03</u>
IO2	Katenweg 4, 21368 Dahlenburg (Gienau)	<u>57:45</u>	155	<u>0:40</u>	7:26
IO3	Katenweg 3, 21368 Dahlenburg (Gienau)	<u>59:50</u>	159	<u>0:39</u>	7:50
IO4	Wiebecker Str. 2, 21368 Dahlenburg (Gienau)	<u>53:49</u>	156	<u>0:36</u>	7:01
IO5	Wiebecker Str. 4, 21368 Dahlenburg (Gienau)	<u>53:53</u>	158	<u>0:35</u>	7:10
IO6	An der Alten Schule 4, 21368 Dahlenburg (Gienau)	<u>58:44</u>	166	<u>0:37</u>	<u>8:03</u>
IO7	An der Alten Schule 1, 21368 Dahlenburg (Gienau)	<u>57:08</u>	169	<u>0:34</u>	7:57
IO8	Wiebecker Str. 8, 21368 Dahlenburg (Gienau)	<u>55:05</u>	172	<u>0:31</u>	7:46
IO9	Wiebecker Str. 10, 21368 Dahlenburg (Gienau)	<u>55:27</u>	175	0:30	7:55
IO10	Wiebecker Str. 9, 21368 Dahlenburg (Gienau)	<u>50:27</u>	178	0:27	7:25
IO11	Wiebecker Str. 7, 21368 Dahlenburg (Gienau)	<u>50:24</u>	172	0:28	7:14
IO12	Wiebecker Str. 17, 21368 Dahlenburg (Gienau)	<u>46:04</u>	173	0:25	6:48
IO13	An der Ziegelei 15, 21368 Dahlenburg (Gienau) - un- bebaut	<u>36:55</u>	147	0:24	5:42
IO14	An der Ziegelei 13, 21368 Dahlenburg (Gienau)	<u>35:35</u>	145	0:24	5:35

Gesamtbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage / Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO15	An der Ziegelei 6, 21368 Dahlenburg (Gienau)	23:12	102	0:23	4:01
IO16	An der Ziegelei 12, 21368 Dahlenburg (Gienau)	<u>39:25</u>	156	0:24	5:57
IO17	An der Ziegelei 11, 21368 Dahlenburg (Gienau)	<u>47:58</u>	171	0:27	6:55
IO18	An der Ziegelei 9, 21368 Dahlenburg (Gienau)	<u>48:46</u>	170	0:27	6:58
IO19	An der Ziegelei 7, 21368 Dahlenburg (Gienau)	<u>49:44</u>	170	0:28	7:03
IO20	Wiebecker Str. 5, 21368 Dahlenburg (Gienau)	<u>51:48</u>	163	<u>0:32</u>	7:05
IO21	An der Ziegelei 14, 21368 Dahlenburg (Gienau)	<u>46:23</u>	167	0:26	6:37
IO22	Mittelstr. 8, 21368 Dahlenburg (Gienau)	<u>46:42</u>	158	0:28	6:18
IO23	Mittelstr. 6, 21368 Dahlenburg (Gienau)	29:51	123	0:24	4:32
IO24	Bostelwiebeck 1, 29575 Altenmedingen OT Bostelwiebeck	<u>102:45</u>	209	<u>0:53</u>	<u>24:52</u>
IO25	Bostelwiebeck 2, 29575 Altenmedingen OT Bostelwiebeck	<u>91:21</u>	208	<u>0:49</u>	<u>22:06</u>
IO26	Bostelwiebeck 26, 29575 Altenmedingen OT Bostelwiebeck	<u>90:32</u>	219	<u>0:42</u>	<u>21:41</u>
IO27	Bostelwiebeck 24, 29575 Altenmedingen OT Bostelwiebeck	<u>106:36</u>	231	<u>0:43</u>	<u>25:15</u>
IO28	Bostelwiebeck 22, 29575 Altenmedingen OT Bostelwiebeck	<u>121:02</u>	239	<u>0:50</u>	<u>28:42</u>
IO29	Bostelwiebeck 23, 29575 Altenmedingen OT Bostelwiebeck	<u>128:24</u>	245	<u>0:53</u>	<u>30:22</u>
IO30	Bostelwiebeck 21, 29575 Altenmedingen OT Bostelwiebeck	<u>119:56</u>	240	<u>0:50</u>	<u>28:27</u>
IO31	Bostelwiebeck 20, 29575 Altenmedingen OT Bostelwiebeck	<u>118:28</u>	238	<u>0:49</u>	<u>28:07</u>
IO32	Bostelwiebeck 19, 29575 Altenmedingen OT Bostelwiebeck	<u>117:02</u>	237	<u>0:49</u>	<u>27:47</u>
IO33	Bostelwiebeck 18, 29575 Altenmedingen OT Bostelwiebeck	<u>110:53</u>	235	<u>0:50</u>	<u>26:22</u>
IO34	Bostelwiebeck 17, 29575 Altenmedingen OT Bostelwiebeck	<u>101:41</u>	228	<u>0:44</u>	<u>24:07</u>
IO35	Bostelwiebeck 16, 29575 Altenmedingen OT Bostelwiebeck	<u>84:05</u>	223	<u>0:36</u>	<u>20:02</u>
IO36	Bostelwiebeck 15, 29575 Altenmedingen OT Bostelwiebeck	<u>76:15</u>	223	<u>0:35</u>	<u>18:13</u>
IO37	Bostelwiebeck 32, 29575 Altenmedingen OT Bostelwiebeck	<u>87:53</u>	219	<u>0:39</u>	<u>20:56</u>
IO38	Bostelwiebeck 31, 29575 Altenmedingen OT Bostelwiebeck	<u>85:07</u>	215	<u>0:33</u>	<u>20:19</u>
IO39	Bostelwiebeck 34, 29575 Altenmedingen OT Bostelwiebeck	<u>92:33</u>	222	<u>0:36</u>	<u>22:00</u>
IO40	Bostelwiebeck 27, 29575 Altenmedingen OT Bostelwiebeck	<u>91:35</u>	220	<u>0:35</u>	<u>21:49</u>
IO41	Bostelwiebeck 28, 29575 Altenmedingen OT Bostelwiebeck	<u>87:16</u>	217	<u>0:40</u>	<u>20:53</u>
IO42	Bostelwiebeck 7, 29575 Altenmedingen OT Bostelwiebeck	<u>81:17</u>	209	<u>0:40</u>	<u>19:31</u>
IO43	Bostelwiebeck 3, 29575 Altenmedingen OT Bostelwiebeck	<u>81:25</u>	208	<u>0:45</u>	<u>19:42</u>

Gesamtbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO44	Bostelwiebeck 4, 29575 Altenmedingen OT Bostelwiebeck	<u>77:49</u>	204	<u>0:43</u>	<u>18:52</u>
IO45	Bostelwiebeck 8, 29575 Altenmedingen OT Bostelwiebeck	<u>75:36</u>	204	<u>0:37</u>	<u>18:12</u>
IO46	Bostelwiebeck 12, 29575 Altenmedingen OT Bostelwiebeck	<u>72:36</u>	205	<u>0:31</u>	<u>17:26</u>
IO47	Bostelwiebeck 13, 29575 Altenmedingen OT Bostelwiebeck	<u>73:32</u>	206	<u>0:33</u>	<u>17:38</u>
IO48	Bostelwiebeck 14, 29575 Altenmedingen OT Bostelwiebeck	<u>70:32</u>	202	<u>0:32</u>	<u>16:57</u>
IO49	In den Wiesen 6b, 29575 Altenmedingen OT Eddelstorf	<u>37:02</u>	94	<u>0:38</u>	<u>10:23</u>
IO50	In den Wiesen 6a, 29575 Altenmedingen OT Eddelstorf	<u>36:52</u>	95	<u>0:39</u>	<u>10:22</u>
IO51	In den Wiesen 4, 29575 Altenmedingen OT Eddelstorf	<u>31:19</u>	110	0:25	<u>8:41</u>
IO52	In den Wiesen 1, 29575 Altenmedingen OT Eddelstorf	<u>36:54</u>	118	0:25	<u>10:08</u>
IO53	In den Wiesen 2, 29575 Altenmedingen OT Eddelstorf	<u>38:56</u>	125	0:24	<u>10:40</u>
IO54	Alte Dorfstr. 2, 29575 Altenmedingen OT Eddelstorf	<u>42:20</u>	135	0:24	<u>11:30</u>
IO55	In den Wiesen 1a, 29575 Altenmedingen OT Eddelstorf	<u>52:09</u>	141	<u>0:41</u>	<u>14:22</u>
IO56	In den Wiesen 5, 29575 Altenmedingen OT Eddelstorf	<u>55:03</u>	154	<u>0:40</u>	<u>15:02</u>
IO57	Alte Dorfstr. 4, 29575 Altenmedingen OT Eddelstorf	<u>45:24</u>	141	0:25	<u>12:15</u>
IO58	Alte Dorfstr. 1, 29575 Altenmedingen OT Eddelstorf	<u>40:27</u>	146	0:24	<u>10:56</u>
IO59	In den Wiesen 5, 29575 Altenmedingen OT Eddelstorf	<u>55:05</u>	153	<u>0:39</u>	<u>15:03</u>
IO60	In den Wiesen 7a, 29575 Altenmedingen OT Eddelstorf	<u>56:24</u>	158	<u>0:40</u>	<u>15:21</u>
IO61	In den Wiesen 7b, 29575 Altenmedingen OT Eddelstorf	<u>55:45</u>	155	<u>0:39</u>	<u>15:11</u>
IO62	In den Wiesen 9a, 29575 Altenmedingen OT Eddelstorf	<u>56:40</u>	162	<u>0:38</u>	<u>15:23</u>
IO63	In den Wiesen 9b, 29575 Altenmedingen OT Eddelstorf	<u>56:03</u>	158	<u>0:38</u>	<u>15:13</u>
IO64	In den Wiesen 11, 29575 Altenmedingen OT Eddelstorf	<u>54:05</u>	164	<u>0:37</u>	<u>14:39</u>
IO65	Alte Dorfstr. 6, 29575 Altenmedingen OT Eddelstorf	<u>54:02</u>	160	<u>0:38</u>	<u>14:40</u>
IO66	Alte Dorfstr. 3, 29575 Altenmedingen OT Eddelstorf	<u>42:42</u>	152	0:25	<u>11:31</u>
IO67	In den Wiesen 10, 29575 Altenmedingen OT Eddelstorf	<u>59:44</u>	163	<u>0:39</u>	<u>16:10</u>
IO68	Immenweg 3, 29575 Altenmedingen OT Eddelstorf	<u>56:10</u>	175	<u>0:36</u>	<u>15:07</u>
IO69	Immenweg 1, 29575 Altenmedingen OT Eddelstorf	<u>54:08</u>	175	<u>0:36</u>	<u>14:36</u>
IO70	Alte Dorfstr. 5, 29575 Altenmedingen OT Eddelstorf	<u>51:36</u>	174	<u>0:34</u>	<u>13:55</u>
IO71	Zum Sportplatz 1, 29575 Altenmedingen OT Eddelstorf	<u>54:09</u>	178	0:30	<u>14:28</u>
IO72	Alte Dorfstr. 8, 29575 Altenmedingen OT Eddelstorf	<u>55:02</u>	178	<u>0:33</u>	<u>14:44</u>

Gesamtbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
I073	Alte Dorfstr. 7, 29575 Altenmedingen OT Eddelstorf	<u>55:51</u>	178	0:30	<u>14:55</u>
I074	Alte Dorfstr. 10, 29575 Altenmedingen OT Eddelstorf	<u>56:50</u>	179	<u>0:32</u>	<u>15:10</u>
I075	Alte Dorfstr. 7a, 29575 Altenmedingen OT Eddelstorf	<u>56:39</u>	181	0:30	<u>15:05</u>
I076	Alte Dorfstr. 9, 29575 Altenmedingen OT Eddelstorf	<u>57:52</u>	183	0:30	<u>15:23</u>
I077	Alte Dorfstr. 12, 29575 Altenmedingen OT Eddelstorf	<u>59:07</u>	184	0:30	<u>15:43</u>
I078	Alte Dorfstr. 11, 29575 Altenmedingen OT Eddelstorf	<u>59:19</u>	184	0:29	<u>15:44</u>
I079	Zum Sportplatz 5, 29575 Altenmedingen OT Eddelstorf	<u>58:39</u>	185	0:26	<u>15:26</u>
I080	Vorwerker Str. 4, 29575 Altenmedingen OT Eddelstorf	<u>60:15</u>	186	<u>0:33</u>	<u>16:02</u>
I081	Vorwerker Str. 7, 29575 Altenmedingen OT Eddelstorf	<u>64:35</u>	189	<u>0:37</u>	<u>17:11</u>
I082	Vorwerker Str. 5, 29575 Altenmedingen OT Eddelstorf	<u>62:43</u>	186	<u>0:34</u>	<u>16:40</u>
I083	Vorwerker Str. 3, 29575 Altenmedingen OT Eddelstorf	<u>62:34</u>	187	<u>0:32</u>	<u>16:35</u>
I084	Vorwerker Str. 1, 29575 Altenmedingen OT Eddelstorf	<u>61:54</u>	188	0:29	<u>16:20</u>
I085	Zum Sportplatz 2, 29575 Altenmedingen OT Eddelstorf	<u>60:33</u>	187	0:27	<u>15:52</u>
I086	Zum Sportplatz 4, 29575 Altenmedingen OT Eddelstorf	<u>58:56</u>	186	0:26	<u>15:24</u>
I087	Zum Sportplatz 6, 29575 Altenmedingen OT Eddelstorf	<u>54:59</u>	190	0:27	<u>14:17</u>
I088	Zum Sportplatz 8, 29575 Altenmedingen OT Eddelstorf	<u>52:27</u>	190	0:26	<u>13:31</u>
I089	Zum Sportplatz 7, 29575 Altenmedingen OT Eddelstorf	<u>44:40</u>	174	0:25	<u>11:31</u>
I090	Zum Sportplatz 9, 29575 Altenmedingen OT Eddelstorf	<u>39:55</u>	152	0:24	<u>10:35</u>
I091	Zum Sportplatz 10, 29575 Altenmedingen OT Eddelstorf	<u>40:45</u>	151	0:25	<u>10:47</u>
I092	Zum Sportplatz 12, 29575 Altenmedingen OT Eddelstorf	<u>41:16</u>	150	0:25	<u>10:55</u>
I093	Zum Sportplatz 12a, 29575 Altenmedingen OT Eddelstorf	<u>42:01</u>	154	0:25	<u>11:06</u>
I094	Zum Sportplatz 14, 29575 Altenmedingen OT Eddelstorf	<u>42:24</u>	154	0:24	<u>11:10</u>
I095	Zum Sportplatz 11, 29575 Altenmedingen OT Eddelstorf	<u>41:38</u>	150	0:24	<u>11:00</u>
I096	Zum Sportplatz 13, 29575 Altenmedingen OT Eddelstorf	<u>43:26</u>	152	0:23	<u>11:27</u>
I097	Am Sportplatz 16, 29575 Altenmedingen OT Eddelstorf	<u>44:58</u>	153	0:24	<u>11:50</u>
I098	Am Kleukerberg 1, 29575 Altenmedingen OT Eddelstorf	<u>45:19</u>	156	0:24	<u>11:55</u>
I099	Am Kleukerberg 2, 29575 Altenmedingen OT Eddelstorf	<u>44:17</u>	156	0:25	<u>11:38</u>

Gesamtbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO100	Am Kleukerberg 3, 29575 Altenmedingen OT Eddelstorf	<u>46:55</u>	156	0:25	<u>12:20</u>
IO101	Am Kleukerberg 4b, 29575 Altenmedingen OT Eddelstorf	<u>49:24</u>	167	0:25	<u>12:54</u>
IO102	Am Kleukerberg 4, 29575 Altenmedingen OT Eddelstorf	<u>50:02</u>	168	0:25	<u>13:03</u>
IO103	Am Kleukerberg 5, 29575 Altenmedingen OT Eddelstorf	<u>47:11</u>	157	0:24	<u>12:24</u>
IO104	Am Kleukerberg 6, 29575 Altenmedingen OT Eddelstorf	<u>51:18</u>	168	0:25	<u>13:22</u>
IO105	Am Kleukerberg 8, 29575 Altenmedingen OT Eddelstorf	<u>52:17</u>	170	0:25	<u>13:37</u>
IO106	Am Kleukerberg 7, 29575 Altenmedingen OT Eddelstorf	<u>52:36</u>	169	0:25	<u>13:41</u>
IO107	Am Kleukerberg 10, 29575 Altenmedingen OT Eddelstorf	<u>58:31</u>	193	0:26	<u>14:46</u>
IO108	Am Kleukerberg 9, 29575 Altenmedingen OT Eddelstorf	<u>53:56</u>	172	0:26	<u>14:00</u>
IO109	Am Kleukerberg 11, 29575 Altenmedingen OT Eddelstorf	<u>54:26</u>	173	0:27	<u>14:07</u>
IO110	Am Kleukerberg 13, 29575 Altenmedingen OT Eddelstorf	<u>55:38</u>	175	0:27	<u>14:22</u>
IO111	Am Kleukerberg 15, 29575 Altenmedingen OT Eddelstorf	<u>61:26</u>	198	0:28	<u>15:23</u>
IO112	Am Kleukerberg 17, 29575 Altenmedingen OT Eddelstorf	<u>63:02</u>	199	0:28	<u>15:42</u>
IO113	Alte Salzstr. 11, 29575 Altenmedingen OT Eddelstorf	<u>60:54</u>	181	0:30	<u>15:26</u>
IO114	Alte Salzstr. 12, 29575 Altenmedingen OT Eddelstorf	<u>68:25</u>	203	<u>0:31</u>	<u>16:47</u>
IO115	Alte Salzstr. 9, 29575 Altenmedingen OT Eddelstorf	<u>60:05</u>	180	0:30	<u>15:17</u>
IO116	Alte Salzstr. 7, 29575 Altenmedingen OT Eddelstorf	<u>61:20</u>	198	0:27	<u>15:22</u>
IO117	Alte Salzstr. 6, 29575 Altenmedingen OT Eddelstorf	<u>62:49</u>	199	0:28	<u>15:40</u>
IO118	Alte Salzstr. 4, 29575 Altenmedingen OT Eddelstorf	<u>61:51</u>	199	0:28	<u>15:26</u>
IO119	Alte Salzstr. 2, 29575 Altenmedingen OT Eddelstorf	<u>60:24</u>	197	0:27	<u>15:07</u>
IO120	Alte Salzstr. 5, 29575 Altenmedingen OT Eddelstorf	<u>58:38</u>	195	0:27	<u>14:44</u>
IO121	Alte Salzstr. 3, 29575 Altenmedingen OT Eddelstorf	<u>57:49</u>	197	0:27	<u>14:41</u>
IO122	Alte Salzstr. 1, 29575 Altenmedingen OT Eddelstorf	<u>59:52</u>	194	0:27	<u>15:20</u>
IO123	Alte Dorfstr. 13, 29575 Altenmedingen OT Eddelstorf	<u>62:28</u>	192	0:27	<u>16:12</u>
IO124	Alte Dorfstr. 15, 29575 Altenmedingen OT Eddelstorf	<u>61:45</u>	192	0:27	<u>15:56</u>
IO125	Alte Dorfstr. 14, 29575 Altenmedingen OT Eddelstorf	<u>66:02</u>	196	0:28	<u>16:55</u>
IO126	Alte Dorfstr. 16, 29575 Altenmedingen OT Eddelstorf	<u>64:47</u>	200	0:29	<u>16:26</u>
IO127	Alte Dorfstr. 17, 29575 Altenmedingen OT Eddelstorf	<u>60:14</u>	198	0:28	<u>15:09</u>
IO128	Alte Dorfstr. 18, 29575 Altenmedingen OT Eddelstorf	<u>62:39</u>	202	0:28	<u>15:46</u>

Gesamtbelastung					
Nr.	Immissionsort	Astron. max. mögl. Beschattungsdauer			Met. wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std. / Jahr	Schattentage in Tage/ Jahr	Max. Schattendauer, in Std. / Tag	Max. Schattendauer in Std. / Jahr
IO129	Alte Dorfstr. 19, 29575 Altenmedingen OT Eddelstorf	<u>61:46</u>	198	0:28	<u>15:28</u>
IO130	Alte Dorfstr. 20, 29575 Altenmedingen OT Eddelstorf	<u>63:43</u>	203	0:29	<u>15:55</u>
IO131	Alte Dorfstr. 21, 29575 Altenmedingen OT Eddelstorf	<u>63:21</u>	202	0:28	<u>15:47</u>
IO132	Alte Dorfstr. 22, 29575 Altenmedingen OT Eddelstorf	<u>64:28</u>	202	0:29	<u>16:03</u>
IO133	Alte Dorfstr. 23, 29575 Altenmedingen OT Eddelstorf	<u>64:40</u>	201	0:29	<u>16:02</u>
IO134	Alte Dorfstr. 23a, 29575 Altenmedingen OT Eddelstorf	<u>63:18</u>	200	0:29	<u>15:44</u>
IO135	Alte Dorfstr. 24, 29575 Altenmedingen OT Eddelstorf	<u>66:13</u>	204	0:29	<u>16:24</u>
IO136	Am Berg 3, 29575 Altenmedingen OT Eddelstorf	<u>68:34</u>	205	0:30	<u>17:13</u>
IO137	Am Berg 6, 29575 Altenmedingen OT Eddelstorf	<u>74:15</u>	204	<u>0:31</u>	<u>18:43</u>
IO138	Am Berg 4, 29575 Altenmedingen OT Eddelstorf	<u>72:23</u>	202	0:30	<u>18:21</u>
IO139	Am Berg 2a, 29575 Altenmedingen OT Eddelstorf	<u>70:28</u>	202	0:30	<u>17:50</u>
IO140	Am Berg 2, 29575 Altenmedingen OT Eddelstorf	<u>67:48</u>	201	0:29	<u>17:07</u>
IO141	Am Berg 18, 29575 Altenmedingen OT Eddelstorf	<u>62:39</u>	202	0:28	<u>15:46</u>
IO142	Boomstück 15, 29575 Altenmedingen OT Eddelstorf	<u>69:58</u>	201	0:29	<u>17:48</u>
IO143	Boomstück 22, 29575 Altenmedingen OT Eddelstorf	<u>72:11</u>	199	0:30	<u>18:23</u>
IO144	Boomstück 20, 29575 Altenmedingen OT Eddelstorf	<u>71:00</u>	197	0:30	<u>18:13</u>
IO145	Boomstück 13, 29575 Altenmedingen OT Eddelstorf	<u>68:01</u>	196	0:29	<u>17:27</u>
IO146	Boomstück 11, 29575 Altenmedingen OT Eddelstorf	<u>67:09</u>	194	0:29	<u>17:18</u>
IO147	Boomstück 16, 29575 Altenmedingen OT Eddelstorf	<u>68:04</u>	193	0:29	<u>17:37</u>
IO148	Boomstück 14, 29575 Altenmedingen OT Eddelstorf	<u>69:22</u>	195	0:30	<u>17:58</u>
IO149	Boomstück 12, 29575 Altenmedingen OT Eddelstorf	<u>69:13</u>	195	0:30	<u>17:58</u>
IO150	Boomstück 7, 29575 Altenmedingen OT Eddelstorf	<u>66:06</u>	190	<u>0:31</u>	<u>17:21</u>
IO151	Boomstück 10, 29575 Altenmedingen OT Eddelstorf	<u>68:32</u>	194	<u>0:31</u>	<u>17:52</u>
IO152	Boomstück 8, 29575 Altenmedingen OT Eddelstorf	<u>68:47</u>	194	<u>0:33</u>	<u>18:00</u>
IO153	Boomstück 5, 29575 Altenmedingen OT Eddelstorf	<u>65:48</u>	189	<u>0:33</u>	<u>17:22</u>
IO154	Boomstück 3, 29575 Altenmedingen OT Eddelstorf	<u>66:47</u>	191	<u>0:35</u>	<u>17:38</u>
IO155	Boomstück 6, 29575 Altenmedingen OT Eddelstorf	<u>69:19</u>	194	<u>0:35</u>	<u>18:12</u>
IO156	Boomstück 4, 29575 Altenmedingen OT Eddelstorf	<u>70:09</u>	195	<u>0:36</u>	<u>18:26</u>
IO157	Boomstück 2, 29575 Altenmedingen OT Eddelstorf	<u>71:19</u>	197	<u>0:38</u>	<u>18:51</u>
IO158	Boomstück 1, 29575 Altenmedingen OT Eddelstorf	<u>67:39</u>	192	<u>0:38</u>	<u>17:57</u>
IO159	Zur Mühle 2, 29575 Altenmedingen OT Eddelstorf	<u>117:30</u>	197	<u>1:14</u>	<u>31:02</u>
IO160	Zur Mühle 4, 29575 Altenmedingen OT Eddelstorf	<u>129:36</u>	198	<u>1:20</u>	<u>34:17</u>
IO161	Zur Mühle 1, 29575 Altenmedingen OT Eddelstorf	<u>126:02</u>	212	<u>1:12</u>	<u>32:27</u>
IO162	Zum Uhlenbusch 2, 29575 Altenmedingen	<u>137:26</u>	175	<u>1:22</u>	<u>17:41</u>

Tabelle 6.3: Analyseergebnisse Gesamtbelastung

Der Grenzwert für die astronomisch maximal mögliche Schattenwurfdauer von 30 Stunden pro Jahr und/oder 30 Minuten pro Tag wird an den Immissionsorten **IO1 – IO14, IO16 – IO22 und IO24 – IO162** überschritten.

Die meteorologisch wahrscheinliche Beschattungsdauer in Stunden / Jahr wird an den Immissionsorten **IO1, IO6 und IO24 — IO162** überschritten.

7 Zusammenfassung

Für das Genehmigungsverfahren nach dem BImSchG [2] ist der Nachweis der Einhaltung der gesetzlichen Grenzwerte für die Schattenwurfimmissionen zu führen. Gemäß den Hinweisen zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen des Länderausschusses für Immissionsschutz [1] darf eine Belastung von 30 Stunden im Jahr oder 30 Minuten pro Tag nicht überschritten werden.

Die durchgeführten Berechnungen kommen zu dem Ergebnis, dass bei der Gesamtbelastung der Grenzwert für die astronomisch maximal mögliche Schattenwurfdauer von 30 Stunden pro Jahr und/oder 30 Minuten pro Tag an den Immissionsorten **IO1 – IO14, IO16 – IO22 und IO24 – IO162** überschritten wird.

An den Immissionsorten **IO1 – IO12, IO17 – IO20, IO22, IO24 – IO48, IO62, IO67, IO71 – IO158, IO161 und IO161** werden die Grenzwerte von 30 Stunden pro Jahr und/oder von 30 Minuten pro Tag bereits durch die Vorbelastung ausgeschöpft. An diesen Immissionsorten darf von den neu geplanten WEA kein weiterer Schattenwurf verursacht werden.

An den Immissionsorten **IO1 – IO14, IO16 – IO22 und IO24 – IO162** muss die Rotorschattenwurfdauer durch den Einsatz eines Schattenwurfabschaltmoduls entsprechend der vorgenannten Empfehlungen begrenzt werden. Dieses Modul schaltet die WEA ab, wenn an den relevanten Immissionsorten die vorgegebenen Grenzwerte erreicht sind. Da der Grenzwert von 30 Stunden pro Kalenderjahr auf Grundlage der astronomisch möglichen Beschattung entwickelt wurde, ist für die Schattenwurfabschaltautomatik der Wert für die tatsächliche, meteorologische Schattendauer von 8 Stunden pro Kalenderjahr zu berücksichtigen. Ferner ist der Tatsache Rechnung zu tragen, dass sich die Zeitpunkte für den Schattenwurf jedes Jahr leicht verschieben. Hier muss die Abschaltung auf dem realen Sonnenstand basieren.

Die Genehmigung sollte mit der Auflage des Einsatzes eines Schattenwurfabschaltmoduls erteilt werden.

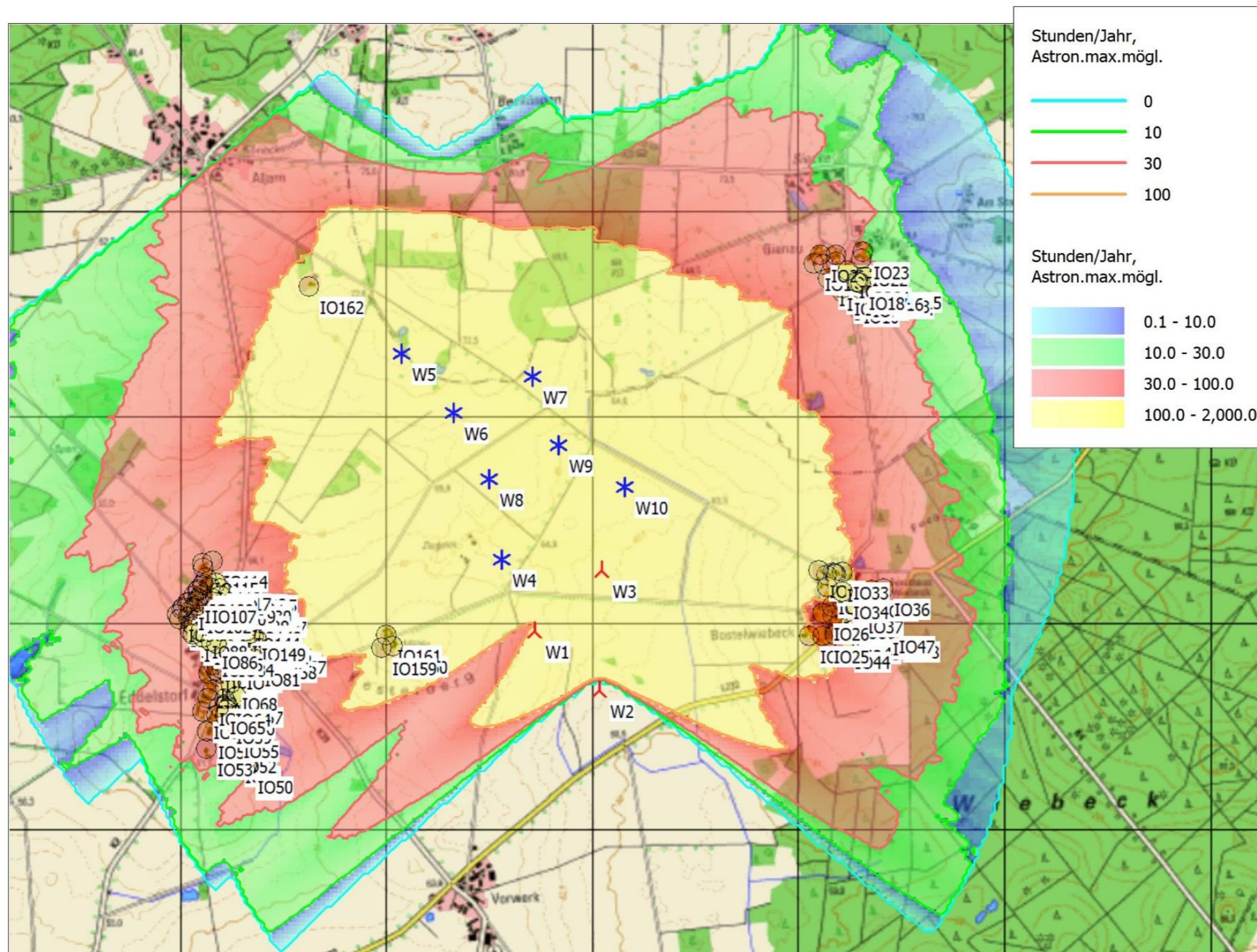
8 Abkürzungs- und Symbolverzeichnis

Abb.	Abbildung
Astron.	Astronomisch
Bez.	Bezeichnung
GB	Gesamtbelastung
GPS	Global Positioning System
Hz	Hertz
IO	Immissionsort
Max.	Maximal
Met.	Meteorologisch
NN	Normalnull
Nr.	Nummer
Std.	Stunden
UTM	Universal Transverse Mercator
VB	Vorbelastung
WEA	Windenergieanlage
W-Nr.	Interne WEA Nummer

9 Literaturverzeichnis

- [1] *LAI; Länderausschuss für Immissionsschutz: Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen. WEA-Schattenwurf-Hinweise. Stand 13.03.2002*
- [2] *BImSchG, Bundes-Immissionsschutzgesetz*
- [3] *MagicMaps Tour Explorer, TOP25 Karten*
- [4] *Sonnenwahrscheinlichkeit Wetterstation Hamburg / Sasel, WindPRO-Datenbank WRDC - http://wrd-cmgo.nrel.gov/html/get_data-ap.html*
- [5] *Vestas Deutschland GmbH; Allgemeine Beschreibung EnVentus™ 5 MW; Dokument Nr.: 0081-6996 V02; vom 22.03.2019*
- [6] *UKA Nord Projektentwicklung GmbH & Co. KG; AAU_190520_I17_Schallimmissions- u. Schattenwurfprognose_Bostelwiebeck II.pdf; per E-Mail mit dem Betreff: „F-4-004-2 - Windenergieprojekt Bostelwiebeck II - Auftragserteilung Schallimmissions- und Schattenwurfprognose“ am 22.05.2019;*
- [7] *UKA Nord Projektentwicklung GmbH & Co. KG; AAU_190514_I17_AI SchallGA+All S3_Boizenburg.pdf und Anlagen.7z; per E-Mail mit dem Betreff: „B-3-068-0 Boizenburg - Beauftragung (Teil 1)“ am 16.05.2019;*
- [8] *DIN 67530, Reflektometer als Hilfsmittel zur Glanzbeurteilung an ebenen Anstrich- und Kunststoff-Oberflächen, Januar 1982*

Anhang 1 / Übersichtskarte der Gesamtbelastung mit Iso-Schattenlinien

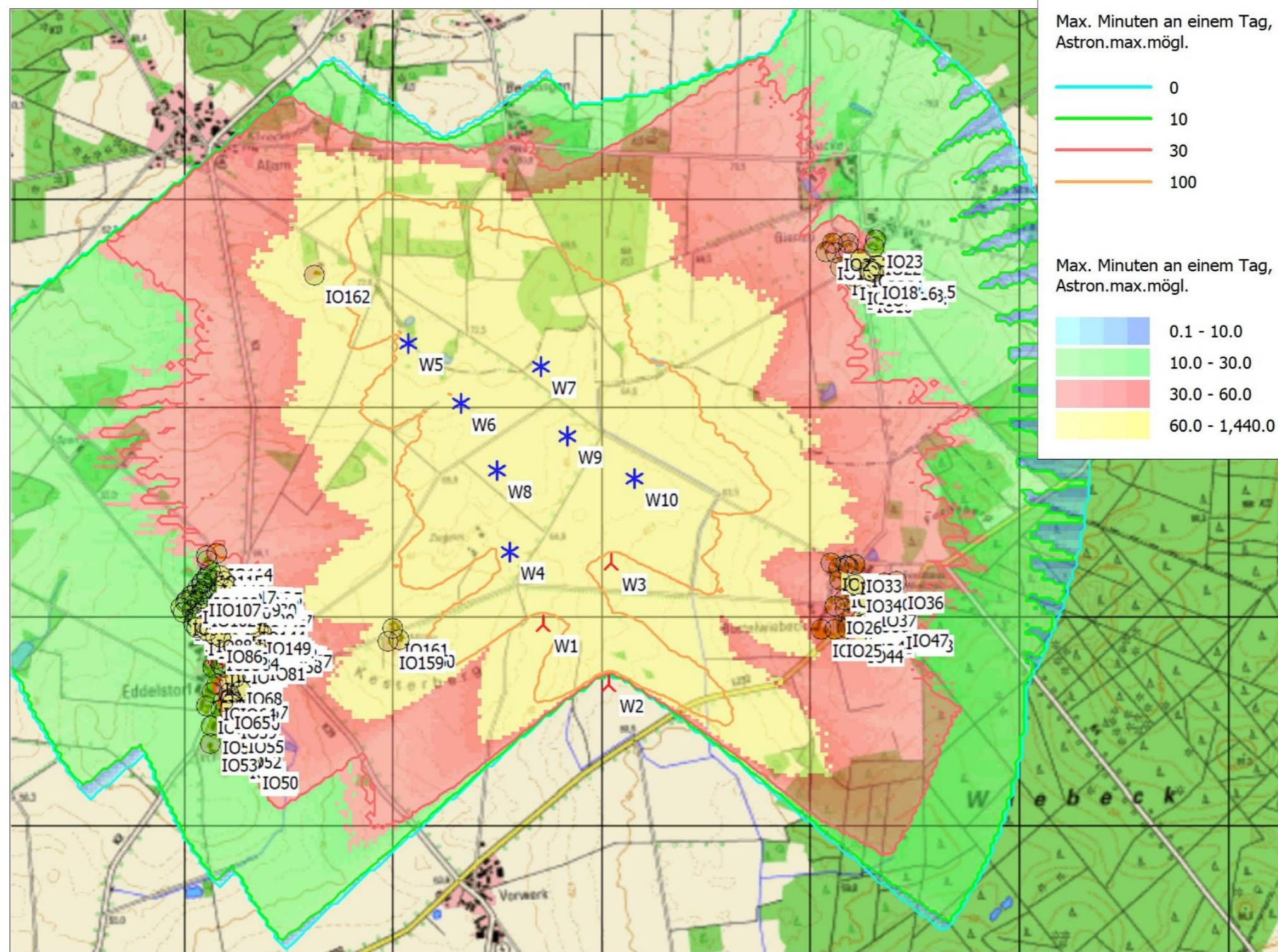


Projekt:
20190529_Bostelwiebeck II

SHADOW - Karte
Berechnung:
GB

Lizenziertes Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 11:58/3.2.744

0 500 1000 1500 2000 m
Karte: BostelwiebeckIIMM_Übersicht, Maßstab 1:30,000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 610,229 Nord: 5,890,659
 * Neue WEA * Existierende WEA * Schattenrezeptor
 Höhe der Schattenkarte: Höhenlinien: CONTOURLINE_20190529_Bostelwiebeck II_0.wpo (5)



Projekt:
20190529_Bostelwiebeck II

SHADOW - Karte
Berechnung:
GB

Lizenziertes Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 11:58/3.2.744

0 500 1000 1500 2000 m
Karte: BostelwiebeckIIMM_Übersicht , Maßstab 1:30,000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 610,229 Nord: 5,890,659
 ⚡ Neue WEA * Existierende WEA 📍 Schattenrezeptor
 Höhe der Schattenkarte: Höhenlinien: CONTOURLINE_20190529_Bostelwiebeck II_0.wpo (5)

Anhang 2 / Hauptergebnis: Vorbelastung

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
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Berechnet:
05.08.2019 09:41/3.2.744

SHADOW - Hauptergebnis

Berechnung: VB

Voraussetzungen für Berechnung des Schattenwurfs

Beschattungsbereich der WEA
Schatten nur relevant, wo Rotorblatt mind. 20% der Sonne verdeckt
Siehe WEA-Tabelle

Minimale relevante Sonnenhöhe über Horizont 3 °
Tage zwischen Berechnungen 1 Tag(e)
Berechnungszeitsprung 1 Minuten

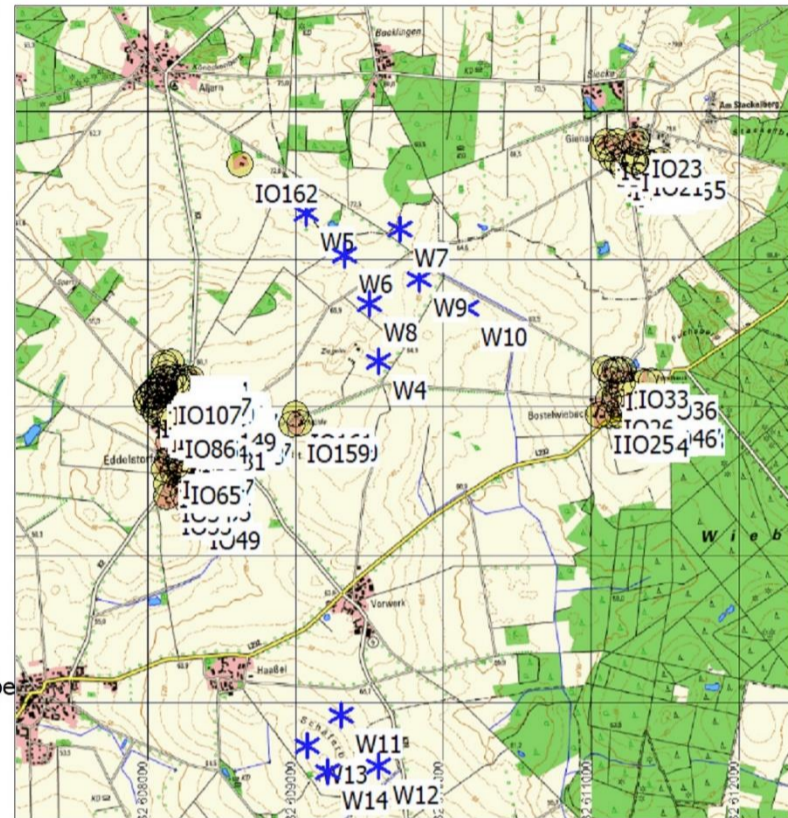
Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsstunden ermittelt aus WEA in Berechnung und Windverteilung:
Terraindaten: WAsP (12)

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
305 341 474 712 795 623 559 824 1,360 1,341 729 401 8,463
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Eine WEA wird nicht berücksichtigt, wenn sie von keinem Teil der Rezeptorfläche aus sichtbar ist. Die Sichtbarkeitsberechnung basiert auf den folgenden Annahmen:
Verwendete Höhenlinien: Höhenlinien: CONTOURLINE_20190529_Bostelwiebeck
Hindernisse in Berechnung verwendet
Berechnungshöhe ü.Gr. für Karte: 1.5 m
Rasterauflösung: 1.0 m

Alle Koordinatenangaben in:
UTM (north)-ETRS89 Zone: 32



Maßstab 1:60,000
* Existierende WEA ● Schattenrezeptor

WEA

Ost	Nord	Z	Beschreibung	WEA-Typ		Typ	Nennleistung	Rotor-durchmesser	Nabenhöhe	Schattendaten	
				Aktuell	Hersteller					Beschatt.-Bereich	U/min
		[m]					[kW]	[m]	[m]	[m]	[U/min]
1	609,566	5,890,307	64.1 W4	Ja	VESTAS	V162-5.6MW-5,600	5,600	162.0	169.0	1,993	12.1
2	609,077	5,891,308	72.8 W5	Ja	GE WIND ENERGY	GE 3.6-137-3,630	3,630	137.0	164.5	2,500	0.0
3	609,333	5,891,020	68.2 W6	Ja	GE WIND ENERGY	GE 3.6-137-3,630	3,630	137.0	164.5	2,500	0.0
4	609,713	5,891,198	69.1 W7	Ja	GE WIND ENERGY	GE 3.6-137-3,630	3,630	137.0	164.5	2,500	0.0
5	609,505	5,890,698	66.1 W8	Ja	GE WIND ENERGY	GE 3.6-137-3,630	3,630	137.0	164.5	2,500	0.0
6	609,841	5,890,865	65.1 W9	Ja	GE WIND ENERGY	GE 3.6-137-3,630	3,630	137.0	164.5	2,500	0.0
7	610,162	5,890,660	64.0 W10	Nein	GE WIND ENERGY	GE 5.3-158-5,300	5,300	158.0	161.0	1,816	9.7
8	609,312	5,887,912	70.2 W11	Ja	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
9	609,563	5,887,565	70.0 W12	Ja	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
10	609,085	5,887,701	75.0 W13	Ja	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0
11	609,220	5,887,525	75.0 W14	Ja	ENERCON	E-70 E4 2,3 MW-2,300	2,300	71.0	64.0	1,644	20.0

Schattenrezeptor-Eingabe

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
A	IO1	611,082	5,891,745	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
B	IO2	611,112	5,891,786	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
C	IO3	611,126	5,891,741	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
D	IO4	611,189	5,891,787	78.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
E	IO5	611,186	5,891,752	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
F	IO6	611,150	5,891,672	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
G	IO7	611,189	5,891,648	77.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
H	IO8	611,223	5,891,628	78.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
I	IO9	611,222	5,891,605	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
J	IO10	611,269	5,891,589	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
K	IO11	611,275	5,891,628	78.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
L	IO12	611,315	5,891,619	76.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
M	IO13	611,417	5,891,638	77.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
N	IO14	611,436	5,891,626	77.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

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Berechnet:
05.08.2019 09:41/3.2.744

SHADOW - Hauptergebnis

Berechnung: VB

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe	Neigung des	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
					[m]	[m]	ü.Gr.	Fensters		[m]
O IO15	611,476	5,891,659	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
P IO16	611,386	5,891,650	76.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
Q IO17	611,308	5,891,649	76.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
R IO18	611,297	5,891,654	76.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
S IO19	611,286	5,891,658	77.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
T IO20	611,244	5,891,712	77.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
U IO21	611,326	5,891,681	76.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
V IO22	611,311	5,891,770	77.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
W IO23	611,319	5,891,803	78.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
X IO24	611,058	5,889,934	70.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
Y IO25	611,126	5,889,935	71.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
Z IO26	611,126	5,890,046	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AA IO27	611,146	5,890,172	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AB IO28	611,142	5,890,231	70.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AC IO29	611,104	5,890,254	70.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AD IO30	611,174	5,890,244	71.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AE IO31	611,183	5,890,239	71.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AF IO32	611,190	5,890,235	71.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AG IO33	611,221	5,890,246	71.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AH IO34	611,220	5,890,151	71.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AI IO35	611,362	5,890,157	71.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AJ IO36	611,418	5,890,164	72.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AK IO37	611,287	5,890,083	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AL IO38	611,254	5,890,056	70.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AM IO39	611,220	5,890,104	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AN IO40	611,172	5,890,077	71.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AO IO41	611,173	5,890,035	70.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AP IO42	611,203	5,889,985	70.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AQ IO43	611,185	5,889,938	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AR IO44	611,228	5,889,910	70.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AS IO45	611,277	5,889,950	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AT IO46	611,413	5,889,973	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AU IO47	611,442	5,889,986	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AV IO48	611,465	5,889,960	70.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AW IO49	608,323	5,889,288	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AX IO50	608,330	5,889,303	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AY IO51	608,270	5,889,354	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AZ IO52	608,250	5,889,401	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BA IO53	608,134	5,889,389	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BB IO54	608,137	5,889,473	60.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BC IO55	608,261	5,889,477	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BD IO56	608,225	5,889,548	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BE IO57	608,182	5,889,548	60.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BF IO58	608,116	5,889,568	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BG IO59	608,226	5,889,546	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BH IO60	608,242	5,889,585	60.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BI IO61	608,234	5,889,577	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BJ IO62	608,235	5,889,605	60.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BK IO63	608,229	5,889,597	60.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BL IO64	608,221	5,889,628	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BM IO65	608,197	5,889,592	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BN IO66	608,141	5,889,633	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BO IO67	608,278	5,889,641	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BP IO68	608,251	5,889,707	61.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BQ IO69	608,225	5,889,685	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BR IO70	608,166	5,889,671	60.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BS IO71	608,146	5,889,751	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BT IO72	608,199	5,889,736	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BU IO73	608,183	5,889,768	61.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BV IO74	608,209	5,889,773	61.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BW IO75	608,168	5,889,795	62.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BX IO76	608,198	5,889,813	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BY IO77	608,226	5,889,818	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BZ IO78	608,207	5,889,839	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:41/3.2.744

SHADOW - Hauptergebnis

Berechnung: VB

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe	Neigung des	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
					[m]	[m]	ü.Gr.	Fensters		[m]
CA	IO79	608,158	5,889,872	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CB	IO80	608,274	5,889,810	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CC	IO81	608,363	5,889,825	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CD	IO82	608,326	5,889,830	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CE	IO83	608,287	5,889,848	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CF	IO84	608,238	5,889,871	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CG	IO85	608,183	5,889,897	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CH	IO86	608,156	5,889,908	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CI	IO87	608,120	5,889,927	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CJ	IO88	608,106	5,889,958	61.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CK	IO89	608,068	5,889,945	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CL	IO90	608,052	5,889,964	61.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CM	IO91	608,073	5,889,982	60.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CN	IO92	608,062	5,889,996	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CO	IO93	608,074	5,890,007	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CP	IO94	608,044	5,890,028	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CQ	IO95	608,004	5,890,015	60.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CR	IO96	607,992	5,890,041	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CS	IO97	608,016	5,890,066	60.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CT	IO98	608,022	5,890,074	61.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CU	IO99	608,057	5,890,058	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CV	IO100	608,042	5,890,097	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CW	IO101	608,074	5,890,070	61.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CX	IO102	608,083	5,890,080	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CY	IO103	608,048	5,890,102	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CZ	IO104	608,087	5,890,103	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DA	IO105	608,094	5,890,116	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DB	IO106	608,071	5,890,131	62.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DC	IO107	608,107	5,890,132	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DD	IO108	608,091	5,890,154	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DE	IO109	608,096	5,890,161	63.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DF	IO110	608,114	5,890,183	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DG	IO111	608,119	5,890,189	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DH	IO112	608,135	5,890,218	64.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DI	IO113	608,115	5,890,290	65.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DJ	IO114	608,164	5,890,300	65.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DK	IO115	608,120	5,890,267	64.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DL	IO116	608,153	5,890,171	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DM	IO117	608,180	5,890,191	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DN	IO118	608,200	5,890,166	64.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DO	IO119	608,201	5,890,133	63.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DP	IO120	608,157	5,890,119	62.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DQ	IO121	608,194	5,890,032	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DR	IO122	608,197	5,889,998	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DS	IO123	608,200	5,889,944	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DT	IO124	608,199	5,889,964	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DU	IO125	608,250	5,890,003	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DV	IO126	608,261	5,890,049	63.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DW	IO127	608,234	5,890,086	63.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DX	IO128	608,269	5,890,080	63.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DY	IO129	608,241	5,890,125	63.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DZ	IO130	608,280	5,890,133	64.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EA	IO131	608,247	5,890,158	63.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EB	IO132	608,289	5,890,156	64.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EC	IO133	608,256	5,890,190	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
ED	IO134	608,221	5,890,190	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EE	IO135	608,304	5,890,184	64.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EF	IO136	608,313	5,890,096	63.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EG	IO137	608,352	5,890,079	63.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EH	IO138	608,330	5,890,054	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EI	IO139	608,311	5,890,064	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EJ	IO140	608,295	5,890,073	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EK	IO141	608,269	5,890,080	63.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EL	IO142	608,301	5,890,037	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:41/3.2.744

SHADOW - Hauptergebnis

Berechnung: VB

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe	Neigung des	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
					[m]	[m]	ü.Gr.	Fensters		[m]
EM IO143	608,328	5,890,028	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EN IO144	608,323	5,889,999	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EO IO145	608,275	5,889,998	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EP IO146	608,271	5,889,976	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EQ IO147	608,303	5,889,959	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
ER IO148	608,329	5,889,960	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
ES IO149	608,349	5,889,948	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
ET IO150	608,332	5,889,901	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EU IO151	608,363	5,889,930	62.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EV IO152	608,380	5,889,917	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EW IO153	608,344	5,889,882	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EX IO154	608,369	5,889,880	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EY IO155	608,401	5,889,908	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EZ IO156	608,420	5,889,906	61.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FA IO157	608,449	5,889,886	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FB IO158	608,403	5,889,860	61.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FC IO159	608,985	5,889,879	72.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FD IO160	609,038	5,889,885	72.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FE IO161	609,008	5,889,941	72.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FF IO162	608,631	5,891,636	72.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0

Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr	Stunden/Jahr
		[h/a]	[d/a]	[h/d]	[h/a]	
A IO1		51:44	157	0:28	7:12	
B IO2		49:05	155	0:28	6:43	
C IO3		47:33	159	0:27	6:46	
D IO4		41:48	156	0:26	5:57	
E IO5		40:00	149	0:26	5:55	
F IO6		41:30	140	0:27	6:27	
G IO7		37:46	129	0:27	6:06	
H IO8		35:17	124	0:27	5:49	
I IO9		35:32	123	0:27	5:55	
J IO10		32:53	120	0:26	5:36	
K IO11		32:10	118	0:25	5:23	
L IO12		30:18	113	0:25	5:09	
M IO13		25:45	105	0:24	4:28	
N IO14		25:05	105	0:24	4:25	
O IO15		23:12	102	0:23	4:03	
P IO16		26:56	107	0:24	4:36	
Q IO17		30:54	115	0:25	5:11	
R IO18		31:02	116	0:25	5:10	
S IO19		31:34	118	0:25	5:14	
T IO20		34:06	127	0:26	5:24	
U IO21		29:32	115	0:24	4:54	
V IO22		30:14	122	0:24	4:44	
W IO23		29:51	123	0:24	4:34	
X IO24		38:29	118	0:25	9:26	
Y IO25		38:06	121	0:24	9:19	
Z IO26		44:48	132	0:28	11:01	
AA IO27		66:05	146	0:43	16:17	
AB IO28		80:26	151	0:50	19:51	
AC IO29		84:39	155	0:53	20:54	
AD IO30		81:27	155	0:50	20:08	
AE IO31		80:29	153	0:49	19:54	
AF IO32		79:29	153	0:49	19:39	
AG IO33		75:21	156	0:50	18:43	
AH IO34		65:42	147	0:44	16:10	
AI IO35		55:38	148	0:36	13:48	
AJ IO36		50:22	152	0:35	12:34	
AK IO37		55:08	140	0:39	13:34	

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
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Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:41/3.2.744

SHADOW - Hauptergebnis

Berechnung: VB

...(Fortsetzung von letzter Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr	
		[h/a]	[d/a]	[h/d]	[h/a]	
AL	IO38	49:41	137	0:33	12:14	
AM	IO39	55:58	141	0:36	13:48	
AN	IO40	50:49	136	0:34	12:30	
AO	IO41	45:15	134	0:30	11:07	
AP	IO42	39:20	128	0:26	9:38	
AQ	IO43	35:23	124	0:23	8:40	
AR	IO44	34:16	123	0:23	8:22	
AS	IO45	38:14	126	0:26	9:19	
AT	IO46	43:57	132	0:31	10:47	
AU	IO47	46:24	135	0:33	11:24	
AV	IO48	43:55	134	0:32	10:46	
AW	IO49	0:00	0	0:00	0:00	
AX	IO50	0:00	0	0:00	0:00	
AY	IO51	8:55	35	0:19	2:22	
AZ	IO52	16:04	48	0:24	4:19	
BA	IO53	21:30	62	0:24	5:51	
BB	IO54	25:19	73	0:24	6:59	
BC	IO55	22:54	61	0:26	6:14	
BD	IO56	28:11	76	0:26	7:47	
BE	IO57	27:44	80	0:25	7:41	
BF	IO58	24:30	88	0:24	6:51	
BG	IO59	28:10	75	0:26	7:46	
BH	IO60	29:13	80	0:27	8:06	
BI	IO61	28:45	79	0:26	7:58	
BJ	IO62	30:08	83	0:27	8:22	
BK	IO63	29:38	82	0:26	8:13	
BL	IO64	28:13	88	0:26	7:53	
BM	IO65	28:38	84	0:26	7:58	
BN	IO66	26:27	94	0:25	7:26	
BO	IO67	31:49	85	0:28	8:51	
BP	IO68	29:44	96	0:27	8:22	
BQ	IO69	28:33	96	0:27	8:02	
BR	IO70	27:55	98	0:25	7:51	
BS	IO71	31:38	105	0:25	8:54	
BT	IO72	30:47	102	0:26	8:40	
BU	IO73	32:18	105	0:26	9:06	
BV	IO74	32:30	103	0:27	9:09	
BW	IO75	33:27	107	0:26	9:25	
BX	IO76	34:04	107	0:27	9:35	
BY	IO77	34:23	108	0:27	9:41	
BZ	IO78	35:17	110	0:27	9:55	
CA	IO79	36:29	114	0:26	10:12	
CB	IO80	33:48	106	0:28	9:32	
CC	IO81	34:41	105	0:30	9:49	
CD	IO82	34:30	105	0:29	9:45	
CE	IO83	35:54	108	0:28	10:06	
CF	IO84	37:04	112	0:28	10:24	
CG	IO85	37:43	115	0:27	10:31	
CH	IO86	37:02	117	0:26	10:19	
CI	IO87	34:08	120	0:25	9:30	
CJ	IO88	31:59	123	0:25	8:55	
CK	IO89	30:51	122	0:25	8:36	
CL	IO90	31:39	123	0:24	8:49	
CM	IO91	32:17	122	0:25	9:00	
CN	IO92	32:59	122	0:25	9:12	
CO	IO93	33:35	124	0:25	9:21	
CP	IO94	34:18	126	0:24	9:32	
CQ	IO95	34:02	123	0:24	9:28	
CR	IO96	35:52	125	0:23	9:57	
CS	IO97	37:09	125	0:24	10:18	
CT	IO98	37:36	129	0:24	10:25	
CU	IO99	36:03	127	0:25	10:00	
CV	IO100	39:03	129	0:25	10:49	
CW	IO101	36:32	127	0:25	10:08	

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Projekt:
20190529_Bostelwiebeck II

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Berechnet:
05.08.2019 09:41/3.2.744

SHADOW - Hauptergebnis

Berechnung: VB

...(Fortsetzung von letzter Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr	
		[h/a]	[d/a]	[h/d]	[h/a]	
CX	IO102	37:09	126	0:25	10:18	
CY	IO103	39:09	129	0:24	10:50	
CZ	IO104	38:45	128	0:25	10:44	
DA	IO105	39:33	129	0:25	10:57	
DB	IO106	40:34	130	0:25	11:12	
DC	IO107	40:29	128	0:26	11:12	
DD	IO108	42:06	132	0:26	11:37	
DE	IO109	42:26	133	0:27	11:42	
DF	IO110	43:37	134	0:27	12:00	
DG	IO111	44:02	135	0:28	12:06	
DH	IO112	45:43	136	0:28	12:30	
DI	IO113	50:35	145	0:30	13:35	
DJ	IO114	51:39	143	0:31	13:52	
DK	IO115	49:14	142	0:30	13:17	
DL	IO116	42:51	132	0:27	11:49	
DM	IO117	43:58	133	0:28	12:06	
DN	IO118	41:57	132	0:28	11:35	
DO	IO119	39:57	128	0:27	11:03	
DP	IO120	39:08	128	0:27	10:50	
DQ	IO121	35:55	127	0:27	10:01	
DR	IO122	37:25	123	0:27	10:25	
DS	IO123	39:17	120	0:27	10:55	
DT	IO124	38:52	120	0:27	10:48	
DU	IO125	41:55	123	0:28	11:39	
DV	IO126	40:58	128	0:29	11:24	
DW	IO127	38:07	128	0:28	10:37	
DX	IO128	39:11	130	0:28	10:55	
DY	IO129	39:57	128	0:28	11:06	
DZ	IO130	40:52	130	0:29	11:21	
EA	IO131	41:52	131	0:28	11:35	
EB	IO132	42:02	131	0:29	11:39	
EC	IO133	43:36	132	0:29	12:01	
ED	IO134	43:25	133	0:29	11:58	
EE	IO135	43:43	133	0:29	12:05	
EF	IO136	43:45	130	0:30	12:09	
EG	IO137	47:47	127	0:31	13:15	
EH	IO138	46:16	126	0:30	12:50	
EI	IO139	45:14	127	0:30	12:34	
EJ	IO140	43:20	128	0:29	12:03	
EK	IO141	39:11	130	0:28	10:55	
EL	IO142	44:35	125	0:29	12:23	
EM	IO143	45:32	122	0:30	12:38	
EN	IO144	44:05	121	0:30	12:15	
EO	IO145	42:48	122	0:29	11:53	
EP	IO146	41:53	118	0:29	11:38	
EQ	IO147	41:32	117	0:29	11:34	
ER	IO148	41:55	117	0:30	11:42	
ES	IO149	40:41	114	0:30	11:23	
ET	IO150	38:02	110	0:30	10:41	
EU	IO151	39:26	113	0:31	11:04	
EV	IO152	38:52	110	0:31	10:56	
EW	IO153	37:19	109	0:30	10:31	
EX	IO154	37:07	109	0:31	10:28	
EY	IO155	38:19	110	0:32	10:48	
EZ	IO156	38:21	109	0:32	10:50	
FA	IO157	38:01	107	0:33	10:46	
FB	IO158	36:16	106	0:31	10:16	
FC	IO159	22:41	58	0:28	6:09	
FD	IO160	19:16	51	0:28	5:11	
FE	IO161	31:56	66	0:40	8:43	
FF	IO162	128:27	175	1:22	17:04	

Projekt:
20190529_Bostelwiebeck II

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Berechnet:
05.08.2019 09:41/3.2.744

SHADOW - Hauptergebnis

Berechnung: VB

Gesamtmenge der max. mögl. Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]	Erwartet [h/a]
1	W4	197:16	51:16
2	W5	83:35	15:46
3	W6	104:58	22:51
4	W7	89:10	20:38
5	W8	162:12	38:36
6	W9	157:40	37:42
7	W10	196:01	40:00
8	W11	0:00	0:00
9	W12	0:00	0:00
10	W13	0:00	0:00
11	W14	0:00	0:00

Summen in Rezeptortabelle und WEA-Tabelle können sich unterscheiden, da eine WEA gleichzeitig an zwei oder mehr Rezeptoren Beschattung verursachen kann und/oder ein Rezeptor gleichzeitig von zwei oder mehr WEA beschattet werden kann.

Anhang 3 / Hauptergebnis: Zusatzbelastung

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
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Berechnet:
05.08.2019 09:30/3.2.744

SHADOW - Hauptergebnis

Berechnung: ZB / EWB

Voraussetzungen für Berechnung des Schattenwurfs

Beschattungsbereich der WEA
Schatten nur relevant, wo Rotorblatt mind. 20% der Sonne verdeckt
Siehe WEA-Tabelle

Minimale relevante Sonnenhöhe über Horizont 3 °
Tage zwischen Berechnungen 1 Tag(e)
Berechnungszeitsprung 1 Minuten

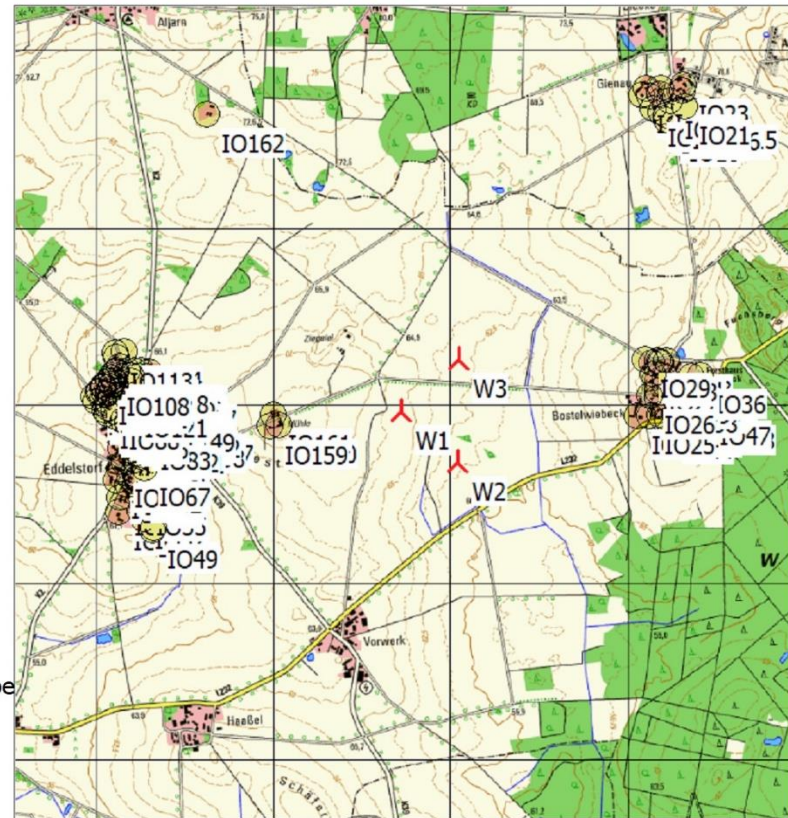
Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASSEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsstunden ermittelt aus WEA in Berechnung und Windverteilung:
Terraindaten: WAsP (12)

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 337 468 707 787 616 554 814 1,348 1,332 722 398 8,385
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Eine WEA wird nicht berücksichtigt, wenn sie von keinem Teil der Rezeptorfläche aus sichtbar ist. Die Sichtbarkeitsberechnung basiert auf den folgenden Annahmen:
Verwendete Höhenlinien: Höhenlinien: CONTOURLINE_20190529_Bostelwiebeck
Hindernisse in Berechnung verwendet
Berechnungshöhe ü.Gr. für Karte: 1.5 m
Rasterauflösung: 1.0 m

Alle Koordinatenangaben in:
UTM (north)-ETRS89 Zone: 32



Maßstab 1:50,000
Neue WEA Schattenrezeptor

WEA

Ost	Nord	Z	Beschreibung	WEA-Typ			Nennleistung [kW]	Rotordurchmesser [m]	Nabenhöhe [m]	Schattendaten	
				Aktuell	Hersteller	Typ				Beschatt.-Bereich [m]	U/min [U/min]
1	609,729	5,889,960	63.9 W1	Ja	VESTAS	V162-5.6MW-5,600	5,600	162.0	169.0	1,993	12.1
2	610,042	5,889,672	61.7 W2	Ja	VESTAS	V162-5.6MW-5,600	5,600	162.0	169.0	1,993	12.1
3	610,054	5,890,253	63.1 W3	Ja	VESTAS	V162-5.6MW-5,600	5,600	162.0	169.0	1,993	12.1

Schattenrezeptor-Eingabe

Nr.	Name	Ost	Nord	Z	Breite [m]	Höhe [m]	Höhe ü.Gr. [m]	Neigung des Fensters [°]	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr. [m]
A	IO1	611,082	5,891,745	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
B	IO2	611,112	5,891,786	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
C	IO3	611,126	5,891,741	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
D	IO4	611,189	5,891,787	78.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
E	IO5	611,186	5,891,752	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
F	IO6	611,150	5,891,672	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
G	IO7	611,189	5,891,648	77.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
H	IO8	611,223	5,891,628	78.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
I	IO9	611,222	5,891,605	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
J	IO10	611,269	5,891,589	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
K	IO11	611,275	5,891,628	78.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
L	IO12	611,315	5,891,619	76.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
M	IO13	611,417	5,891,638	77.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
N	IO14	611,436	5,891,626	77.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
O	IO15	611,476	5,891,659	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
P	IO16	611,386	5,891,650	76.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
Q	IO17	611,308	5,891,649	76.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
R	IO18	611,297	5,891,654	76.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
S	IO19	611,286	5,891,658	77.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
T	IO20	611,244	5,891,712	77.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
U	IO21	611,326	5,891,681	76.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
V	IO22	611,311	5,891,770	77.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
W	IO23	611,319	5,891,803	78.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

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Berechnet:
05.08.2019 09:30/3.2.744

SHADOW - Hauptergebnis

Berechnung: ZB / EWB

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe	Neigung des	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
					[m]	[m]	ü.Gr.	Fensters		[m]
X	IO24	611,058	5,889,934	70.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
Y	IO25	611,126	5,889,935	71.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
Z	IO26	611,126	5,890,046	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AA	IO27	611,146	5,890,172	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AB	IO28	611,142	5,890,231	70.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AC	IO29	611,104	5,890,254	70.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AD	IO30	611,174	5,890,244	71.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AE	IO31	611,183	5,890,239	71.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AF	IO32	611,190	5,890,235	71.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AG	IO33	611,221	5,890,246	71.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AH	IO34	611,220	5,890,151	71.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AI	IO35	611,362	5,890,157	71.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AJ	IO36	611,418	5,890,164	72.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AK	IO37	611,287	5,890,083	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AL	IO38	611,254	5,890,056	70.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AM	IO39	611,220	5,890,104	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AN	IO40	611,172	5,890,077	71.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AO	IO41	611,173	5,890,035	70.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AP	IO42	611,203	5,889,985	70.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AQ	IO43	611,185	5,889,938	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AR	IO44	611,228	5,889,910	70.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AS	IO45	611,277	5,889,950	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AT	IO46	611,413	5,889,973	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AU	IO47	611,442	5,889,986	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AV	IO48	611,465	5,889,960	70.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AW	IO49	608,323	5,889,288	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AX	IO50	608,330	5,889,303	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AY	IO51	608,270	5,889,354	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
AZ	IO52	608,250	5,889,401	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BA	IO53	608,134	5,889,389	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BB	IO54	608,137	5,889,473	60.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BC	IO55	608,261	5,889,477	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BD	IO56	608,225	5,889,548	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BE	IO57	608,182	5,889,548	60.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BF	IO58	608,116	5,889,568	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BG	IO59	608,226	5,889,546	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BH	IO60	608,242	5,889,585	60.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BI	IO61	608,234	5,889,577	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BJ	IO62	608,235	5,889,605	60.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BK	IO63	608,229	5,889,597	60.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BL	IO64	608,221	5,889,628	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BM	IO65	608,197	5,889,592	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BN	IO66	608,141	5,889,633	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BO	IO67	608,278	5,889,641	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BP	IO68	608,251	5,889,707	61.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BQ	IO69	608,225	5,889,685	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BR	IO70	608,166	5,889,671	60.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BS	IO71	608,146	5,889,751	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BT	IO72	608,199	5,889,736	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BU	IO73	608,183	5,889,768	61.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BV	IO74	608,209	5,889,773	61.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BW	IO75	608,168	5,889,795	62.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BX	IO76	608,198	5,889,813	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BY	IO77	608,226	5,889,818	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
BZ	IO78	608,207	5,889,839	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CA	IO79	608,158	5,889,872	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CB	IO80	608,274	5,889,810	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CC	IO81	608,363	5,889,825	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CD	IO82	608,326	5,889,830	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CE	IO83	608,287	5,889,848	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CF	IO84	608,238	5,889,871	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CG	IO85	608,183	5,889,897	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CH	IO86	608,156	5,889,908	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CI	IO87	608,120	5,889,927	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:30/3.2.744

SHADOW - Hauptergebnis

Berechnung: ZB / EWB

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe	Neigung des	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
					[m]	[m]	ü.Gr.	Fensters		[m]
CJ	IO88	608,106	5,889,958	61.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CK	IO89	608,068	5,889,945	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CL	IO90	608,052	5,889,964	61.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CM	IO91	608,073	5,889,982	60.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CN	IO92	608,062	5,889,996	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CO	IO93	608,074	5,890,007	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CP	IO94	608,044	5,890,028	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CQ	IO95	608,004	5,890,015	60.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CR	IO96	607,992	5,890,041	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CS	IO97	608,016	5,890,066	60.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CT	IO98	608,022	5,890,074	61.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CU	IO99	608,057	5,890,058	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CV	IO100	608,042	5,890,097	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CW	IO101	608,074	5,890,070	61.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CX	IO102	608,083	5,890,080	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CY	IO103	608,048	5,890,102	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CZ	IO104	608,087	5,890,103	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DA	IO105	608,094	5,890,116	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DB	IO106	608,071	5,890,131	62.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DC	IO107	608,107	5,890,132	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DD	IO108	608,091	5,890,154	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DE	IO109	608,096	5,890,161	63.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DF	IO110	608,114	5,890,183	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DG	IO111	608,119	5,890,189	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DH	IO112	608,135	5,890,218	64.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DI	IO113	608,115	5,890,290	65.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DJ	IO114	608,164	5,890,300	65.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DK	IO115	608,120	5,890,267	64.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DL	IO116	608,153	5,890,171	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DM	IO117	608,180	5,890,191	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DN	IO118	608,200	5,890,166	64.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DO	IO119	608,201	5,890,133	63.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DP	IO120	608,157	5,890,119	62.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DQ	IO121	608,194	5,890,032	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DR	IO122	608,197	5,889,998	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DS	IO123	608,200	5,889,944	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DT	IO124	608,199	5,889,964	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DU	IO125	608,250	5,890,003	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DV	IO126	608,261	5,890,049	63.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DW	IO127	608,234	5,890,086	63.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DX	IO128	608,269	5,890,080	63.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DY	IO129	608,241	5,890,125	63.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DZ	IO130	608,280	5,890,133	64.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EA	IO131	608,247	5,890,158	63.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EB	IO132	608,289	5,890,156	64.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EC	IO133	608,256	5,890,190	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
ED	IO134	608,221	5,890,190	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EE	IO135	608,304	5,890,184	64.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EF	IO136	608,313	5,890,096	63.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EG	IO137	608,352	5,890,079	63.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EH	IO138	608,330	5,890,054	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EI	IO139	608,311	5,890,064	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EJ	IO140	608,295	5,890,073	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EK	IO141	608,269	5,890,080	63.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EL	IO142	608,301	5,890,037	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EM	IO143	608,328	5,890,028	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EN	IO144	608,323	5,889,999	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EO	IO145	608,275	5,889,998	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EP	IO146	608,271	5,889,976	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EQ	IO147	608,303	5,889,959	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
ER	IO148	608,329	5,889,960	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
ES	IO149	608,349	5,889,948	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
ET	IO150	608,332	5,889,901	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EU	IO151	608,363	5,889,930	62.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
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DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:30/3.2.744

SHADOW - Hauptergebnis

Berechnung: ZB / EWB

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
					[m]	[m]	[m]	[°]		[m]
EV	IO152	608,380	5,889,917	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EW	IO153	608,344	5,889,882	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EX	IO154	608,369	5,889,880	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EY	IO155	608,401	5,889,908	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EZ	IO156	608,420	5,889,906	61.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FA	IO157	608,449	5,889,886	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FB	IO158	608,403	5,889,860	61.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FC	IO159	608,985	5,889,879	72.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FD	IO160	609,038	5,889,885	72.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FE	IO161	609,008	5,889,941	72.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
FF	IO162	608,631	5,891,636	72.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr	[h/a]
		[h/a]	[d/a]	[h/d]		
A	IO1	9:58	38	0:20	0:55	
B	IO2	8:40	34	0:19	0:48	
C	IO3	12:17	42	0:21	1:09	
D	IO4	12:01	42	0:21	1:08	
E	IO5	13:53	46	0:22	1:19	
F	IO6	17:14	52	0:23	1:41	
G	IO7	19:22	58	0:23	1:56	
H	IO8	19:48	62	0:22	2:02	
I	IO9	19:55	66	0:23	2:04	
J	IO10	17:34	70	0:22	1:53	
K	IO11	18:14	66	0:22	1:55	
L	IO12	15:46	70	0:22	1:43	
M	IO13	11:10	48	0:21	1:17	
N	IO14	10:30	46	0:21	1:13	
O	IO15	0:00	0	0:00	0:00	
P	IO16	12:29	57	0:21	1:24	
Q	IO17	17:04	66	0:22	1:48	
R	IO18	17:44	66	0:22	1:52	
S	IO19	18:10	64	0:22	1:53	
T	IO20	17:42	56	0:22	1:45	
U	IO21	16:51	64	0:21	1:46	
V	IO22	16:28	54	0:21	1:38	
W	IO23	0:00	0	0:00	0:00	
X	IO24	69:36	158	0:37	16:55	
Y	IO25	58:43	142	0:35	14:15	
Z	IO26	53:15	128	0:35	12:39	
AA	IO27	48:09	120	0:34	10:58	
AB	IO28	47:15	119	0:34	10:34	
AC	IO29	50:04	123	0:35	11:06	
AD	IO30	44:41	116	0:33	9:54	
AE	IO31	44:15	115	0:33	9:50	
AF	IO32	43:47	114	0:33	9:45	
AG	IO33	41:21	109	0:32	9:08	
AH	IO34	43:05	116	0:32	9:49	
AI	IO35	34:32	102	0:29	7:48	
AJ	IO36	31:35	98	0:27	7:06	
AK	IO37	39:33	110	0:30	9:11	
AL	IO38	42:24	113	0:31	9:57	
AM	IO39	43:52	116	0:32	10:08	
AN	IO40	48:21	122	0:34	11:21	
AO	IO41	49:14	125	0:33	11:42	
AP	IO42	48:15	123	0:33	11:33	
AQ	IO43	51:30	132	0:33	12:29	
AR	IO44	48:25	128	0:32	11:48	
AS	IO45	42:52	116	0:30	10:20	
AT	IO46	34:05	105	0:28	8:07	

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
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Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:30/3.2.744

SHADOW - Hauptergebnis

Berechnung: ZB / EWB

...(Fortsetzung von letzter Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr	
		[h/a]	[d/a]	[h/d]	[h/a]	
AU	IO47	32:35	102	0:27	7:43	
AV	IO48	31:45	100	0:27	7:34	
AW	IO49	37:02	94	0:38	10:23	
AX	IO50	36:52	95	0:39	10:22	
AY	IO51	22:24	75	0:25	6:20	
AZ	IO52	20:50	70	0:25	5:51	
BA	IO53	17:26	63	0:23	4:52	
BB	IO54	17:01	62	0:23	4:35	
BC	IO55	29:15	80	0:41	8:12	
BD	IO56	26:52	78	0:40	7:20	
BE	IO57	17:40	61	0:24	4:38	
BF	IO58	15:57	58	0:23	4:09	
BG	IO59	26:55	78	0:39	7:21	
BH	IO60	27:11	78	0:40	7:20	
BI	IO61	27:00	76	0:39	7:18	
BJ	IO62	26:32	79	0:38	7:06	
BK	IO63	26:25	76	0:38	7:05	
BL	IO64	25:52	76	0:37	6:51	
BM	IO65	25:24	76	0:38	6:48	
BN	IO66	16:15	58	0:23	4:09	
BO	IO67	27:55	78	0:39	7:25	
BP	IO68	26:26	79	0:36	6:49	
BQ	IO69	25:35	79	0:36	6:39	
BR	IO70	23:41	76	0:34	6:09	
BS	IO71	22:31	75	0:30	5:39	
BT	IO72	24:15	76	0:33	6:09	
BU	IO73	23:33	75	0:30	5:54	
BV	IO74	24:20	77	0:32	6:06	
BW	IO75	23:12	76	0:30	5:46	
BX	IO76	23:48	78	0:30	5:54	
BY	IO77	24:44	79	0:30	6:08	
BZ	IO78	24:02	78	0:29	5:55	
CA	IO79	22:10	75	0:26	5:21	
CB	IO80	26:27	82	0:33	6:36	
CC	IO81	29:54	86	0:37	7:28	
CD	IO82	28:13	82	0:34	7:01	
CE	IO83	26:40	81	0:32	6:35	
CF	IO84	24:50	80	0:29	6:03	
CG	IO85	22:50	76	0:25	5:27	
CH	IO86	21:54	74	0:24	5:12	
CI	IO87	20:52	76	0:23	4:53	
CJ	IO88	20:40	74	0:23	4:45	
CK	IO89	13:49	52	0:23	3:01	
CL	IO90	8:16	29	0:22	1:51	
CM	IO91	8:28	29	0:23	1:52	
CN	IO92	8:17	28	0:22	1:49	
CO	IO93	8:26	30	0:23	1:50	
CP	IO94	8:06	28	0:22	1:44	
CQ	IO95	7:36	27	0:21	1:38	
CR	IO96	7:34	27	0:21	1:36	
CS	IO97	7:49	28	0:22	1:38	
CT	IO98	7:43	27	0:22	1:37	
CU	IO99	8:14	29	0:22	1:44	
CV	IO100	7:52	27	0:22	1:38	
CW	IO101	14:01	50	0:22	3:09	
CX	IO102	14:12	52	0:23	3:11	
CY	IO103	8:02	28	0:22	1:40	
CZ	IO104	14:10	52	0:23	3:09	
DA	IO105	14:17	51	0:23	3:10	
DB	IO106	13:52	51	0:23	3:03	
DC	IO107	19:54	77	0:23	4:10	
DD	IO108	13:55	52	0:22	3:02	
DE	IO109	14:11	52	0:23	3:05	
DF	IO110	14:23	53	0:23	3:05	

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:30/3.2.744

SHADOW - Hauptergebnis

Berechnung: ZB / EWB

...(Fortsetzung von letzter Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr	Stunden/Jahr
		[h/a]	[d/a]	[h/d]	[h/a]	
DG	IO111	19:59	77	0:23	4:05	
DH	IO112	20:16	77	0:23	4:04	
DI	IO113	14:03	52	0:22	2:49	
DJ	IO114	20:47	76	0:23	3:58	
DK	IO115	14:16	53	0:23	2:54	
DL	IO116	20:49	78	0:23	4:17	
DM	IO117	21:35	80	0:23	4:24	
DN	IO118	22:17	80	0:24	4:36	
DO	IO119	22:24	81	0:24	4:41	
DP	IO120	21:19	79	0:24	4:29	
DQ	IO121	22:37	80	0:24	4:58	
DR	IO122	22:50	79	0:24	5:08	
DS	IO123	23:11	78	0:25	5:24	
DT	IO124	23:00	78	0:24	5:17	
DU	IO125	24:27	81	0:25	5:30	
DV	IO126	24:39	82	0:25	5:23	
DW	IO127	23:24	82	0:25	5:00	
DX	IO128	24:36	82	0:25	5:17	
DY	IO129	23:40	82	0:25	4:58	
DZ	IO130	24:51	85	0:25	5:12	
EA	IO131	23:49	83	0:25	4:56	
EB	IO132	24:50	85	0:25	5:09	
EC	IO133	23:49	84	0:25	4:51	
ED	IO134	22:42	81	0:24	4:38	
EE	IO135	25:12	84	0:26	5:09	
EF	IO136	26:11	85	0:26	5:34	
EG	IO137	27:39	87	0:27	5:57	
EH	IO138	26:54	86	0:27	5:52	
EI	IO139	26:12	85	0:26	5:41	
EJ	IO140	25:31	83	0:26	5:30	
EK	IO141	24:36	82	0:25	5:17	
EL	IO142	25:58	84	0:26	5:44	
EM	IO143	27:08	85	0:27	6:02	
EN	IO144	27:06	84	0:27	6:09	
EO	IO145	25:29	82	0:26	5:46	
EP	IO146	25:22	82	0:26	5:49	
EQ	IO147	26:32	82	0:27	6:10	
ER	IO148	27:27	84	0:28	6:23	
ES	IO149	28:32	86	0:30	6:42	
ET	IO150	28:04	84	0:31	6:47	
EU	IO151	29:06	86	0:31	6:55	
EV	IO152	29:55	88	0:33	7:11	
EW	IO153	28:29	84	0:33	6:58	
EX	IO154	29:40	86	0:35	7:17	
EY	IO155	31:00	88	0:35	7:30	
EZ	IO156	31:48	89	0:36	7:44	
FA	IO157	33:18	91	0:38	8:12	
FB	IO158	31:23	88	0:38	7:47	
FC	IO159	94:49	144	1:14	24:58	
FD	IO160	110:20	156	1:20	29:10	
FE	IO161	94:06	147	1:12	23:51	
FF	IO162	13:06	64	0:20	1:11	

Gesamtmenge der max. mögl. Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal Erwartet	
		[h/a]	[h/a]
1	W1	212:41	54:23
2	W2	144:12	30:17
3	W3	253:57	57:35

Summen in Rezeptortabelle und WEA-Tabelle können sich unterscheiden, da eine WEA gleichzeitig an zwei oder mehr Rezeptoren Beschattung verursachen kann und/oder ein Rezeptor gleichzeitig von zwei oder mehr WEA beschattet werden kann.

Anhang 4 / Hauptergebnis & detaillierte Ergebnisse: Gesamtbelastung

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Hauptergebnis

Berechnung: GB

Voraussetzungen für Berechnung des Schattenwurfs

Beschattungsbereich der WEA
Schatten nur relevant, wo Rotorblatt mind. 20% der Sonne verdeckt
Siehe WEA-Tabelle

Minimale relevante Sonnenhöhe über Horizont 3 °
Tage zwischen Berechnungen 1 Tag(e)
Berechnungszeitsprung 1 Minuten

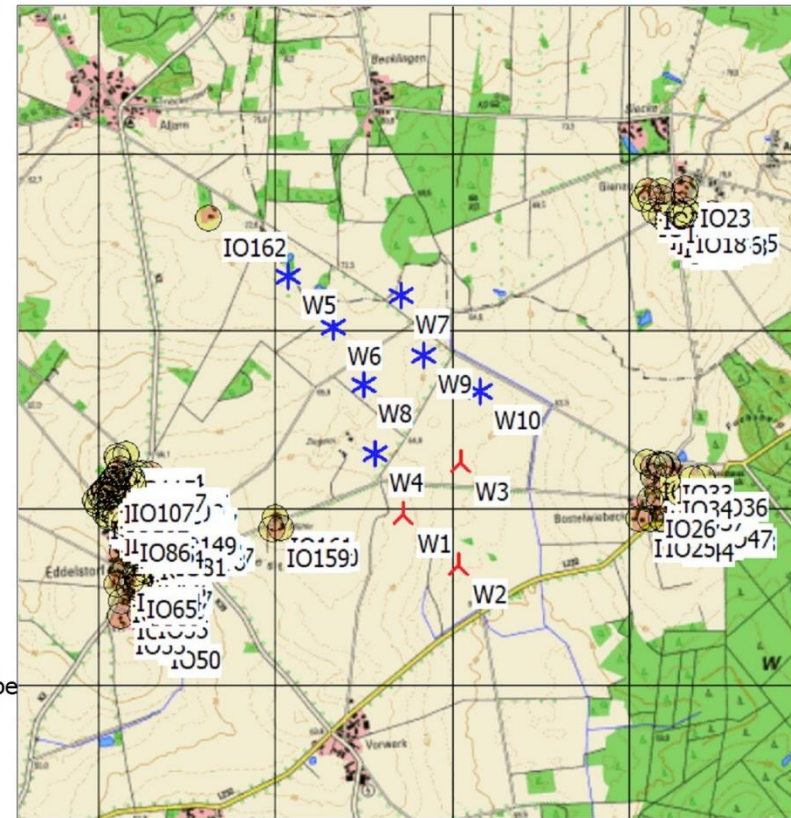
Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsstunden ermittelt aus WEA in Berechnung und Windverteilung:
Terraindaten: WAsP (12)

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Eine WEA wird nicht berücksichtigt, wenn sie von keinem Teil der Rezeptorfläche aus sichtbar ist. Die Sichtbarkeitsberechnung basiert auf den folgenden Annahmen:
Verwendete Höhenlinien: Höhenlinien: CONTOURLINE_20190529_Bostelwiebeck
Hindernisse in Berechnung verwendet
Berechnungshöhe ü.Gr. für Karte: 1.5 m
Rasterauflösung: 1.0 m

Alle Koordinatenangaben in:
UTM (north)-ETRS89 Zone: 32



Maßstab 1:50,000
Neue WEA Existierende WEA Schattenrezeptor

WEA

Ost	Nord	Z	Beschreibung	WEA-Typ		Typ	Nennleistung	Rotor-durchmesser	Nabenhöhe	Schattendaten	
				Aktuell	Hersteller					Beschatt.-Bereich	U/min
		[m]					[kW]	[m]	[m]	[m]	[U/min]
1	609,729	5,889,960	63.9 W1	Ja	VESTAS	V162-5.6MW-5,600	5,600	162.0	169.0	1,993	12.1
2	610,042	5,889,672	61.7 W2	Ja	VESTAS	V162-5.6MW-5,600	5,600	162.0	169.0	1,993	12.1
3	610,054	5,890,253	63.1 W3	Ja	VESTAS	V162-5.6MW-5,600	5,600	162.0	169.0	1,993	12.1
4	609,566	5,890,307	64.1 W4	Ja	VESTAS	V162-5.6MW-5,600	5,600	162.0	169.0	1,993	12.1
5	609,077	5,891,308	72.8 W5	Ja	GE WIND ENERGY	GE 3.6-137-3,630	3,630	137.0	164.5	2,500	0.0
6	609,333	5,891,020	68.2 W6	Ja	GE WIND ENERGY	GE 3.6-137-3,630	3,630	137.0	164.5	2,500	0.0
7	609,713	5,891,198	69.1 W7	Ja	GE WIND ENERGY	GE 3.6-137-3,630	3,630	137.0	164.5	2,500	0.0
8	609,505	5,890,698	66.1 W8	Ja	GE WIND ENERGY	GE 3.6-137-3,630	3,630	137.0	164.5	2,500	0.0
9	609,841	5,890,865	65.1 W9	Ja	GE WIND ENERGY	GE 3.6-137-3,630	3,630	137.0	164.5	2,500	0.0
10	610,162	5,890,660	64.0 W10	Nein	GE WIND ENERGY	GE 5.3-158-5,300	5,300	158.0	161.0	1,816	9.7

Schattenrezeptor-Eingabe

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
A	IO1	611,082	5,891,745	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
B	IO2	611,112	5,891,786	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
C	IO3	611,126	5,891,741	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
D	IO4	611,189	5,891,787	78.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
E	IO5	611,186	5,891,752	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
F	IO6	611,150	5,891,672	77.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
G	IO7	611,189	5,891,648	77.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
H	IO8	611,223	5,891,628	78.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
I	IO9	611,222	5,891,605	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
J	IO10	611,269	5,891,589	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
K	IO11	611,275	5,891,628	78.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
L	IO12	611,315	5,891,619	76.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
M	IO13	611,417	5,891,638	77.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
N	IO14	611,436	5,891,626	77.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Hauptergebnis

Berechnung: GB

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe	Neigung des	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
					[m]	[m]	ü.Gr.	Fensters		[m]
O IO15	611,476	5,891,659	78.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
P IO16	611,386	5,891,650	76.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
Q IO17	611,308	5,891,649	76.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
R IO18	611,297	5,891,654	76.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
S IO19	611,286	5,891,658	77.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
T IO20	611,244	5,891,712	77.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
U IO21	611,326	5,891,681	76.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
V IO22	611,311	5,891,770	77.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
W IO23	611,319	5,891,803	78.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
X IO24	611,058	5,889,934	70.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
Y IO25	611,126	5,889,935	71.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
Z IO26	611,126	5,890,046	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AA IO27	611,146	5,890,172	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AB IO28	611,142	5,890,231	70.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AC IO29	611,104	5,890,254	70.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AD IO30	611,174	5,890,244	71.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AE IO31	611,183	5,890,239	71.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AF IO32	611,190	5,890,235	71.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AG IO33	611,221	5,890,246	71.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AH IO34	611,220	5,890,151	71.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AI IO35	611,362	5,890,157	71.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AJ IO36	611,418	5,890,164	72.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AK IO37	611,287	5,890,083	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AL IO38	611,254	5,890,056	70.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AM IO39	611,220	5,890,104	71.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AN IO40	611,172	5,890,077	71.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AO IO41	611,173	5,890,035	70.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AP IO42	611,203	5,889,985	70.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AQ IO43	611,185	5,889,938	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AR IO44	611,228	5,889,910	70.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AS IO45	611,277	5,889,950	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AT IO46	611,413	5,889,973	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AU IO47	611,442	5,889,986	70.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AV IO48	611,465	5,889,960	70.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AW IO49	608,323	5,889,288	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AX IO50	608,330	5,889,303	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AY IO51	608,270	5,889,354	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
AZ IO52	608,250	5,889,401	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BA IO53	608,134	5,889,389	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BB IO54	608,137	5,889,473	60.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BC IO55	608,261	5,889,477	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BD IO56	608,225	5,889,548	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BE IO57	608,182	5,889,548	60.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BF IO58	608,116	5,889,568	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BG IO59	608,226	5,889,546	60.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BH IO60	608,242	5,889,585	60.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BI IO61	608,234	5,889,577	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BJ IO62	608,235	5,889,605	60.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BK IO63	608,229	5,889,597	60.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BL IO64	608,221	5,889,628	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BM IO65	608,197	5,889,592	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BN IO66	608,141	5,889,633	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BO IO67	608,278	5,889,641	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BP IO68	608,251	5,889,707	61.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BQ IO69	608,225	5,889,685	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BR IO70	608,166	5,889,671	60.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BS IO71	608,146	5,889,751	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BT IO72	608,199	5,889,736	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BU IO73	608,183	5,889,768	61.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BV IO74	608,209	5,889,773	61.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BW IO75	608,168	5,889,795	62.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BX IO76	608,198	5,889,813	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BY IO77	608,226	5,889,818	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
BZ IO78	608,207	5,889,839	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Hauptergebnis

Berechnung: GB

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe	Neigung des	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
					[m]	[m]	ü.Gr.	Fensters		[m]
CA	IO79	608,158	5,889,872	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CB	IO80	608,274	5,889,810	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CC	IO81	608,363	5,889,825	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CD	IO82	608,326	5,889,830	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CE	IO83	608,287	5,889,848	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CF	IO84	608,238	5,889,871	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CG	IO85	608,183	5,889,897	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CH	IO86	608,156	5,889,908	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CI	IO87	608,120	5,889,927	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CJ	IO88	608,106	5,889,958	61.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CK	IO89	608,068	5,889,945	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CL	IO90	608,052	5,889,964	61.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CM	IO91	608,073	5,889,982	60.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CN	IO92	608,062	5,889,996	60.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CO	IO93	608,074	5,890,007	60.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CP	IO94	608,044	5,890,028	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CQ	IO95	608,004	5,890,015	60.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CR	IO96	607,992	5,890,041	60.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CS	IO97	608,016	5,890,066	60.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CT	IO98	608,022	5,890,074	61.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CU	IO99	608,057	5,890,058	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CV	IO100	608,042	5,890,097	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CW	IO101	608,074	5,890,070	61.7	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CX	IO102	608,083	5,890,080	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CY	IO103	608,048	5,890,102	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
CZ	IO104	608,087	5,890,103	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DA	IO105	608,094	5,890,116	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DB	IO106	608,071	5,890,131	62.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DC	IO107	608,107	5,890,132	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DD	IO108	608,091	5,890,154	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DE	IO109	608,096	5,890,161	63.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DF	IO110	608,114	5,890,183	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DG	IO111	608,119	5,890,189	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DH	IO112	608,135	5,890,218	64.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DI	IO113	608,115	5,890,290	65.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DJ	IO114	608,164	5,890,300	65.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DK	IO115	608,120	5,890,267	64.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DL	IO116	608,153	5,890,171	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DM	IO117	608,180	5,890,191	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DN	IO118	608,200	5,890,166	64.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DO	IO119	608,201	5,890,133	63.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DP	IO120	608,157	5,890,119	62.9	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DQ	IO121	608,194	5,890,032	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DR	IO122	608,197	5,889,998	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DS	IO123	608,200	5,889,944	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DT	IO124	608,199	5,889,964	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DU	IO125	608,250	5,890,003	62.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DV	IO126	608,261	5,890,049	63.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DW	IO127	608,234	5,890,086	63.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DX	IO128	608,269	5,890,080	63.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DY	IO129	608,241	5,890,125	63.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
DZ	IO130	608,280	5,890,133	64.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EA	IO131	608,247	5,890,158	63.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EB	IO132	608,289	5,890,156	64.4	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EC	IO133	608,256	5,890,190	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
ED	IO134	608,221	5,890,190	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EE	IO135	608,304	5,890,184	64.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EF	IO136	608,313	5,890,096	63.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EG	IO137	608,352	5,890,079	63.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EH	IO138	608,330	5,890,054	63.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EI	IO139	608,311	5,890,064	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EJ	IO140	608,295	5,890,073	63.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EK	IO141	608,269	5,890,080	63.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0
EL	IO142	608,301	5,890,037	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"	2.0

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
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Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Hauptergebnis

Berechnung: GB

...(Fortsetzung von letzter Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
					[m]	[m]	[m]	[°]		[m]
EM IO143	608,328	5,890,028	64.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EN IO144	608,323	5,889,999	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EO IO145	608,275	5,889,998	62.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EP IO146	608,271	5,889,976	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EQ IO147	608,303	5,889,959	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
ER IO148	608,329	5,889,960	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
ES IO149	608,349	5,889,948	62.3	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
ET IO150	608,332	5,889,901	62.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EU IO151	608,363	5,889,930	62.0	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EV IO152	608,380	5,889,917	61.6	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EW IO153	608,344	5,889,882	62.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EX IO154	608,369	5,889,880	61.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EY IO155	608,401	5,889,908	61.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
EZ IO156	608,420	5,889,906	61.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FA IO157	608,449	5,889,886	60.8	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FB IO158	608,403	5,889,860	61.1	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FC IO159	608,985	5,889,879	72.2	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FD IO160	609,038	5,889,885	72.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FE IO161	609,008	5,889,941	72.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0
FF IO162	608,631	5,891,636	72.5	0.1	0.1	2.0	0.0	"Gewächshaus-Modus"		2.0

Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr	Stunden/Jahr
		[h/a]	[d/a]	[h/d]	[h/a]	
A IO1		61:42	157	0:42	8:03	
B IO2		57:45	155	0:40	7:26	
C IO3		59:50	159	0:39	7:50	
D IO4		53:49	156	0:36	7:01	
E IO5		53:53	158	0:35	7:10	
F IO6		58:44	166	0:37	8:03	
G IO7		57:08	169	0:34	7:57	
H IO8		55:05	172	0:31	7:46	
I IO9		55:27	175	0:30	7:55	
J IO10		50:27	178	0:27	7:25	
K IO11		50:24	172	0:28	7:14	
L IO12		46:04	173	0:25	6:48	
M IO13		36:55	147	0:24	5:42	
N IO14		35:35	145	0:24	5:35	
O IO15		23:12	102	0:23	4:01	
P IO16		39:25	156	0:24	5:57	
Q IO17		47:58	171	0:27	6:55	
R IO18		48:46	170	0:27	6:58	
S IO19		49:44	170	0:28	7:03	
T IO20		51:48	163	0:32	7:05	
U IO21		46:23	167	0:26	6:37	
V IO22		46:42	158	0:28	6:18	
W IO23		29:51	123	0:24	4:32	
X IO24		102:45	209	0:53	24:52	
Y IO25		91:21	208	0:49	22:06	
Z IO26		90:32	219	0:42	21:41	
AA IO27		106:36	231	0:43	25:15	
AB IO28		121:02	239	0:50	28:42	
AC IO29		128:24	245	0:53	30:22	
AD IO30		119:56	240	0:50	28:27	
AE IO31		118:28	238	0:49	28:07	
AF IO32		117:02	237	0:49	27:47	
AG IO33		110:53	235	0:50	26:22	
AH IO34		101:41	228	0:44	24:07	
AI IO35		84:05	223	0:36	20:02	
AJ IO36		76:15	223	0:35	18:13	
AK IO37		87:53	219	0:39	20:56	

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
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Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Hauptergebnis

Berechnung: GB

...(Fortsetzung von letzter Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr	Stunden/Jahr
		[h/a]	[d/a]	[h/d]	[h/a]	[h/a]
AL	IO38	85:07	215	0:33	20:19	20:19
AM	IO39	92:33	222	0:36	22:00	22:00
AN	IO40	91:35	220	0:35	21:49	21:49
AO	IO41	87:16	217	0:40	20:53	20:53
AP	IO42	81:17	209	0:40	19:31	19:31
AQ	IO43	81:25	208	0:45	19:42	19:42
AR	IO44	77:49	204	0:43	18:52	18:52
AS	IO45	75:36	204	0:37	18:12	18:12
AT	IO46	72:36	205	0:31	17:26	17:26
AU	IO47	73:32	206	0:33	17:38	17:38
AV	IO48	70:32	202	0:32	16:57	16:57
AW	IO49	37:02	94	0:38	10:23	10:23
AX	IO50	36:52	95	0:39	10:22	10:22
AY	IO51	31:19	110	0:25	8:41	8:41
AZ	IO52	36:54	118	0:25	10:08	10:08
BA	IO53	38:56	125	0:24	10:40	10:40
BB	IO54	42:20	135	0:24	11:30	11:30
BC	IO55	52:09	141	0:41	14:22	14:22
BD	IO56	55:03	154	0:40	15:02	15:02
BE	IO57	45:24	141	0:25	12:15	12:15
BF	IO58	40:27	146	0:24	10:56	10:56
BG	IO59	55:05	153	0:39	15:03	15:03
BH	IO60	56:24	158	0:40	15:21	15:21
BI	IO61	55:45	155	0:39	15:11	15:11
BJ	IO62	56:40	162	0:38	15:23	15:23
BK	IO63	56:03	158	0:38	15:13	15:13
BL	IO64	54:05	164	0:37	14:39	14:39
BM	IO65	54:02	160	0:38	14:40	14:40
BN	IO66	42:42	152	0:25	11:31	11:31
BO	IO67	59:44	163	0:39	16:10	16:10
BP	IO68	56:10	175	0:36	15:07	15:07
BQ	IO69	54:08	175	0:36	14:36	14:36
BR	IO70	51:36	174	0:34	13:55	13:55
BS	IO71	54:09	178	0:30	14:28	14:28
BT	IO72	55:02	178	0:33	14:44	14:44
BU	IO73	55:51	178	0:30	14:55	14:55
BV	IO74	56:50	179	0:32	15:10	15:10
BW	IO75	56:39	181	0:30	15:05	15:05
BX	IO76	57:52	183	0:30	15:23	15:23
BY	IO77	59:07	184	0:30	15:43	15:43
BZ	IO78	59:19	184	0:29	15:44	15:44
CA	IO79	58:39	185	0:26	15:26	15:26
CB	IO80	60:15	186	0:33	16:02	16:02
CC	IO81	64:35	189	0:37	17:11	17:11
CD	IO82	62:43	186	0:34	16:40	16:40
CE	IO83	62:34	187	0:32	16:35	16:35
CF	IO84	61:54	188	0:29	16:20	16:20
CG	IO85	60:33	187	0:27	15:52	15:52
CH	IO86	58:56	186	0:26	15:24	15:24
CI	IO87	54:59	190	0:27	14:17	14:17
CJ	IO88	52:27	190	0:26	13:31	13:31
CK	IO89	44:40	174	0:25	11:31	11:31
CL	IO90	39:55	152	0:24	10:35	10:35
CM	IO91	40:45	151	0:25	10:47	10:47
CN	IO92	41:16	150	0:25	10:55	10:55
CO	IO93	42:01	154	0:25	11:06	11:06
CP	IO94	42:24	154	0:24	11:10	11:10
CQ	IO95	41:38	150	0:24	11:00	11:00
CR	IO96	43:26	152	0:23	11:27	11:27
CS	IO97	44:58	153	0:24	11:50	11:50
CT	IO98	45:19	156	0:24	11:55	11:55
CU	IO99	44:17	156	0:25	11:38	11:38
CV	IO100	46:55	156	0:25	12:20	12:20
CW	IO101	49:24	167	0:25	12:54	12:54

(Fortsetzung nächste Seite)...

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Hauptergebnis

Berechnung: GB

...(Fortsetzung von letzter Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer			met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag	Stunden/Jahr	
		[h/a]	[d/a]	[h/d]	[h/a]	
CX	IO102	50:02	168	0:25	13:03	
CY	IO103	47:11	157	0:24	12:24	
CZ	IO104	51:18	168	0:25	13:22	
DA	IO105	52:17	170	0:25	13:37	
DB	IO106	52:36	169	0:25	13:41	
DC	IO107	58:31	193	0:26	14:46	
DD	IO108	53:56	172	0:26	14:00	
DE	IO109	54:26	173	0:27	14:07	
DF	IO110	55:38	175	0:27	14:22	
DG	IO111	61:26	198	0:28	15:23	
DH	IO112	63:02	199	0:28	15:42	
DI	IO113	60:54	181	0:30	15:26	
DJ	IO114	68:25	203	0:31	16:47	
DK	IO115	60:05	180	0:30	15:17	
DL	IO116	61:20	198	0:27	15:22	
DM	IO117	62:49	199	0:28	15:40	
DN	IO118	61:51	199	0:28	15:26	
DO	IO119	60:24	197	0:27	15:07	
DP	IO120	58:38	195	0:27	14:44	
DQ	IO121	57:49	197	0:27	14:41	
DR	IO122	59:52	194	0:27	15:20	
DS	IO123	62:28	192	0:27	16:12	
DT	IO124	61:45	192	0:27	15:56	
DU	IO125	66:02	196	0:28	16:55	
DV	IO126	64:47	200	0:29	16:26	
DW	IO127	60:14	198	0:28	15:09	
DX	IO128	62:39	202	0:28	15:46	
DY	IO129	61:46	198	0:28	15:28	
DZ	IO130	63:43	203	0:29	15:55	
EA	IO131	63:21	202	0:28	15:47	
EB	IO132	64:28	202	0:29	16:03	
EC	IO133	64:40	201	0:29	16:02	
ED	IO134	63:18	200	0:29	15:44	
EE	IO135	66:13	204	0:29	16:24	
EF	IO136	68:34	205	0:30	17:13	
EG	IO137	74:15	204	0:31	18:43	
EH	IO138	72:23	202	0:30	18:21	
EI	IO139	70:28	202	0:30	17:50	
EJ	IO140	67:48	201	0:29	17:07	
EK	IO141	62:39	202	0:28	15:46	
EL	IO142	69:58	201	0:29	17:48	
EM	IO143	72:11	199	0:30	18:23	
EN	IO144	71:00	197	0:30	18:13	
EO	IO145	68:01	196	0:29	17:27	
EP	IO146	67:09	194	0:29	17:18	
EQ	IO147	68:04	193	0:29	17:37	
ER	IO148	69:22	195	0:30	17:58	
ES	IO149	69:13	195	0:30	17:58	
ET	IO150	66:06	190	0:31	17:21	
EU	IO151	68:32	194	0:31	17:52	
EV	IO152	68:47	194	0:33	18:00	
EW	IO153	65:48	189	0:33	17:22	
EX	IO154	66:47	191	0:35	17:38	
EY	IO155	69:19	194	0:35	18:12	
EZ	IO156	70:09	195	0:36	18:26	
FA	IO157	71:19	197	0:38	18:51	
FB	IO158	67:39	192	0:38	17:57	
FC	IO159	117:30	197	1:14	31:02	
FD	IO160	129:36	198	1:20	34:17	
FE	IO161	126:02	212	1:12	32:27	
FF	IO162	137:26	175	1:22	17:41	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Hauptergebnis

Berechnung: GB

Gesamtmenge der max. mögl. Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]	Erwartet [h/a]
1	W1	212:41	54:20
2	W2	144:12	30:16
3	W3	253:57	57:32
4	W4	197:16	50:46
5	W5	83:35	15:37
6	W6	104:58	22:38
7	W7	89:10	20:26
8	W8	162:12	38:13
9	W9	157:40	37:20
10	W10	196:01	39:37

Summen in Rezeptortabelle und WEA-Tabelle können sich unterscheiden, da eine WEA gleichzeitig an zwei oder mehr Rezeptoren Beschattung verursachen kann und/oder ein Rezeptor gleichzeitig von zwei oder mehr WEA beschattet werden kann.

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
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-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: A - IO1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	14:51 (3) 08:03	16:20 (9) 07:07	16:59 (7) 06:54	05:46	04:58	
16:10	40 15:32 (10) 17:00	9 16:29 (9) 17:54	22 17:21 (7) 19:51	20:45	21:34	
2 08:32	14:52 (3) 08:02	16:18 (9) 07:05	16:59 (7) 06:51	05:44	04:57	
16:11	40 15:33 (10) 17:02	13 16:31 (9) 17:56	21 17:20 (7) 19:53	20:47	21:35	
3 08:32	14:53 (3) 08:00	16:17 (9) 07:03	16:59 (7) 06:49	05:42	04:57	
16:12	40 15:34 (10) 17:04	16 16:33 (8) 17:58	21 17:20 (7) 19:55	20:49	21:36	
4 08:32	14:53 (3) 07:58	16:16 (9) 07:01	16:58 (7) 06:47	05:40	04:56	
16:14	40 15:34 (10) 17:06	19 16:35 (8) 18:00	21 17:19 (7) 19:57	20:50	21:37	
5 08:31	14:55 (3) 07:57	16:15 (9) 06:58	16:59 (7) 06:44	05:38	04:55	
16:15	38 15:35 (10) 17:08	22 16:37 (8) 18:02	19 17:18 (7) 19:59	20:52	21:38	
6 08:31	14:56 (3) 07:55	16:15 (9) 06:56	17:00 (7) 06:42	05:36	04:54	
16:16	37 15:35 (10) 17:10	24 16:39 (8) 18:04	18 17:18 (7) 20:00	20:54	21:39	
7 08:31	14:58 (3) 07:53	16:14 (9) 06:54	17:01 (7) 06:40	05:35	04:54	
16:17	35 15:36 (10) 17:12	27 16:41 (8) 18:06	14 17:15 (7) 20:02	20:56	21:40	
8 08:30	14:59 (3) 07:51	16:14 (9) 06:51	17:03 (7) 06:37	05:33	04:53	
16:19	34 15:37 (10) 17:14	28 16:42 (8) 18:08	10 17:13 (7) 20:04	20:57	21:41	
9 08:30	15:02 (3) 07:49	16:14 (9) 06:49	17:38 (5) 06:35	05:31	04:53	
16:20	28 15:37 (10) 17:16	28 16:42 (8) 18:09	6 17:44 (5) 20:06	20:59	21:42	
10 08:29	15:12 (10) 07:47	16:14 (9) 06:47	17:36 (5) 06:33	05:29	04:52	
16:22	26 15:38 (10) 17:18	28 16:42 (8) 18:11	9 17:45 (5) 20:07	21:01	21:43	
11 08:28	15:12 (10) 07:45	16:15 (9) 06:44	17:35 (5) 06:30	05:27	04:52	
16:23	27 15:39 (10) 17:20	26 16:41 (8) 18:13	12 17:47 (5) 20:09	21:02	21:43	
12 08:28	15:12 (10) 07:44	16:16 (9) 06:42	17:34 (5) 06:28	05:26	04:51	
16:25	27 15:39 (10) 17:22	25 16:41 (8) 18:15	14 17:48 (5) 20:11	21:04	21:44	
13 08:27	15:12 (10) 07:42	16:16 (9) 06:39	17:34 (5) 06:26	05:24	04:51	
16:26	27 15:39 (10) 17:24	24 16:40 (8) 18:17	15 17:49 (5) 20:13	21:06	21:45	
14 08:26	15:13 (10) 07:40	16:18 (9) 06:37	17:34 (5) 06:23	05:22	04:51	
16:28	27 15:40 (10) 17:26	20 16:38 (8) 18:19	15 17:49 (5) 20:15	21:07	21:46	
15 08:25	15:13 (10) 07:38	16:20 (9) 06:35	17:34 (5) 06:21	05:20	04:50	
16:29	27 15:40 (10) 17:27	12 16:32 (9) 18:21	14 17:48 (5) 20:16	21:09	21:46	
16 08:24	15:14 (10) 07:36	16:23 (9) 06:32	17:35 (5) 06:19	05:19	04:50	
16:31	27 15:41 (10) 17:29	6 16:29 (9) 18:22	12 17:47 (5) 20:18	21:11	21:47	
17 08:23	15:13 (10) 07:33	16:30	17:36 (5) 06:16	05:17	04:50	
16:33	27 15:40 (10) 17:31	18:24	8 17:44 (5) 20:20	21:12	21:47	
18 08:22	15:14 (10) 07:31	06:28	06:14	05:16	04:50	
16:34	26 15:40 (10) 17:33	18:26	20:22	21:14	21:48	
19 08:21	15:15 (10) 07:29	06:25	06:12	05:14	04:50	
16:36	26 15:41 (10) 17:35	18:28	20:24	21:15	21:48	
20 08:20	15:16 (10) 07:27	06:23	06:10	05:13	04:50	
16:38	25 15:41 (10) 17:37	18:30	20:25	21:17	21:48	
21 08:19	15:16 (10) 07:25	17:08 (6) 06:20	06:07	05:11	04:50	
16:40	24 15:40 (10) 17:39	4 17:12 (6) 18:31	1 20:27	21:19	21:49	
22 08:18	15:17 (10) 07:23	17:06 (6) 06:18	06:05	05:10	04:51	
16:41	23 15:40 (10) 17:41	8 17:14 (6) 18:33	20:29	21:20	21:49	
23 08:17	15:18 (10) 07:21	17:04 (6) 06:16	06:03	05:09	04:51	
16:43	21 15:39 (10) 17:43	11 17:15 (6) 18:35	20:31	21:21	21:49	
24 08:15	15:20 (10) 07:19	17:03 (6) 06:13	06:01	05:07	04:51	
16:45	19 15:39 (10) 17:45	14 17:17 (6) 18:37	20:33	21:23	21:49	
25 08:14	15:20 (10) 07:16	17:03 (6) 06:11	05:59	05:06	04:51	
16:47	18 15:38 (10) 17:47	16 17:19 (6) 18:39	20:34	21:24	21:49	
26 08:12	15:23 (10) 07:14	17:01 (7) 06:08	05:57	05:05	04:52	
16:49	14 15:37 (10) 17:49	18 17:19 (6) 18:40	20:36	21:26	21:49	
27 08:11	15:25 (10) 07:12	17:00 (7) 06:06	05:55	05:04	04:52	
16:51	10 15:35 (10) 17:51	19 17:19 (6) 18:42	20:38	21:27	21:49	
28 08:10	07:10	17:00 (7) 06:03	05:52	05:02	04:53	
16:53	17:53	20 17:20 (7) 18:44	20:40	21:29	21:49	
29 08:08		07:01	05:50	05:01	04:53	
16:54		19:46	20:42	21:30	21:49	
30 08:07		06:59	05:48	05:00	04:54	
16:56		19:48	20:43	21:31	21:48	
31 08:05		06:56		04:59		
16:58		19:50		21:32		
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	753	437	251			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.68	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	83	71	48			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: A - IO1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember	
1	04:55	05:33	06:26	07:18	18:14 (5) 07:14	15:44 (9) 08:08	14:54 (10)
	21:48	21:14	20:09	18:57	15 18:29 (5) 16:48	27 16:11 (8) 16:05	27 15:21 (10)
2	04:55	05:35	06:28	07:19	18:13 (5) 07:16	15:44 (9) 08:09	14:54 (10)
	21:48	21:12	20:07	18:55	13 18:26 (5) 16:46	28 16:12 (8) 16:04	26 15:20 (10)
3	04:56	05:37	06:29	07:21	18:13 (5) 07:18	15:44 (9) 08:11	14:47 (3)
	21:47	21:11	20:04	18:52	11 18:24 (5) 16:44	27 16:11 (8) 16:04	27 15:21 (10)
4	04:57	05:38	06:31	07:23	18:14 (5) 07:20	15:44 (9) 08:12	14:43 (3)
	21:47	21:09	20:02	18:50	8 18:22 (5) 16:42	27 16:11 (8) 16:03	34 15:21 (10)
5	04:58	05:40	06:33	07:25	17:42 (7) 07:22	15:44 (9) 08:14	14:43 (3)
	21:46	21:07	20:00	18:47	10 18:19 (5) 16:40	25 16:09 (8) 16:02	36 15:22 (10)
6	04:59	05:41	06:35	07:26	17:39 (7) 07:24	15:45 (9) 08:15	14:42 (3)
	21:46	21:05	19:57	18:45	13 17:52 (7) 16:39	22 16:07 (8) 16:02	37 15:21 (10)
7	05:00	05:43	06:36	07:28	17:36 (7) 07:26	15:47 (9) 08:16	14:42 (3)
	21:45	21:03	19:55	18:43	16 17:52 (7) 16:37	19 16:06 (8) 16:02	39 15:22 (10)
8	05:01	05:45	06:38	07:30	17:35 (7) 07:28	15:48 (9) 08:18	14:42 (3)
	21:44	21:01	19:53	18:40	18 17:53 (7) 16:35	16 16:04 (8) 16:01	39 15:22 (10)
9	05:02	05:47	06:40	07:32	17:34 (7) 07:29	15:49 (9) 08:19	14:41 (3)
	21:44	20:59	19:50	18:38	20 17:54 (7) 16:33	13 16:02 (9) 16:01	40 15:22 (10)
10	05:03	05:48	06:41	07:34	17:33 (7) 07:31	15:51 (9) 08:20	14:41 (3)
	21:43	20:57	19:48	18:36	21 17:54 (7) 16:32	9 16:00 (9) 16:01	40 15:22 (10)
11	05:04	05:50	06:43	07:35	17:33 (7) 07:33	15:51 (9) 08:21	14:42 (3)
	21:42	20:55	19:45	18:33	21 17:54 (7) 16:30	16:00	40 15:23 (10)
12	05:05	05:52	06:45	07:37	17:33 (7) 07:35	15:52 (9) 08:22	14:42 (3)
	21:41	20:53	19:43	18:31	21 17:54 (7) 16:28	16:00	41 15:23 (10)
13	05:06	05:53	06:47	07:39	17:33 (7) 07:37	15:53 (9) 08:23	14:42 (3)
	21:40	20:51	19:41	18:29	21 17:54 (7) 16:27	16:00	40 15:23 (10)
14	05:07	05:55	06:48	07:41	17:32 (7) 07:39	15:54 (9) 08:24	14:42 (3)
	21:39	20:49	19:38	18:26	20 17:52 (7) 16:25	16:00	42 15:24 (10)
15	05:08	05:57	06:50	07:43	17:33 (7) 07:41	15:55 (9) 08:25	14:43 (3)
	21:38	20:47	19:36	18:24	18 17:51 (6) 16:24	10 15:08 (10) 16:00	41 15:24 (10)
16	05:10	05:58	06:52	07:44	17:33 (7) 07:42	14:56 (10) 08:26	14:43 (3)
	21:37	20:45	19:33	18:22	18 17:51 (6) 16:22	14 15:10 (10) 16:00	40 15:24 (10)
17	05:11	06:00	06:53	07:46	17:34 (6) 07:44	14:54 (10) 08:27	14:43 (3)
	21:36	20:43	19:31	18:20	16 17:50 (6) 16:21	18 15:12 (10) 16:00	39 15:23 (10)
18	05:12	06:02	06:55	07:48	17:35 (6) 07:46	14:54 (10) 08:28	14:43 (3)
	21:35	20:41	19:28	18:17	13 17:48 (6) 16:19	19 15:13 (10) 16:01	40 15:23 (10)
19	05:14	06:04	06:57	07:50	17:35 (6) 07:48	14:53 (10) 08:28	14:44 (3)
	21:34	20:39	19:26	18:15	11 17:46 (6) 16:18	21 15:14 (10) 16:01	40 15:24 (10)
20	05:15	06:05	06:59	07:52	17:37 (6) 07:50	14:52 (10) 08:29	14:45 (3)
	21:32	20:36	19:24	18:13	6 17:43 (6) 16:17	23 15:15 (10) 16:01	40 15:25 (10)
21	05:16	06:07	07:00	07:54	17:39 (6) 07:51	14:52 (10) 08:30	14:45 (3)
	21:31	20:34	19:21	18:11	2 17:41 (6) 16:15	24 15:16 (10) 16:02	39 15:25 (10)
22	05:18	06:09	07:02	07:56	17:41 (6) 07:53	14:52 (10) 08:30	14:46 (3)
	21:30	20:32	19:19	18:09	16:14	25 15:17 (10) 16:02	39 15:26 (10)
23	05:19	06:10	07:04	07:57	17:42 (6) 07:55	14:52 (10) 08:31	14:46 (3)
	21:28	20:30	19:16	18:06	16:13	26 15:18 (10) 16:03	39 15:26 (10)
24	05:21	06:12	07:05	07:59	17:43 (6) 07:57	14:51 (10) 08:31	14:46 (3)
	21:27	20:28	19:14	18:04	16:12	26 15:17 (10) 16:03	40 15:26 (10)
25	05:22	06:14	07:07	07:01	17:44 (6) 07:58	14:51 (10) 08:31	14:47 (3)
	21:25	20:25	19:11	17:02	16:11	27 15:18 (10) 16:04	40 15:27 (10)
26	05:24	06:16	07:09	18:20 (5) 07:03	8 15:51 (9) 08:00	14:52 (10) 08:32	14:47 (3)
	21:24	20:23	19:09	5 18:25 (5) 17:00	8 15:59 (9) 16:10	27 15:19 (10) 16:04	41 15:28 (10)
27	05:25	06:17	07:11	18:17 (5) 07:05	15:49 (9) 08:02	14:52 (10) 08:32	14:48 (3)
	21:22	20:21	19:07	11 18:28 (5) 16:58	16 16:05 (8) 16:09	27 15:19 (10) 16:05	39 15:28 (10)
28	05:27	06:19	07:12	18:15 (5) 07:07	15:47 (9) 08:03	14:53 (10) 08:32	14:48 (3)
	21:21	20:18	19:04	13 18:28 (5) 16:56	21 16:08 (8) 16:08	27 15:20 (10) 16:06	40 15:29 (10)
29	05:28	06:21	07:14	18:14 (5) 07:09	15:46 (9) 08:05	14:52 (10) 08:32	14:49 (3)
	21:19	20:16	19:02	15 18:29 (5) 16:54	24 16:10 (8) 16:07	28 15:20 (10) 16:07	41 15:30 (10)
30	05:30	06:22	07:16	18:14 (5) 07:11	15:45 (9) 08:06	14:53 (10) 08:32	14:50 (3)
	21:17	20:14	18:59	15 18:29 (5) 16:52	26 16:11 (8) 16:06	27 15:20 (10) 16:08	40 15:31 (10)
31	05:32	06:24	07:18	18:14 (5) 07:12	15:44 (9) 08:06	14:53 (10) 08:32	14:51 (3)
	21:16	20:12	18:57	16:50	27 16:11 (8) 16:06	16:09	40 15:32 (10)
Sonnenscheinstunden	509	458	382	330	262	237	
astr. max. mögl. Beschattung			59	434	582		1186
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19		0.14
Reduktion Betriebsdauer			0.96	0.96	0.96		0.96
Reduktion Windrichtung			0.72	0.72	0.70		0.68
Gesamte Reduktion			0.24	0.20	0.13		0.09
Met. wahrsch. Beschattung			14	87	74		106

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: B - IO2

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	14:52 (3) 08:03	16:16 (9) 07:07	16:57 (7) 06:54	05:46	04:58	
16:10	40 15:32 (10) 17:00	13 16:29 (9) 17:54	20 17:17 (7) 19:51	20:45	21:34	
2 08:32	14:53 (3) 08:02	16:15 (9) 07:05	16:56 (7) 06:51	05:44	04:57	
16:11	39 15:33 (10) 17:02	16 16:31 (9) 17:56	20 17:16 (7) 19:53	20:47	21:35	
3 08:32	14:54 (3) 08:00	16:14 (9) 07:03	16:57 (7) 06:49	05:42	04:57	
16:12	39 15:34 (10) 17:04	19 16:33 (8) 17:58	19 17:16 (7) 19:55	20:49	21:36	
4 08:32	14:55 (3) 07:58	16:13 (9) 07:01	16:57 (7) 06:47	05:40	04:56	
16:14	38 15:34 (10) 17:06	22 16:35 (8) 18:00	17 17:14 (7) 19:57	20:50	21:37	
5 08:31	14:57 (3) 07:57	16:13 (9) 06:58	16:59 (7) 06:44	05:38	04:55	
16:15	36 15:35 (10) 17:08	24 16:37 (8) 18:02	14 17:13 (7) 19:59	20:52	21:38	
6 08:31	14:57 (3) 07:55	16:13 (9) 06:56	17:01 (7) 06:42	05:36	04:54	
16:16	35 15:35 (10) 17:10	26 16:39 (8) 18:04	10 17:11 (7) 20:00	20:54	21:39	
7 08:31	15:00 (3) 07:53	16:13 (9) 06:54	17:36 (5) 06:40	05:35	04:54	
16:17	31 15:36 (10) 17:12	27 16:40 (8) 18:06	3 17:39 (5) 20:02	20:56	21:40	
8 08:30	15:11 (10) 07:51	16:13 (9) 06:51	17:34 (5) 06:37	05:33	04:53	
16:19	25 15:36 (10) 17:14	27 16:40 (8) 18:08	7 17:41 (5) 20:04	20:57	21:41	
9 08:30	15:11 (10) 07:49	16:13 (9) 06:49	17:33 (5) 06:35	05:31	04:53	
16:20	26 15:37 (10) 17:16	27 16:40 (8) 18:09	11 17:44 (5) 20:06	20:59	21:42	
10 08:29	15:12 (10) 07:47	16:14 (9) 06:47	17:32 (5) 06:33	05:29	04:52	
16:22	26 15:38 (10) 17:18	26 16:40 (8) 18:11	13 17:45 (5) 20:07	21:01	21:43	
11 08:28	15:12 (10) 07:45	16:14 (9) 06:44	17:32 (5) 06:30	05:27	04:52	
16:23	26 15:38 (10) 17:20	25 16:39 (8) 18:13	15 17:47 (5) 20:09	21:02	21:43	
12 08:28	15:12 (10) 07:44	16:15 (9) 06:42	17:31 (5) 06:28	05:25	04:51	
16:25	27 15:39 (10) 17:22	23 16:38 (8) 18:15	15 17:46 (5) 20:11	21:04	21:44	
13 08:27	15:13 (10) 07:42	16:17 (9) 06:39	17:32 (5) 06:26	05:24	04:51	
16:26	26 15:39 (10) 17:24	19 16:36 (8) 18:17	14 17:46 (5) 20:13	21:06	21:45	
14 08:26	15:13 (10) 07:40	16:19 (9) 06:37	17:33 (5) 06:23	05:22	04:51	
16:28	26 15:39 (10) 17:26	9 16:28 (9) 18:19	12 17:45 (5) 20:15	21:07	21:46	
15 08:25	15:14 (10) 07:38	16:21 (9) 06:35	17:33 (5) 06:21	05:20	04:50	
16:29	26 15:40 (10) 17:27	18:21	10 17:43 (5) 20:16	21:09	21:46	
16 08:24	15:14 (10) 07:36	16:21 (9) 06:32	17:32 (5) 06:19	05:19	04:50	
16:31	26 15:40 (10) 17:29	18:22	2 17:39 (5) 20:18	21:11	21:47	
17 08:23	15:14 (10) 07:33	16:22 (9) 06:30	17:39 (5) 06:16	05:17	04:50	
16:33	25 15:39 (10) 17:31	18:24	20:20	21:12	21:47	
18 08:22	15:15 (10) 07:31	16:23 (9) 06:28	17:38 (5) 06:14	05:16	04:50	
16:34	24 15:39 (10) 17:33	18:26	20:22	21:14	21:48	
19 08:21	15:16 (10) 07:29	16:24 (9) 06:25	17:37 (5) 06:12	05:14	04:50	
16:36	24 15:40 (10) 17:35	18:28	20:24	21:15	21:48	
20 08:20	15:17 (10) 07:27	17:04 (6) 06:23	17:36 (5) 06:10	05:13	04:50	
16:38	23 15:40 (10) 17:37	5 17:09 (6) 18:30	20:25	21:17	21:48	
21 08:19	15:17 (10) 07:25	17:03 (6) 06:20	17:35 (5) 06:07	05:11	04:50	
16:40	22 15:39 (10) 17:39	9 17:13 (6) 18:31	20:27	21:19	21:49	
22 08:18	15:19 (10) 07:23	17:02 (6) 06:18	17:34 (5) 06:05	05:10	04:51	
16:41	20 15:39 (10) 17:41	12 17:14 (6) 18:33	20:29	21:20	21:49	
23 08:17	15:19 (10) 07:21	17:00 (6) 06:16	17:33 (5) 06:03	05:09	04:51	
16:43	19 15:38 (10) 17:43	15 17:15 (6) 18:35	20:31	21:21	21:49	
24 08:15	15:21 (10) 07:19	16:59 (7) 06:13	17:32 (5) 06:01	05:07	04:51	
16:45	16 15:37 (10) 17:45	18 17:17 (6) 18:37	20:33	21:23	21:49	
25 08:14	15:23 (10) 07:16	16:58 (7) 06:11	17:31 (5) 05:59	05:06	04:51	
16:47	13 15:36 (10) 17:47	19 17:17 (6) 18:39	20:34	21:24	21:49	
26 08:12	15:26 (10) 07:14	16:57 (7) 06:08	17:30 (5) 05:57	05:05	04:52	
16:49	8 15:34 (10) 17:49	19 17:16 (6) 18:40	20:36	21:26	21:49	
27 08:11	15:27 (10) 07:12	16:56 (7) 06:06	17:29 (5) 05:55	05:04	04:52	
16:51	16:51	21 17:17 (7) 18:42	20:38	21:27	21:49	
28 08:10	15:28 (10) 07:10	16:56 (7) 06:03	17:28 (5) 05:52	05:02	04:53	
16:53	16:53	21 17:17 (7) 18:44	20:40	21:29	21:49	
29 08:08	15:29 (10) 07:08	16:55 (7) 06:01	17:27 (5) 05:50	05:01	04:53	
16:54	16:54	19:46	20:42	21:30	21:49	
30 08:07	16:20 (9) 07:06	16:54 (7) 06:00	17:26 (5) 05:48	05:00	04:54	
16:56	4 16:24 (9) 07:04	16:53 (7) 05:59	20:43	21:31	21:48	
31 08:05	16:17 (9) 07:02	16:52 (7) 05:57	17:25 (5) 05:46	04:59	04:54	
16:58	9 16:26 (9) 07:00	16:51 (7) 05:55	17:24 (5) 05:44	04:57	04:54	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	699	442	202			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.68	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	77	72	38			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: B - IO2

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember					
1	04:55	05:33	06:26	07:18	18:11 (5) 07:14	15:43 (9) 08:08					
	21:48	21:14	20:09	18:57	15	18:26 (5) 16:48	26	16:09 (8) 16:05	26	15:20 (10)	
2	04:55	05:35	06:28	07:19	18:10 (5) 07:16	15:43 (9) 08:09	14:54 (10)				
	21:48	21:12	20:07	18:55	15	18:25 (5) 16:46	27	16:10 (8) 16:04	26	15:20 (10)	
3	04:56	05:37	06:29	07:21	18:10 (5) 07:18	15:42 (9) 08:11	14:55 (10)				
	21:47	21:11	20:04	18:52	14	18:24 (5) 16:44	28	16:10 (8) 16:04	26	15:21 (10)	
4	04:57	05:38	06:31	07:23	18:10 (5) 07:20	15:42 (9) 08:12	14:55 (10)				
	21:47	21:09	20:02	18:50	12	18:22 (5) 16:42	28	16:10 (8) 16:03	25	15:20 (10)	
5	04:58	05:40	06:33	07:25	18:11 (5) 07:22	15:43 (9) 08:14	14:45 (3)				
	21:46	21:07	20:00	18:47	8	18:19 (5) 16:40	26	16:09 (8) 16:02	31	15:21 (10)	
6	04:59	05:41	06:35	07:26	18:12 (5) 07:24	15:43 (9) 08:15	14:44 (3)				
	21:46	21:05	19:57	18:45	5	18:17 (5) 16:39	24	16:07 (8) 16:02	34	15:21 (10)	
7	05:00	05:43	06:36	07:28	17:38 (7) 07:26	15:44 (9) 08:16	14:44 (3)				
	21:45	21:03	19:55	18:43	6	17:44 (7) 16:37	22	16:06 (8) 16:02	36	15:22 (10)	
8	05:01	05:45	06:38	07:30	17:35 (7) 07:28	15:45 (9) 08:18	14:43 (3)				
	21:44	21:01	19:53	18:40	12	17:47 (7) 16:35	19	16:04 (8) 16:01	38	15:22 (10)	
9	05:02	05:47	06:40	07:32	17:33 (7) 07:29	15:46 (9) 08:19	14:43 (3)				
	21:44	20:59	19:50	18:38	16	17:49 (7) 16:33	16	16:02 (9) 16:01	37	15:22 (10)	
10	05:03	05:48	06:41	07:34	17:32 (7) 07:31	15:47 (9) 08:20	14:42 (3)				
	21:43	20:57	19:48	18:36	18	17:50 (7) 16:32	13	16:00 (9) 16:01	39	15:22 (10)	
11	05:04	05:50	06:43	07:35	17:31 (7) 07:33	15:49 (9) 08:21	14:43 (3)				
	21:42	20:55	19:45	18:33	19	17:50 (7) 16:30	9	15:58 (9) 16:00	40	15:23 (10)	
12	05:05	05:52	06:45	07:37	17:30 (7) 07:35	15:52 (9) 08:22	14:43 (3)				
	21:41	20:53	19:43	18:31	20	17:50 (7) 16:28	4	15:56 (9) 16:00	39	15:23 (10)	
13	05:06	05:53	06:47	07:39	17:30 (7) 07:37	15:56 (9) 08:23	14:43 (3)				
	21:40	20:51	19:41	18:29	20	17:50 (7) 16:27	16:00	40	15:23 (10)		
14	05:07	05:55	06:48	07:41	17:29 (7) 07:39	15:57 (9) 08:24	14:43 (3)				
	21:39	20:49	19:38	18:26	20	17:49 (7) 16:25	16:00	40	15:23 (10)		
15	05:08	05:57	06:50	07:43	17:29 (7) 07:41	15:58 (9) 08:25	14:44 (3)				
	21:38	20:47	19:36	18:24	20	17:49 (7) 16:24	16:00	39	15:24 (10)		
16	05:10	05:58	06:52	07:44	17:29 (7) 07:42	15:59 (9) 08:26	14:44 (3)				
	21:37	20:45	19:33	18:22	19	17:48 (6) 16:22	8	15:07 (10) 16:00	40	15:24 (10)	
17	05:11	06:00	06:53	07:46	17:30 (7) 07:44	15:56 (9) 08:27	14:44 (3)				
	21:36	20:43	19:31	18:20	18	17:48 (6) 16:21	14	15:10 (10) 16:00	39	15:23 (10)	
18	05:12	06:02	06:55	07:48	17:31 (7) 07:46	15:57 (9) 08:28	14:44 (3)				
	21:35	20:41	19:28	18:17	17	17:48 (6) 16:19	16	15:11 (10) 16:01	39	15:23 (10)	
19	05:14	06:04	06:57	07:50	17:32 (6) 07:48	15:58 (9) 08:29	14:45 (3)				
	21:34	20:39	19:26	18:15	14	17:46 (6) 16:18	19	15:13 (10) 16:01	38	15:24 (10)	
20	05:15	06:05	06:59	07:52	17:33 (6) 07:50	15:59 (9) 08:30	14:46 (3)				
	21:32	20:36	19:24	18:13	10	17:43 (6) 16:17	20	15:14 (10) 16:01	38	15:25 (10)	
21	05:16	06:07	07:00	07:54	17:34 (6) 07:51	15:53 (9) 08:30	14:46 (3)				
	21:31	20:34	19:21	18:11	7	17:41 (6) 16:15	22	15:15 (10) 16:02	38	15:25 (10)	
22	05:18	06:09	07:02	07:56	17:36 (6) 07:53	15:54 (9) 08:30	14:47 (3)				
	21:30	20:32	19:19	18:09	3	17:39 (6) 16:14	23	15:16 (10) 16:02	38	15:26 (10)	
23	05:19	06:10	07:04	07:57	17:35 (6) 07:55	15:55 (9) 08:31	14:47 (3)				
	21:28	20:30	19:16	18:06	16:13	24	15:17 (10) 16:03	38	15:26 (10)		
24	05:21	06:12	07:05	07:59	16:12	24	15:16 (10) 16:03	38	15:26 (10)		
	21:27	20:28	19:14	18:04	16:12	24	15:16 (10) 16:03	38	15:26 (10)		
25	05:22	06:14	07:07	07:01	16:11	25	15:17 (10) 16:04	38	15:27 (10)		
	21:25	20:25	19:11	17:02	16:11	25	15:17 (10) 16:04	38	15:27 (10)		
26	05:24	06:16	07:09	07:03	16:10	26	15:18 (10) 16:04	39	15:28 (10)		
	21:24	20:23	19:09	17:00	16:10	26	15:18 (10) 16:04	39	15:28 (10)		
27	05:25	06:17	07:11	07:05	15:52 (9) 08:02	14:53 (10) 08:32	14:49 (3)				
	21:22	20:21	19:07	16:58	2	15:54 (9) 16:09	26	15:19 (10) 16:05	39	15:28 (10)	
28	05:27	06:19	07:12	18:15 (5) 07:07	15:48 (9) 08:03	14:53 (10) 08:32	14:50 (3)				
	21:21	20:18	19:04	8	18:23 (5) 16:56	10	15:58 (9) 16:08	26	15:19 (10) 16:06	38	15:29 (10)
29	05:28	06:21	07:14	18:13 (5) 07:09	15:46 (9) 08:05	14:53 (10) 08:32	14:50 (3)				
	21:19	20:16	19:02	11	18:24 (5) 16:54	20	16:06 (8) 16:07	26	15:19 (10) 16:07	39	15:30 (10)
30	05:30	06:22	07:16	18:12 (5) 07:11	15:45 (9) 08:06	14:53 (10) 08:32	14:51 (3)				
	21:17	20:14	18:59	13	18:25 (5) 16:52	23	16:08 (8) 16:06	27	15:20 (10) 16:08	40	15:31 (10)
31	05:32	06:24	07:18	07:12	15:44 (9) 08:07	14:54 (10) 08:33	14:52 (3)				
	21:16	20:12	18:57	16:50	25	16:09 (8) 16:07	16:09	39	15:32 (10)		
Sonnenscheinstunden	509	458	382	330	262	237					
astr. max. mögl. Beschattung			32	388	568	1134					
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19	0.14					
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96					
Reduktion Windrichtung			0.72	0.72	0.70	0.68					
Gesamte Reduktion			0.24	0.20	0.13	0.09					
Met. wahrsch. Beschattung			8	78	73	102					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: C - IO3

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	14:55 (3) 08:03		07:07	17:03 (7) 06:54	05:46	04:58
16:10	36 15:33 (10) 17:00		17:54	20 17:23 (7) 19:51	20:45	21:34
2 08:32	14:56 (3) 08:02		16:27 (9) 07:05	17:02 (7) 06:51	05:44	04:57
16:11	36 15:35 (10) 17:02	3 16:30 (9) 17:56	20 17:22 (7) 19:53	20:47	21:35	
3 08:32	14:57 (3) 08:00		16:24 (9) 07:03	17:02 (7) 06:49	05:42	04:57
16:12	37 15:36 (10) 17:04	9 16:33 (9) 17:58	21 17:23 (7) 19:55	20:49	21:36	
4 08:32	14:57 (3) 07:58		16:22 (9) 07:01	17:01 (7) 06:47	05:40	04:56
16:14	38 15:37 (10) 17:06	13 16:35 (9) 18:00	21 17:22 (7) 19:57	20:50	21:37	
5 08:31	14:58 (3) 07:57		16:21 (9) 06:58	17:02 (7) 06:44	05:38	04:55
16:15	39 15:39 (10) 17:08	16 16:37 (9) 18:02	19 17:21 (7) 19:59	20:52	21:38	
6 08:31	14:59 (3) 07:55		16:20 (9) 06:56	17:03 (7) 06:42	05:36	04:54
16:16	39 15:40 (10) 17:10	19 16:39 (8) 18:04	18 17:21 (7) 20:00	20:54	21:39	
7 08:31	15:00 (3) 07:53		16:19 (9) 06:54	17:03 (7) 06:40	05:35	04:54
16:17	38 15:41 (10) 17:12	22 16:41 (8) 18:06	16 17:19 (7) 20:02	20:56	21:40	
8 08:30	15:01 (3) 07:51		16:19 (9) 06:51	17:05 (7) 06:37	05:33	04:53
16:19	38 15:41 (10) 17:14	25 16:44 (8) 18:08	13 17:18 (7) 20:04	20:57	21:41	
9 08:30	15:02 (3) 07:49		16:19 (9) 06:49	17:07 (7) 06:35	05:31	04:53
16:20	37 15:42 (10) 17:16	26 16:45 (8) 18:09	11 17:44 (5) 20:06	20:59	21:42	
10 08:29	15:04 (3) 07:47		16:19 (9) 06:47	17:38 (5) 06:33	05:29	04:52
16:22	35 15:43 (10) 17:18	26 16:45 (8) 18:11	7 17:45 (5) 20:07	21:01	21:43	
11 08:28	15:06 (3) 07:45		16:19 (9) 06:44	17:37 (5) 06:30	05:27	04:52
16:23	33 15:44 (10) 17:20	26 16:45 (8) 18:13	10 17:47 (5) 20:09	21:02	21:43	
12 08:28	15:18 (10) 07:44		16:19 (9) 06:42	17:35 (5) 06:28	05:26	04:51
16:25	26 15:44 (10) 17:22	25 16:44 (8) 18:15	13 17:48 (5) 20:11	21:04	21:44	
13 08:27	15:19 (10) 07:42		16:20 (9) 06:39	17:35 (5) 06:26	05:24	04:51
16:26	26 15:45 (10) 17:24	24 16:44 (8) 18:17	15 17:50 (5) 20:13	21:06	21:45	
14 08:26	15:19 (10) 07:40		16:21 (9) 06:37	17:36 (5) 06:23	05:22	04:51
16:28	26 15:45 (10) 17:26	22 16:43 (8) 18:19	14 17:50 (5) 20:15	21:07	21:46	
15 08:25	15:19 (10) 07:38		16:22 (9) 06:35	17:35 (5) 06:21	05:20	04:50
16:29	27 15:46 (10) 17:27	19 16:41 (8) 18:21	14 17:49 (5) 20:16	21:09	21:46	
16 08:24	15:20 (10) 07:36		16:23 (9) 06:32	17:36 (5) 06:19	05:19	04:50
16:31	26 15:46 (10) 17:29	13 16:36 (9) 18:22	12 17:48 (5) 20:18	21:11	21:47	
17 08:23	15:19 (10) 07:33		16:26 (9) 06:30	17:37 (5) 06:16	05:17	04:50
16:33	27 15:46 (10) 17:31	7 16:33 (9) 18:24	9 17:46 (5) 20:20	21:12	21:47	
18 08:22	15:20 (10) 07:31		06:28	06:14	05:16	04:50
16:34	26 15:46 (10) 17:33		18:26	20:22	21:14	21:48
19 08:21	15:20 (10) 07:29		06:25	06:12	05:14	04:50
16:36	27 15:47 (10) 17:35		18:28	20:24	21:15	21:48
20 08:20	15:21 (10) 07:27		06:23	06:10	05:13	04:50
16:38	26 15:47 (10) 17:37		18:30	20:25	21:17	21:48
21 08:19	15:21 (10) 07:25		06:20	06:07	05:11	04:50
16:40	26 15:47 (10) 17:39		18:31	20:27	21:19	21:49
22 08:18	15:22 (10) 07:23		17:10 (6) 06:18	06:05	05:10	04:51
16:41	25 15:47 (10) 17:41	4 17:14 (6) 18:33		20:29	21:20	21:49
23 08:17	15:22 (10) 07:21		17:07 (6) 06:16	06:03	05:09	04:51
16:43	24 15:46 (10) 17:43	8 17:15 (6) 18:35		20:31	21:21	21:49
24 08:15	15:24 (10) 07:19		17:06 (6) 06:13	06:01	05:07	04:51
16:45	22 15:46 (10) 17:45	11 17:17 (6) 18:37		20:33	21:23	21:49
25 08:14	15:24 (10) 07:16		17:05 (6) 06:11	05:59	05:06	04:51
16:47	21 15:45 (10) 17:47	15 17:20 (6) 18:39		20:34	21:24	21:49
26 08:12	15:26 (10) 07:14		17:04 (6) 06:08	05:57	05:05	04:52
16:49	19 15:45 (10) 17:49	16 17:20 (6) 18:40		20:36	21:26	21:49
27 08:11	15:27 (10) 07:12		17:04 (6) 06:06	05:55	05:04	04:52
16:51	17 15:44 (10) 17:51	17 17:21 (6) 18:42		20:38	21:27	21:49
28 08:10	15:30 (10) 07:10		17:03 (7) 06:03	05:52	05:02	04:53
16:53	13 15:43 (10) 17:53	19 17:22 (7) 18:44		20:40	21:28	21:49
29 08:08	15:32 (10)		07:01	05:50	05:01	04:53
16:54	9 15:41 (10)		19:46	20:42	21:30	21:49
30 08:07			06:59	05:48	05:00	04:54
16:56			19:48	20:43	21:31	21:48
31 08:05			06:56		04:59	
16:58			19:50		21:32	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	819	385	253			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.68	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	90	63	48			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: C - IO3

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:55 21:48	05:33 21:14	06:26 20:09	07:18 18:57	18:15 (5) 07:14 18:29 (5) 16:48	15:48 (9) 08:08 16:14 (8) 16:05	14:49 (3) 15:26 (10)
2	04:55 21:48	05:35 21:12	06:28 20:07	07:19 18:55	18:14 (5) 07:16 18:26 (5) 16:46	15:48 (9) 08:09 16:14 (8) 16:04	14:47 (3) 15:25 (10)
3	04:56 21:47	05:37 21:11	06:29 20:04	07:21 18:52	18:15 (5) 07:18 18:24 (5) 16:44	15:48 (9) 08:11 16:13 (8) 16:04	14:46 (3) 15:26 (10)
4	04:57 21:47	05:38 21:09	06:31 20:02	07:23 18:50	17:47 (7) 07:20 18:22 (5) 16:42	15:49 (9) 08:12 16:11 (8) 16:03	14:45 (3) 15:25 (10)
5	04:58 21:46	05:40 21:07	06:33 20:00	07:25 18:47	17:43 (7) 07:22 17:54 (7) 16:40	15:50 (9) 08:14 16:09 (8) 16:02	14:45 (3) 15:26 (10)
6	04:59 21:46	05:41 21:05	06:35 19:57	07:26 18:45	17:41 (7) 07:24 17:55 (7) 16:39	15:50 (9) 08:15 16:07 (8) 16:02	14:45 (3) 15:26 (10)
7	05:00 21:45	05:43 21:03	06:36 19:55	07:28 18:43	17:38 (7) 07:26 17:55 (7) 16:37	15:53 (9) 08:16 16:06 (9) 16:02	14:45 (3) 15:26 (10)
8	05:01 21:44	05:45 21:01	06:38 19:53	07:30 18:40	17:37 (7) 07:28 17:56 (7) 16:35	15:55 (9) 08:18 16:04 (9) 16:01	14:45 (3) 15:25 (10)
9	05:02 21:44	05:47 20:59	06:40 19:50	07:32 18:38	17:36 (7) 07:29 17:57 (7) 16:33	15:59 (9) 08:19 16:00 (9) 16:01	14:45 (3) 15:24 (10)
10	05:03 21:43	05:48 20:57	06:41 19:48	07:34 18:36	17:36 (7) 07:31 17:57 (7) 16:32	16:00 (9) 08:20 16:01 (9) 16:01	14:45 (3) 15:24 (10)
11	05:04 21:42	05:50 20:55	06:43 19:45	07:35 18:33	17:36 (7) 07:33 17:57 (7) 16:30	16:01 (9) 08:21 16:00 (9) 16:00	14:46 (3) 15:24 (10)
12	05:05 21:41	05:52 20:53	06:45 19:43	07:37 18:31	17:36 (7) 07:35 17:56 (7) 16:28	16:02 (9) 08:22 16:00 (9) 16:00	14:46 (3) 15:24 (10)
13	05:06 21:40	05:53 20:51	06:47 19:41	07:39 18:29	17:36 (7) 07:37 17:56 (7) 16:27	15:04 (10) 08:23 15:13 (10) 16:00	14:46 (3) 15:24 (10)
14	05:07 21:39	05:55 20:49	06:48 19:38	07:41 18:26	17:36 (7) 07:39 17:54 (7) 16:25	15:01 (10) 08:24 15:15 (10) 16:00	14:46 (3) 15:24 (10)
15	05:08 21:38	05:57 20:47	06:50 19:36	07:43 18:24	17:37 (6) 07:41 17:53 (6) 16:24	15:00 (10) 08:25 15:17 (10) 16:00	14:47 (3) 15:24 (10)
16	05:10 21:37	05:58 20:45	06:52 19:33	07:44 18:22	17:37 (6) 07:42 17:52 (6) 16:22	14:59 (10) 08:26 15:18 (10) 16:00	14:47 (3) 15:24 (10)
17	05:11 21:36	06:00 20:43	06:53 19:31	07:46 18:20	17:37 (6) 07:44 17:50 (6) 16:21	14:58 (10) 08:27 15:19 (10) 16:00	14:47 (3) 15:23 (10)
18	05:12 21:35	06:02 20:41	06:55 19:28	07:48 18:17	17:38 (6) 07:46 17:48 (6) 16:19	14:58 (10) 08:28 15:20 (10) 16:01	14:48 (3) 15:23 (10)
19	05:14 21:34	06:04 20:39	06:57 19:26	07:50 18:15	17:39 (6) 07:48 17:46 (6) 16:18	14:57 (10) 08:28 15:21 (10) 16:01	14:48 (3) 15:24 (10)
20	05:15 21:32	06:05 20:36	06:59 19:24	07:52 18:13	17:41 (6) 07:50 17:43 (6) 16:17	14:57 (10) 08:29 15:22 (10) 16:01	14:49 (3) 15:25 (10)
21	05:16 21:31	06:07 20:34	07:00 19:21	07:54 18:11	17:02 07:51 18:11 16:15	14:57 (10) 08:30 15:23 (10) 16:02	14:49 (3) 15:25 (10)
22	05:18 21:30	06:09 20:32	07:02 19:19	07:56 18:09	17:02 07:53 16:14 16:14	14:57 (10) 08:30 15:23 (10) 16:02	14:50 (3) 15:26 (10)
23	05:19 21:28	06:10 20:30	07:04 19:16	07:57 18:06	17:02 07:55 16:13 16:13	14:57 (10) 08:31 15:24 (10) 16:03	14:50 (3) 15:26 (10)
24	05:21 21:27	06:12 20:28	07:05 19:14	07:59 18:04	17:02 07:57 16:12 16:12	14:57 (10) 08:31 15:23 (10) 16:03	14:50 (3) 15:26 (10)
25	05:22 21:25	06:14 20:25	07:07 19:11	18:04 17:02	17:01 15:55 (9) 07:58 16:04 (9) 16:11	14:57 (10) 08:31 15:24 (10) 16:04	14:51 (3) 15:27 (10)
26	05:24 21:24	06:16 20:23	07:09 19:09	18:06 17:00	17:02 15:52 (9) 08:00 16:08 (8) 16:10	14:58 (10) 08:32 15:24 (10) 16:04	14:52 (3) 15:28 (10)
27	05:25 21:22	06:17 20:21	07:11 19:07	18:08 17:00	17:00 15:51 (9) 08:02 16:11 (8) 16:09	14:58 (10) 08:32 15:25 (10) 16:05	14:52 (3) 15:28 (10)
28	05:27 21:21	06:19 20:18	07:12 19:04	18:10 16:56	17:00 15:50 (9) 08:03 16:13 (8) 16:08	14:59 (10) 08:32 15:25 (10) 16:06	14:53 (3) 15:29 (10)
29	05:28 21:19	06:21 20:16	07:14 19:02	18:12 16:54	17:00 15:49 (9) 08:05 16:14 (8) 16:07	14:59 (10) 08:32 15:25 (10) 16:07	14:53 (3) 15:30 (10)
30	05:30 21:17	06:22 20:14	07:16 18:59	18:15 (5) 07:11 18:30 (5) 16:52	15:49 (9) 08:06 16:14 (8) 16:06	14:59 (10) 08:32 15:25 (10) 16:08	14:54 (3) 15:31 (10)
31	05:32 21:16	06:24 20:12	07:18 18:57	18:15 (5) 07:11 18:30 (5) 16:52	15:49 (9) 08:06 16:14 (8) 16:06	14:59 (10) 08:32 15:25 (10) 16:08	14:54 (3) 15:31 (10)
Sonnenscheinstunden	509	458	382	330	262	237	1068
astr. max.mögl. Beschattung			62	431	572		1068
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19		0.14
Reduktion Betriebsdauer			0.96	0.96	0.96		0.96
Reduktion Windrichtung			0.72	0.72	0.70		0.68
Gesamte Reduktion			0.24	0.20	0.13		0.09
Met. wahrsch. Beschattung			15	86	73		96

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schatteneinfang	Schatteneinfang	Schatteneinfang	Schatteneinfang	Schatteneinfang	Schatteneinfang	Schatteneinfang	Schatteneinfang	Schatteneinfang	Schatteneinfang	Schatteneinfang	Schatteneinfang	Schatteneinfang	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: D - IO4

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1 08:32	14:58 (3) 08:03		07:07	17:01 (7) 06:54	05:46	04:58	
16:10	32 15:33 (10) 17:00		17:54	20 17:21 (7) 19:51	20:45	21:34	
2 08:32	14:59 (3) 08:02	16:25 (9) 07:05	17:00 (7) 06:51	05:44	04:57		
16:11	34 15:35 (10) 17:02	6 16:31 (9) 17:56	20 17:20 (7) 19:53	20:47	21:35		
3 08:32	15:00 (3) 08:00	16:23 (9) 07:03	17:01 (7) 06:49	05:42	04:57		
16:12	33 15:36 (10) 17:04	10 16:33 (9) 17:58	19 17:20 (7) 19:55	20:49	21:36		
4 08:32	15:00 (3) 07:58	16:22 (9) 07:01	17:01 (7) 06:47	05:40	04:56		
16:14	35 15:37 (10) 17:06	13 16:35 (9) 18:00	17 17:18 (7) 19:57	20:50	21:37		
5 08:31	15:02 (3) 07:57	16:21 (9) 06:58	17:02 (7) 06:44	05:38	04:55		
16:15	34 15:39 (10) 17:08	16 16:37 (9) 18:02	16 17:18 (7) 19:58	20:52	21:38		
6 08:31	15:02 (3) 07:55	16:20 (9) 06:56	17:04 (7) 06:42	05:36	04:54		
16:16	35 15:40 (10) 17:10	19 16:39 (8) 18:04	12 17:16 (7) 20:00	20:54	21:39		
7 08:31	15:04 (3) 07:53	16:20 (9) 06:54	17:05 (7) 06:40	05:35	04:54		
16:17	35 15:42 (10) 17:12	21 16:41 (8) 18:06	8 17:13 (7) 20:02	20:56	21:40		
8 08:30	15:04 (3) 07:51	16:19 (9) 06:51	17:37 (5) 06:37	05:33	04:53		
16:19	36 15:43 (10) 17:14	25 16:44 (8) 18:08	4 17:41 (5) 20:04	20:57	21:41		
9 08:30	15:05 (3) 07:49	16:19 (9) 06:49	17:36 (5) 06:35	05:31	04:53		
16:20	35 15:44 (10) 17:16	25 16:44 (8) 18:09	8 17:44 (5) 20:06	20:59	21:42		
10 08:29	15:08 (3) 07:47	16:19 (9) 06:47	17:34 (5) 06:33	05:29	04:52		
16:22	32 15:45 (10) 17:18	25 16:44 (8) 18:11	11 17:45 (5) 20:07	21:01	21:43		
11 08:28	15:09 (3) 07:45	16:20 (9) 06:44	17:34 (5) 06:30	05:27	04:52		
16:23	31 15:46 (10) 17:20	24 16:44 (8) 18:13	13 17:47 (5) 20:09	21:02	21:43		
12 08:28	15:22 (10) 07:44	16:20 (9) 06:42	17:33 (5) 06:28	05:25	04:51		
16:25	24 15:46 (10) 17:22	24 16:44 (8) 18:15	15 17:48 (5) 20:11	21:04	21:44		
13 08:27	15:22 (10) 07:42	16:21 (9) 06:39	17:34 (5) 06:26	05:24	04:51		
16:26	25 15:47 (10) 17:24	22 16:43 (8) 18:17	13 17:47 (5) 20:13	21:06	21:45		
14 08:26	15:22 (10) 07:40	16:22 (9) 06:37	17:34 (5) 06:23	05:22	04:51		
16:28	25 15:47 (10) 17:26	19 16:41 (8) 18:19	13 17:47 (5) 20:15	21:07	21:46		
15 08:25	15:23 (10) 07:38	16:24 (9) 06:35	17:35 (5) 06:21	05:20	04:50		
16:29	25 15:48 (10) 17:27	11 16:35 (9) 18:21	10 17:45 (5) 20:16	21:09	21:46		
16 08:24	15:23 (10) 07:36	16:27 (9) 06:32	17:38 (5) 06:19	05:19	04:50		
16:31	25 15:48 (10) 17:29	6 16:33 (9) 18:22	4 17:42 (5) 20:18	21:11	21:47		
17 08:23	15:23 (10) 07:33		06:30	06:16	05:17	04:50	
16:33	25 15:48 (10) 17:31		18:24	20:20	21:12	21:47	
18 08:22	15:23 (10) 07:31		06:28	06:14	05:16	04:50	
16:34	25 15:48 (10) 17:33		18:26	20:22	21:14	21:48	
19 08:21	15:24 (10) 07:29		06:25	06:12	05:14	04:50	
16:36	25 15:49 (10) 17:35		18:28	20:24	21:15	21:48	
20 08:20	15:25 (10) 07:27		06:23	06:10	05:13	04:50	
16:38	24 15:49 (10) 17:37		18:30	20:25	21:17	21:48	
21 08:19	15:25 (10) 07:25	17:08 (6) 06:20		06:07	05:11	04:50	
16:40	24 15:49 (10) 17:39	4 17:12 (6) 18:31		20:27	21:19	21:49	
22 08:18	15:26 (10) 07:23	17:06 (6) 06:18		06:05	05:10	04:51	
16:41	23 15:49 (10) 17:41	8 17:14 (6) 18:33		20:29	21:20	21:49	
23 08:17	15:26 (10) 07:21	17:05 (6) 06:16		06:03	05:09	04:51	
16:43	22 15:48 (10) 17:43	10 17:15 (6) 18:35		20:31	21:21	21:49	
24 08:15	15:28 (10) 07:19	17:04 (6) 06:13		06:01	05:07	04:51	
16:45	20 15:48 (10) 17:45	13 17:17 (6) 18:37		20:33	21:23	21:49	
25 08:14	15:28 (10) 07:16	17:04 (6) 06:11		05:59	05:06	04:51	
16:47	19 15:47 (10) 17:47	16 17:20 (6) 18:39		20:34	21:24	21:49	
26 08:12	15:30 (10) 07:14	17:02 (7) 06:08		05:57	05:05	04:52	
16:49	17 15:47 (10) 17:49	17 17:19 (6) 18:40		20:36	21:26	21:49	
27 08:11	15:31 (10) 07:12	17:01 (7) 06:06		05:55	05:04	04:52	
16:51	15 15:46 (10) 17:51	19 17:20 (7) 18:42		20:38	21:27	21:49	
28 08:10	15:34 (10) 07:10	17:01 (7) 06:03		05:52	05:02	04:53	
16:53	11 15:45 (10) 17:53	20 17:21 (7) 18:44		20:40	21:28	21:49	
29 08:08	15:38 (10)		07:01		05:50	05:01	04:53
16:54	3 15:41 (10)		19:46		20:42	21:30	21:49
30 08:07			06:59		05:48	05:00	04:54
16:56			19:48		20:43	21:31	21:48
31 08:05			06:56			04:59	
16:58			19:49			21:32	
Sonnenscheinstunden	253	275	367		419	491	506
astr.max.mögl.Beschattung	749	373		203			
Red.Sonnenscheinwahrsch.	0.17	0.24		0.28			
Reduktion Betriebsdauer	0.96	0.96		0.96			
Reduktion Windrichtung	0.68	0.72		0.72			
Gesamte Reduktion	0.11	0.16		0.19			
Met.wahrsch.Beschattung	82	61		39			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBShadowrezeptor: D - IO4

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 721 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:55 21:48	05:33 21:14	06:26 20:09	07:18 18:57	18:13 (5) 18:27 (5)	07:14 16:48
2	04:55 21:48	05:35 21:12	06:28 20:07	07:19 18:55	18:12 (5) 18:26 (5)	07:16 16:46
3	04:56 21:47	05:37 21:11	06:29 20:04	07:21 18:52	18:12 (5) 18:24 (5)	07:18 16:44
4	04:57 21:47	05:38 21:09	06:31 20:02	07:23 18:50	18:12 (5) 18:22 (5)	07:20 16:42
5	04:58 21:46	05:40 21:07	06:33 20:00	07:25 18:47	18:13 (5) 18:19 (5)	07:22 16:40
6	04:59 21:46	05:41 21:05	06:34 19:57	07:26 18:45	18:15 (5) 18:17 (5)	07:24 16:39
7	05:00 21:45	05:43 21:03	06:36 19:55	07:28 18:43	17:40 (7) 17:50 (7)	07:26 16:37
8	05:01 21:44	05:45 21:01	06:38 19:53	07:30 18:40	17:38 (7) 17:52 (7)	07:28 16:35
9	05:02 21:44	05:46 20:59	06:40 19:50	07:32 18:38	17:36 (7) 17:53 (7)	07:29 16:33
10	05:03 21:43	05:48 20:57	06:41 19:48	07:34 18:36	17:35 (7) 17:54 (7)	07:31 16:32
11	05:04 21:42	05:50 20:55	06:43 19:45	07:35 18:33	17:35 (7) 17:54 (7)	07:33 16:30
12	05:05 21:41	05:52 20:53	06:45 19:43	07:37 18:31	17:34 (7) 17:54 (7)	07:35 16:28
13	05:06 21:40	05:53 20:51	06:47 19:41	07:39 18:29	17:34 (7) 17:54 (7)	07:37 16:27
14	05:07 21:39	05:55 20:49	06:48 19:38	07:41 18:26	17:33 (7) 17:53 (7)	07:39 16:25
15	05:08 21:38	05:57 20:47	06:50 19:36	07:43 18:24	17:34 (7) 17:52 (7)	07:41 16:24
16	05:10 21:37	05:58 20:45	06:52 19:33	07:44 18:22	17:34 (7) 17:51 (6)	07:42 16:22
17	05:11 21:36	06:00 20:43	06:53 19:31	07:46 18:20	17:35 (6) 17:50 (6)	07:44 16:21
18	05:12 21:35	06:02 20:41	06:55 19:28	07:48 18:17	17:36 (6) 17:48 (6)	07:46 16:19
19	05:14 21:34	06:04 20:39	06:57 19:26	07:50 18:15	17:36 (6) 17:46 (6)	07:48 16:18
20	05:15 21:32	06:05 20:36	06:59 19:24	07:52 18:13	17:37 (6) 17:43 (6)	07:50 16:17
21	05:16 21:31	06:07 20:34	07:00 19:21	07:54 18:11	17:39 (6) 17:41 (6)	07:51 16:15
22	05:18 21:30	06:09 20:32	07:02 19:19	07:56 18:09	17:41 (6) 17:41 (6)	07:53 16:14
23	05:19 21:28	06:10 20:30	07:04 19:16	18:09 18:06	16:14 16:13	07:55 16:12
24	05:21 21:27	06:12 20:28	07:05 19:14	18:06 18:04	16:13 16:12	07:55 16:11
25	05:22 21:25	06:14 20:25	07:07 19:11	18:04 18:01	16:12 16:11	07:58 16:10
26	05:24 21:24	06:16 20:23	07:09 19:09	18:02 18:00	16:11 16:10	07:58 16:09
27	05:25 21:22	06:17 20:21	07:11 19:07	18:00 17:58	16:09 16:08	07:58 16:08
28	05:27 21:21	06:19 20:18	07:12 19:04	18:16 (5) 18:25 (5)	16:07 16:06	08:00 16:05
29	05:28 21:19	06:21 20:16	07:14 19:02	18:15 (5) 18:26 (5)	16:08 16:07	08:01 16:04
30	05:30 21:17	06:22 20:14	07:16 18:59	18:14 (5) 18:27 (5)	16:09 16:06	08:02 16:03
31	05:32 21:16	06:24 20:11	07:18 18:57	18:12 (5) 18:27 (5)	16:06 16:05	08:03 16:02
Sonnenscheinstunden	509	458	382	330	262	237
astr. max. mögl. Beschattung				388	542	941
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19	0.14
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.72	0.70	0.68
Gesamte Reduktion			0.24	0.20	0.13	0.09
Met. wahrsch. Beschattung			8	78	69	85

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: E - IO5

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:00 (3) 08:03		07:07	17:05 (7) 06:54	05:46	04:58
16:10	28 15:33 (10) 17:00		17:54	19 17:24 (7) 19:51	20:45	21:34
2 08:32	15:00 (3) 08:02		07:05	17:04 (7) 06:51	05:44	04:57
16:11	30 15:35 (10) 17:02		17:56	20 17:24 (7) 19:53	20:47	21:35
3 08:32	15:01 (3) 08:00		07:03	17:04 (7) 06:49	05:42	04:57
16:12	30 15:36 (10) 17:04		17:58	20 17:24 (7) 19:55	20:49	21:36
4 08:32	15:01 (3) 07:58		07:01	17:03 (7) 06:47	05:40	04:56
16:14	32 15:37 (10) 17:06	7 16:28 (9) 18:00	16:35 (9) 18:00	20 17:23 (7) 19:57	20:50	21:37
5 08:31	15:03 (3) 07:57		06:58	17:04 (7) 06:44	05:38	04:55
16:15	32 15:39 (10) 17:08	11 16:37 (9) 18:02	16:26 (9) 06:58	19 17:23 (7) 19:58	20:52	21:38
6 08:31	15:03 (3) 07:55		06:56	17:05 (7) 06:42	05:36	04:54
16:16	33 15:40 (10) 17:10	14 16:39 (9) 18:04	16:25 (9) 06:56	17 17:22 (7) 20:00	20:54	21:39
7 08:31	15:04 (3) 07:53		06:54	17:05 (7) 06:40	05:35	04:54
16:17	35 15:42 (10) 17:12	17 16:41 (9) 18:06	16:24 (9) 06:54	15 17:20 (7) 20:02	20:56	21:40
8 08:30	15:05 (3) 07:51		06:51	17:07 (7) 06:37	05:33	04:53
16:19	34 15:43 (10) 17:14	21 16:44 (8) 18:08	16:23 (9) 06:51	12 17:19 (7) 20:04	20:57	21:41
9 08:30	15:06 (3) 07:49		06:49	17:10 (7) 06:35	05:31	04:53
16:20	34 15:44 (10) 17:16	23 16:46 (8) 18:09	16:23 (9) 06:49	9 17:44 (5) 20:06	20:59	21:42
10 08:29	15:08 (3) 07:47		06:47	17:38 (5) 06:33	05:29	04:52
16:22	34 15:47 (10) 17:18	24 16:47 (8) 18:11	16:23 (9) 06:47	7 17:45 (5) 20:07	21:01	21:43
11 08:28	15:09 (3) 07:45		06:44	17:37 (5) 06:30	05:27	04:52
16:23	35 15:48 (10) 17:20	24 16:47 (8) 18:13	16:23 (9) 06:44	10 17:47 (5) 20:09	21:02	21:43
12 08:28	15:10 (3) 07:44		06:42	17:36 (5) 06:28	05:25	04:51
16:25	34 15:49 (10) 17:22	24 16:47 (8) 18:15	16:23 (9) 06:42	12 17:48 (5) 20:11	21:04	21:44
13 08:27	15:12 (3) 07:42		06:39	17:36 (5) 06:26	05:24	04:51
16:26	31 15:49 (10) 17:24	24 16:47 (8) 18:17	16:23 (9) 06:39	15 17:51 (5) 20:13	21:06	21:45
14 08:26	15:26 (10) 07:40		06:37	17:36 (5) 06:23	05:22	04:51
16:28	24 15:50 (10) 17:26	22 16:46 (8) 18:19	16:24 (9) 06:37	15 17:51 (5) 20:15	21:07	21:46
15 08:25	15:26 (10) 07:38		06:35	17:36 (5) 06:21	05:20	04:50
16:29	25 15:51 (10) 17:27	20 16:45 (8) 18:21	16:25 (9) 06:35	13 17:49 (5) 20:16	21:09	21:46
16 08:24	15:26 (10) 07:36		06:32	17:37 (5) 06:19	05:19	04:50
16:31	25 15:51 (10) 17:29	17 16:43 (8) 18:22	16:25 (9) 06:32	11 17:48 (5) 20:18	21:11	21:47
17 08:23	15:25 (10) 07:33		06:30	17:38 (5) 06:16	05:17	04:50
16:33	26 15:51 (10) 17:31	10 16:38 (9) 18:24	16:28 (9) 06:30	7 17:45 (5) 20:20	21:12	21:47
18 08:22	15:26 (10) 07:31		06:28	06:14	05:16	04:50
16:34	26 15:52 (10) 17:33		18:26	20:22	21:14	21:48
19 08:21	15:27 (10) 07:29		06:25	06:12	05:14	04:50
16:36	25 15:52 (10) 17:35		18:28	20:24	21:15	21:48
20 08:20	15:27 (10) 07:27		06:23	06:10	05:13	04:50
16:38	26 15:53 (10) 17:37		18:30	20:25	21:17	21:48
21 08:19	15:27 (10) 07:25		06:20	06:07	05:11	04:50
16:40	25 15:52 (10) 17:39		18:31	20:27	21:19	21:49
22 08:18	15:28 (10) 07:23		06:18	06:05	05:10	04:51
16:41	25 15:53 (10) 17:41	2 17:12 (6) 18:33	17:12 (6) 18:33	20:29	21:20	21:49
23 08:17	15:28 (10) 07:21		06:16	06:03	05:09	04:51
16:43	24 15:52 (10) 17:43	6 17:15 (6) 18:35	17:09 (6) 06:16	20:31	21:21	21:49
24 08:15	15:29 (10) 07:19		06:13	06:01	05:07	04:51
16:45	24 15:53 (10) 17:45	9 17:17 (6) 18:37	17:08 (6) 06:13	20:33	21:23	21:49
25 08:14	15:29 (10) 07:16		06:11	05:59	05:06	04:51
16:47	23 15:52 (10) 17:47	13 17:20 (6) 18:39	17:07 (6) 06:11	20:34	21:24	21:49
26 08:12	15:31 (10) 07:14		06:08	05:57	05:05	04:52
16:49	21 15:52 (10) 17:49	15 17:21 (6) 18:40	17:06 (6) 06:08	20:36	21:26	21:49
27 08:11	15:32 (10) 07:12		06:06	05:55	05:04	04:52
16:51	19 15:51 (10) 17:51	16 17:22 (6) 18:42	17:06 (6) 06:06	20:38	21:27	21:49
28 08:10	15:34 (10) 07:10		06:03	05:52	05:02	04:53
16:53	17 15:51 (10) 17:53	18 17:24 (7) 18:44	17:06 (6) 06:03	20:40	21:28	21:49
29 08:08	15:35 (10)		07:01	05:50	05:01	04:53
16:54	14 15:49 (10)		19:46	20:42	21:30	21:49
30 08:07	15:37 (10)		06:59	05:48	05:00	04:54
16:56	10 15:47 (10)		19:48	20:43	21:31	21:48
31 08:05			06:56		04:59	
16:58			19:49		21:32	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	801	337	241			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	88	55	46			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: E - IO5

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember		
1	04:55 21:48	05:33 21:14	06:26 20:09	07:18 18:57	18:16 (5) 07:14 18:29 (5)	15:52 (9) 08:08 16:17 (8)	14:51 (3) 15:30 (10)	
2	04:55 21:48	05:35 21:12	06:28 20:07	07:19 18:55	18:15 (5) 07:16 18:26 (5)	15:52 (9) 08:09 16:15 (8)	14:50 (3) 15:29 (10)	
3	04:56 21:47	05:37 21:11	06:29 20:04	07:21 18:52	18:16 (5) 07:18 18:24 (5)	15:53 (9) 08:11 16:13 (8)	14:50 (3) 15:28 (10)	
4	04:57 21:47	05:38 21:09	06:31 20:02	07:23 18:50	18:17 (5) 07:20 18:22 (5)	15:53 (9) 08:12 16:11 (8)	14:49 (3) 15:27 (10)	
5	04:58 21:46	05:40 21:07	06:33 20:00	07:25 18:47	17:45 (7) 07:22 17:55 (7)	15:54 (9) 08:14 16:09 (9)	14:50 (3) 15:27 (10)	
6	04:59 21:46	05:41 21:05	06:34 19:57	07:26 18:45	17:43 (7) 07:24 17:57 (7)	15:56 (9) 08:15 16:07 (9)	14:49 (3) 15:26 (10)	
7	05:00 21:45	05:43 21:03	06:36 19:55	07:28 18:43	17:40 (7) 07:26 17:57 (7)	15:59 (9) 08:16 16:06 (9)	14:50 (3) 15:26 (10)	
8	05:01 21:44	05:45 21:01	06:38 19:53	07:30 18:40	17:39 (7) 07:28 17:58 (7)	15:59 (9) 08:18 16:01 (9)	14:50 (3) 15:25 (10)	
9	05:02 21:44	05:47 20:59	06:40 19:50	07:32 18:38	17:39 (7) 07:29 17:58 (7)	15:59 (9) 08:19 16:01 (9)	14:50 (3) 15:24 (10)	
10	05:03 21:43	05:48 20:57	06:41 19:48	07:34 18:36	17:38 (7) 07:31 17:58 (7)	15:59 (9) 08:20 16:01 (9)	14:50 (3) 15:24 (10)	
11	05:04 21:42	05:50 20:55	06:43 19:45	07:35 18:33	17:38 (7) 07:33 17:58 (7)	15:13 (10) 08:21 15:09 (10)	14:51 (3) 15:24 (10)	
12	05:05 21:41	05:52 20:53	06:45 19:43	07:37 18:31	17:38 (7) 07:35 17:58 (7)	15:09 (10) 08:22 15:19 (10)	14:51 (3) 15:24 (10)	
13	05:06 21:40	05:53 20:51	06:47 19:41	07:39 18:29	17:39 (7) 07:37 17:57 (7)	15:07 (10) 08:23 15:21 (10)	14:51 (3) 15:24 (10)	
14	05:07 21:39	05:55 20:49	06:48 19:38	07:41 18:26	17:38 (6) 07:39 17:55 (7)	15:05 (10) 08:24 15:23 (10)	14:51 (3) 15:24 (10)	
15	05:08 21:38	05:57 20:47	06:50 19:36	07:43 18:24	17:38 (6) 07:41 17:54 (6)	15:05 (10) 08:25 15:24 (10)	14:52 (3) 15:24 (10)	
16	05:10 21:37	05:58 20:45	06:52 19:33	07:44 18:22	17:38 (6) 07:42 17:52 (6)	15:04 (10) 08:26 15:25 (10)	14:52 (3) 15:24 (10)	
17	05:11 21:36	06:00 20:43	06:53 19:31	07:46 18:20	17:39 (6) 07:44 17:50 (6)	15:03 (10) 08:27 15:26 (10)	14:52 (3) 15:23 (10)	
18	05:12 21:35	06:02 20:41	06:55 19:28	07:48 18:17	17:40 (6) 07:46 17:48 (6)	15:03 (10) 08:28 15:27 (10)	14:53 (3) 15:14 (3)	
19	05:14 21:34	06:04 20:39	06:57 19:26	07:50 18:15	17:41 (6) 07:48 17:46 (6)	15:03 (10) 08:28 15:27 (10)	14:54 (3) 15:15 (3)	
20	05:15 21:32	06:05 20:36	06:59 19:24	07:52 18:13	17:41 (6) 07:50 17:50 (6)	15:03 (10) 08:29 15:28 (10)	14:53 (3) 15:15 (3)	
21	05:16 21:31	06:07 20:34	07:00 19:21	07:54 18:11	17:41 (6) 07:51 17:50 (6)	15:03 (10) 08:30 15:28 (10)	14:54 (3) 15:16 (3)	
22	05:18 21:30	06:09 20:32	07:02 19:19	07:56 18:09	17:42 (6) 07:53 17:52 (6)	15:03 (10) 08:30 15:29 (10)	14:55 (3) 15:16 (3)	
23	05:19 21:28	06:10 20:30	07:04 19:16	07:57 18:06	17:42 (6) 07:55 17:51 (6)	15:03 (10) 08:31 15:28 (10)	14:55 (3) 15:17 (3)	
24	05:21 21:27	06:12 20:28	07:05 19:14	07:59 18:04	17:00 (9) 07:57 17:05 (9)	15:03 (10) 08:31 15:29 (10)	14:55 (3) 15:17 (3)	
25	05:22 21:25	06:14 20:25	07:07 19:11	08:01 18:02	15:57 (9) 07:58 16:08 (9)	15:04 (10) 08:31 15:29 (10)	14:57 (3) 15:18 (3)	
26	05:24 21:24	06:16 20:23	07:09 19:09	17:02 18:22 (5)	15:55 (9) 08:00 15:55 (9)	15:04 (10) 08:32 15:29 (10)	14:57 (3) 15:18 (3)	
27	05:25 21:22	06:17 20:21	07:11 19:07	17:00 18:20 (5)	16:13 (8) 08:10 15:54 (9)	15:04 (10) 08:32 15:30 (10)	14:57 (3) 15:28 (10)	
28	05:27 21:21	06:19 20:18	07:12 19:04	17:00 18:17 (5)	16:15 (8) 08:08 15:53 (9)	15:06 (10) 08:32 15:30 (10)	14:58 (3) 15:29 (10)	
29	05:28 21:19	06:21 20:16	07:14 19:02	17:00 18:16 (5)	16:16 (8) 08:05 16:16 (8)	14:52 (3) 08:32 15:30 (10)	14:58 (3) 15:30 (10)	
30	05:30 21:17	06:22 20:14	07:16 18:59	17:00 18:16 (5)	16:16 (8) 08:05 16:16 (8)	14:51 (3) 08:32 15:30 (10)	14:59 (3) 15:31 (10)	
31	05:32 21:16	06:24 20:11	07:18 18:57	17:00 18:16 (5)	16:17 (8) 08:06 16:17 (8)	14:51 (3) 08:32 15:30 (10)	15:00 (3) 15:32 (10)	
Sonnenscheinstunden		509	458	382	330	262	237	
astr.max.mögl.Beschattung				55	416	566		817
Red.Sonnenscheinwahrsch.				0.35	0.29	0.19		0.14
Reduktion Betriebsdauer				0.96	0.96	0.96		0.96
Reduktion Windrichtung				0.72	0.72	0.69		0.68
Gesamte Reduktion				0.24	0.20	0.13		0.09
Met.wahrsch.Beschattung				13	83	72		73

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: F - IO6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:01 (3) 08:03	15:38 (10) 07:07	17:12 (6) 06:54	05:46	04:58	
16:10	22 15:23 (3) 17:00	17 15:55 (10) 17:54	16 17:28 (6) 19:51	20:45	21:34	
2 08:32	15:01 (3) 08:02	15:40 (10) 07:05	17:11 (6) 06:51	05:44	04:57	
16:11	23 15:24 (3) 17:02	13 15:53 (10) 17:56	17 17:28 (7) 19:53	20:47	21:35	
3 08:32	15:02 (3) 08:00	15:43 (10) 07:03	17:11 (6) 06:49	05:42	04:57	
16:12	22 15:24 (3) 17:04	7 15:50 (10) 17:58	19 17:30 (7) 19:55	20:49	21:36	
4 08:32	15:02 (3) 07:58	07:01	17:11 (6) 06:47	05:40	04:56	
16:14	24 15:37 (10) 17:06	18:00	19 17:30 (7) 19:57	20:50	21:37	
5 08:31	15:03 (3) 07:57	06:58	17:11 (7) 06:44	05:38	04:55	
16:15	27 15:39 (10) 17:08	18:02	19 17:30 (7) 19:58	20:52	21:38	
6 08:31	15:03 (3) 07:55	06:56	17:10 (7) 06:42	05:36	04:54	
16:16	30 15:40 (10) 17:10	18:04	21 17:31 (7) 20:00	20:54	21:39	
7 08:31	15:05 (3) 07:53	16:34 (9) 06:54	17:10 (7) 06:40	05:35	04:54	
16:17	30 15:42 (10) 17:12	7 16:41 (9) 18:06	20 17:30 (7) 20:02	20:56	21:40	
8 08:30	15:05 (3) 07:51	16:32 (9) 06:51	17:10 (7) 06:37	05:33	04:53	
16:19	31 15:43 (10) 17:14	12 16:44 (9) 18:08	20 17:30 (7) 20:04	20:57	21:41	
9 08:30	15:06 (3) 07:49	16:30 (9) 06:49	17:10 (7) 06:35	05:31	04:53	
16:20	32 15:44 (10) 17:16	16 16:46 (8) 18:09	20 17:30 (7) 20:06	20:59	21:42	
10 08:29	15:07 (3) 07:47	16:29 (9) 06:47	17:10 (7) 06:33	05:29	04:52	
16:22	35 15:47 (10) 17:18	19 16:48 (8) 18:11	19 17:29 (7) 20:07	21:01	21:43	
11 08:28	15:08 (3) 07:45	16:29 (9) 06:44	17:11 (7) 06:30	05:27	04:52	
16:23	35 15:48 (10) 17:20	21 16:50 (8) 18:13	17 17:28 (7) 20:09	21:02	21:43	
12 08:28	15:09 (3) 07:44	16:28 (9) 06:42	17:12 (7) 06:28	05:26	04:51	
16:25	36 15:50 (10) 17:22	24 16:52 (8) 18:15	16 17:48 (5) 20:11	21:04	21:44	
13 08:27	15:10 (3) 07:42	16:28 (9) 06:39	17:15 (7) 06:26	05:24	04:51	
16:26	36 15:51 (10) 17:24	24 16:52 (8) 18:17	15 17:51 (5) 20:13	21:06	21:45	
14 08:26	15:11 (3) 07:40	16:28 (9) 06:37	17:43 (5) 06:23	05:22	04:51	
16:28	37 15:53 (10) 17:26	25 16:53 (8) 18:19	10 17:53 (5) 20:15	21:07	21:46	
15 08:25	15:13 (3) 07:38	16:28 (9) 06:35	17:41 (5) 06:21	05:20	04:50	
16:29	35 15:54 (10) 17:27	24 16:52 (8) 18:21	13 17:54 (5) 20:16	21:09	21:46	
16 08:24	15:15 (3) 07:36	16:28 (9) 06:32	17:41 (5) 06:19	05:19	04:50	
16:31	33 15:55 (10) 17:29	24 16:52 (8) 18:22	15 17:56 (5) 20:18	21:11	21:47	
17 08:23	15:29 (10) 07:33	16:29 (9) 06:30	17:40 (5) 06:16	05:17	04:50	
16:33	26 15:55 (10) 17:31	22 16:51 (8) 18:24	15 17:55 (5) 20:20	21:12	21:47	
18 08:22	15:30 (10) 07:31	16:29 (9) 06:28	17:41 (5) 06:14	05:16	04:50	
16:34	25 15:55 (10) 17:33	20 16:49 (8) 18:26	14 17:55 (5) 20:22	21:14	21:48	
19 08:21	15:30 (10) 07:29	16:30 (9) 06:25	17:41 (5) 06:12	05:14	04:50	
16:36	26 15:56 (10) 17:35	16 16:46 (9) 18:28	12 17:53 (5) 20:24	21:15	21:48	
20 08:20	15:30 (10) 07:27	16:32 (9) 06:23	17:43 (5) 06:10	05:13	04:50	
16:38	27 15:57 (10) 17:37	13 16:45 (9) 18:30	8 17:51 (5) 20:25	21:17	21:48	
21 08:19	15:30 (10) 07:25	16:35 (9) 06:20	06:07	05:11	04:50	
16:40	27 15:57 (10) 17:39	7 16:42 (9) 18:31	20:27	21:19	21:49	
22 08:18	15:31 (10) 07:23	06:18	06:05	05:10	04:51	
16:41	27 15:58 (10) 17:41	18:33	20:29	21:20	21:49	
23 08:17	15:30 (10) 07:21	06:16	06:03	05:09	04:51	
16:43	27 15:57 (10) 17:43	18:35	20:31	21:21	21:49	
24 08:15	15:31 (10) 07:19	06:13	06:01	05:07	04:51	
16:45	27 15:58 (10) 17:45	18:37	20:33	21:23	21:49	
25 08:14	15:31 (10) 07:16	17:17 (6) 06:11	05:59	05:06	04:51	
16:47	27 15:58 (10) 17:47	3 17:20 (6) 18:39	20:34	21:24	21:49	
26 08:12	15:32 (10) 07:14	17:14 (6) 06:08	05:57	05:05	04:52	
16:49	26 15:58 (10) 17:49	7 17:21 (6) 18:40	20:36	21:26	21:49	
27 08:11	15:32 (10) 07:12	17:13 (6) 06:06	05:55	05:04	04:52	
16:51	26 15:58 (10) 17:51	10 17:23 (6) 18:42	20:38	21:27	21:49	
28 08:10	15:34 (10) 07:10	17:12 (6) 06:03	05:52	05:02	04:53	
16:53	24 15:58 (10) 17:53	14 17:26 (6) 18:44	20:40	21:28	21:49	
29 08:08	15:34 (10)	07:01	05:50	05:01	04:53	
16:54	23 15:57 (10)	19:46	20:42	21:30	21:49	
30 08:07	15:35 (10)	06:59	05:48	05:00	04:54	
16:56	21 15:56 (10)	19:48	20:43	21:31	21:48	
31 08:05	15:36 (10)	06:56	05:49	05:01	04:54	
16:58	19 15:55 (10)	19:50	21:32	21:32	21:48	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	866	345	325			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	95	56	62			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: F - IO6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:55	05:33	06:26	07:18	17:53 (7) 07:14	15:59 (9) 08:08
	21:48	21:14	20:09	18:57	16	18:29 (5) 16:48
2	04:55	05:35	06:28	07:19	17:50 (7) 07:16	16:00 (9) 08:09
	21:48	21:12	20:07	18:55	15	18:05 (7) 16:46
3	04:56	05:37	06:29	07:21	17:49 (7) 07:18	16:15 (9) 08:11
	21:47	21:11	20:04	18:52	17	18:06 (7) 16:44
4	04:57	05:38	06:31	07:23	17:46 (7) 07:20	16:13 (9) 08:12
	21:47	21:09	20:02	18:50	19	18:07 (7) 16:42
5	04:58	05:40	06:33	07:25	17:47 (7) 07:22	16:10 (9) 08:14
	21:46	21:07	20:00	18:47	20	18:07 (7) 16:40
6	04:59	05:41	06:35	07:26	17:47 (7) 07:24	16:02 (9) 08:15
	21:46	21:05	19:57	18:45	20	18:07 (7) 16:39
7	05:00	05:43	06:36	07:28	17:45 (7) 07:26	16:02 (9) 08:16
	21:45	21:03	19:55	18:43	21	18:06 (7) 16:37
8	05:01	05:45	06:38	07:30	17:46 (7) 07:28	15:13 (10) 08:18
	21:44	21:01	19:53	18:40	20	18:06 (7) 16:35
9	05:02	05:47	06:40	07:32	17:46 (6) 07:29	15:11 (10) 08:19
	21:44	20:59	19:50	18:38	19	18:05 (7) 16:33
10	05:03	05:48	06:41	07:34	17:46 (6) 07:31	15:24 (10) 08:20
	21:43	20:57	19:48	18:36	18	18:04 (7) 16:32
11	05:04	05:50	06:43	07:35	17:45 (6) 07:33	15:26 (10) 08:21
	21:42	20:55	19:45	18:33	18	18:03 (7) 16:30
12	05:05	05:52	06:45	07:37	17:45 (6) 07:35	15:27 (10) 08:22
	21:41	20:53	19:43	18:31	16	18:01 (6) 16:28
13	05:06	05:53	06:47	07:39	17:45 (6) 07:37	15:28 (10) 08:23
	21:40	20:51	19:41	18:29	15	18:00 (6) 16:27
14	05:07	05:55	06:48	07:41	17:45 (6) 07:39	15:29 (10) 08:24
	21:39	20:49	19:38	18:26	12	17:57 (6) 16:25
15	05:08	05:57	06:50	07:43	17:46 (6) 07:41	15:30 (10) 08:25
	21:38	20:47	19:36	18:24	9	17:55 (6) 16:24
16	05:10	05:58	06:52	07:44	17:47 (6) 07:42	15:31 (10) 08:26
	21:37	20:45	19:33	18:22	5	17:52 (6) 16:22
17	05:11	06:00	06:53	07:46	17:47 (6) 07:44	15:31 (10) 08:27
	21:36	20:43	19:31	18:20	16	17:52 (6) 16:21
18	05:12	06:02	06:55	07:48	17:46 (6) 07:46	15:32 (10) 08:28
	21:35	20:41	19:28	18:17	19	17:51 (6) 16:20
19	05:14	06:04	06:57	07:50	17:46 (6) 07:48	15:33 (10) 08:29
	21:34	20:39	19:26	18:15	16	17:50 (6) 16:19
20	05:15	06:05	06:59	07:52	17:46 (6) 07:50	15:34 (10) 08:30
	21:32	20:36	19:24	18:13	17	17:49 (6) 16:17
21	05:16	06:07	07:00	07:54	17:04 (9) 07:51	15:35 (10) 08:31
	21:31	20:34	19:21	18:11	10	17:14 (9) 16:15
22	05:18	06:09	07:02	07:56	17:02 (9) 07:53	15:36 (10) 08:32
	21:30	20:32	19:19	18:09	14	17:16 (9) 16:14
23	05:19	06:10	07:04	07:57	17:00 (9) 07:55	15:37 (10) 08:33
	21:28	20:30	19:16	18:28 (5) 18:06	18	17:18 (8) 16:13
24	05:21	06:12	07:05	18:25 (5) 07:59	16:59 (9) 07:57	15:38 (10) 08:34
	21:27	20:28	19:14	18:36 (5) 18:04	21	17:20 (8) 16:12
25	05:22	06:14	07:07	18:24 (5) 07:01	15:58 (9) 07:58	15:39 (10) 08:35
	21:25	20:25	19:11	18:37 (5) 17:02	23	16:21 (8) 16:11
26	05:24	06:16	07:09	18:23 (5) 07:03	15:58 (9) 08:00	14:53 (3) 08:32
	21:24	20:23	19:09	18:38 (5) 17:00	24	16:22 (8) 16:10
27	05:25	06:17	07:11	18:23 (5) 07:05	15:58 (9) 08:02	14:52 (3) 08:32
	21:22	20:21	19:07	18:38 (5) 16:58	24	16:22 (8) 16:09
28	05:27	06:19	07:12	18:22 (5) 07:07	15:57 (9) 08:03	14:51 (3) 08:32
	21:21	20:18	19:04	18:36 (5) 16:56	25	16:22 (8) 16:08
29	05:28	06:21	07:14	18:22 (5) 07:09	15:58 (9) 08:05	14:50 (3) 08:32
	21:19	20:16	19:02	18:34 (5) 16:54	24	16:22 (8) 16:07
30	05:30	06:22	07:16	17:57 (7) 07:11	15:58 (9) 08:06	14:50 (3) 08:32
	21:17	20:14	18:59	18:31 (5) 16:52	23	16:21 (8) 16:06
31	05:32	06:24		07:12	15:58 (9)	08:32
	21:16	20:11		16:50	21	16:19 (8)
Sonnenscheinstunden	509	458	382	330	262	237
astr. max. mögl. Beschattung			99	487	644	758
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19	0.14
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.72	0.69	0.68
Gesamte Reduktion			0.24	0.20	0.13	0.09
Met. wahrsch. Beschattung			24	98	81	68

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: G - IO7

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:06 (3) 08:03	15:42 (10) 07:07	17:16 (6) 06:54	05:46	04:58	
16:10	23 15:29 (3) 17:00	23 16:05 (10) 17:54	11 17:27 (6) 19:51	20:45	21:34	
2 08:32	15:07 (3) 08:02	15:43 (10) 07:05	17:15 (6) 06:51	05:44	04:57	
16:11	22 15:29 (3) 17:02	21 16:04 (10) 17:56	14 17:29 (6) 19:53	20:47	21:35	
3 08:32	15:08 (3) 08:00	15:44 (10) 07:03	17:15 (6) 06:49	05:42	04:57	
16:12	22 15:30 (3) 17:04	19 16:03 (10) 17:58	16 17:31 (6) 19:55	20:49	21:36	
4 08:32	15:08 (3) 07:58	15:46 (10) 07:01	17:14 (6) 06:47	05:40	04:56	
16:14	22 15:30 (3) 17:06	15 16:01 (10) 18:00	18 17:32 (7) 19:57	20:50	21:37	
5 08:31	15:09 (3) 07:57	15:48 (10) 06:58	17:15 (6) 06:44	05:38	04:55	
16:15	22 15:31 (3) 17:08	11 15:59 (10) 18:02	19 17:34 (7) 19:58	20:52	21:38	
6 08:31	15:09 (3) 07:55	06:56	17:15 (6) 06:42	05:36	04:54	
16:16	22 15:31 (3) 17:10	18:04	20 17:35 (7) 20:00	20:54	21:39	
7 08:31	15:10 (3) 07:53	06:54	17:15 (7) 06:40	05:35	04:54	
16:17	22 15:32 (3) 17:12	18:06	19 17:34 (7) 20:02	20:56	21:40	
8 08:30	15:10 (3) 07:51	06:51	17:14 (7) 06:37	05:33	04:53	
16:19	22 15:32 (3) 17:14	18:08	21 17:35 (7) 20:04	20:57	21:41	
9 08:30	15:10 (3) 07:49	16:42 (9) 06:49	17:15 (7) 06:35	05:31	04:53	
16:20	22 15:32 (3) 17:16	2 16:44 (9) 18:09	20 17:35 (7) 20:06	20:59	21:42	
10 08:29	15:11 (3) 07:47	16:38 (9) 06:47	17:14 (7) 06:33	05:29	04:52	
16:22	21 15:32 (3) 17:18	10 16:48 (9) 18:11	20 17:34 (7) 20:07	21:01	21:43	
11 08:28	15:12 (3) 07:45	16:36 (9) 06:44	17:15 (7) 06:30	05:27	04:52	
16:23	26 15:48 (10) 17:20	14 16:50 (9) 18:13	18 17:33 (7) 20:09	21:02	21:43	
12 08:28	15:13 (3) 07:44	16:35 (9) 06:42	17:15 (7) 06:28	05:26	04:51	
16:25	28 15:50 (10) 17:22	17 16:52 (9) 18:15	17 17:32 (7) 20:11	21:04	21:44	
13 08:27	15:14 (3) 07:42	16:35 (9) 06:39	17:16 (7) 06:26	05:24	04:51	
16:26	29 15:51 (10) 17:24	19 16:54 (8) 18:17	17 17:51 (5) 20:13	21:06	21:45	
14 08:26	15:14 (3) 07:40	16:34 (9) 06:37	17:18 (7) 06:23	05:22	04:51	
16:28	32 15:53 (10) 17:26	23 16:57 (8) 18:19	17 17:53 (5) 20:15	21:07	21:46	
15 08:25	15:15 (3) 07:38	16:34 (9) 06:35	17:22 (7) 06:21	05:20	04:50	
16:29	33 15:55 (10) 17:27	23 16:57 (8) 18:21	10 17:54 (5) 20:16	21:09	21:46	
16 08:24	15:17 (3) 07:36	16:34 (9) 06:32	17:44 (5) 06:19	05:19	04:50	
16:31	33 15:57 (10) 17:29	23 16:57 (8) 18:22	13 17:57 (5) 20:18	21:11	21:47	
17 08:23	15:17 (3) 07:33	16:34 (9) 06:30	17:43 (5) 06:16	05:17	04:50	
16:33	34 15:58 (10) 17:31	23 16:57 (8) 18:24	15 17:58 (5) 20:20	21:12	21:47	
18 08:22	15:19 (3) 07:31	16:33 (9) 06:28	17:44 (5) 06:14	05:16	04:50	
16:34	33 16:00 (10) 17:33	22 16:55 (8) 18:26	14 17:58 (5) 20:22	21:14	21:48	
19 08:21	15:22 (3) 07:29	16:34 (9) 06:25	17:43 (5) 06:12	05:14	04:50	
16:36	31 16:02 (10) 17:35	20 16:54 (8) 18:28	14 17:57 (5) 20:24	21:15	21:48	
20 08:20	15:38 (10) 07:27	16:35 (9) 06:23	17:44 (5) 06:10	05:13	04:50	
16:38	25 16:03 (10) 17:37	18 16:53 (8) 18:30	12 17:56 (5) 20:25	21:17	21:48	
21 08:19	15:38 (10) 07:25	16:36 (9) 06:20	17:46 (5) 06:07	05:11	04:50	
16:40	25 16:03 (10) 17:39	15 16:51 (9) 18:31	8 17:54 (5) 20:27	21:19	21:49	
22 08:18	15:38 (10) 07:23	16:38 (9) 06:18	06:05	05:10	04:51	
16:41	26 16:04 (10) 17:41	12 16:50 (9) 18:33	20:29	21:20	21:49	
23 08:17	15:38 (10) 07:21	16:40 (9) 06:16	06:03	05:09	04:51	
16:43	26 16:04 (10) 17:43	6 16:46 (9) 18:35	20:31	21:21	21:49	
24 08:15	15:38 (10) 07:19	06:13	06:01	05:07	04:51	
16:45	27 16:05 (10) 17:45	18:37	20:33	21:23	21:49	
25 08:14	15:38 (10) 07:16	06:11	05:59	05:06	04:51	
16:47	27 16:05 (10) 17:47	18:39	20:34	21:24	21:49	
26 08:12	15:39 (10) 07:14	06:08	05:57	05:05	04:52	
16:49	26 16:05 (10) 17:49	18:40	20:36	21:26	21:49	
27 08:11	15:39 (10) 07:12	17:19 (6) 06:06	05:55	05:04	04:52	
16:51	26 16:05 (10) 17:51	4 17:23 (6) 18:42	20:38	21:27	21:49	
28 08:10	15:40 (10) 07:10	17:17 (6) 06:03	05:52	05:02	04:53	
16:53	26 16:06 (10) 17:53	9 17:26 (6) 18:44	20:40	21:28	21:49	
29 08:08	15:40 (10) 07:01	06:01	05:50	05:01	04:53	
16:54	25 16:05 (10) 17:46	19:46	20:42	21:30	21:49	
30 08:07	15:40 (10) 06:59	06:59	05:48	05:00	04:54	
16:56	25 16:05 (10) 17:48	19:48	20:43	21:31	21:48	
31 08:05	15:41 (10) 06:56	06:56	05:49	05:01	04:54	
16:58	23 16:04 (10) 17:49	19:49	20:45	21:32	21:48	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	806	349	333			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	89	57	63			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: G - IO7

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember	
1	04:55	05:33	06:26	07:18	17:55 (7) 07:14	16:08 (9) 08:08	
	21:48	21:14	20:09	18:57	18:11 (7) 16:48	16:17 (9) 16:05	
2	04:55	05:35	06:28	07:19	17:53 (7) 07:16	16:09	
	21:48	21:12	20:07	18:55	18:11 (7) 16:46	16:04	
3	04:56	05:37	06:29	07:21	17:52 (7) 07:18	16:04	
	21:47	21:11	20:04	18:52	18:12 (7) 16:44	16:04	
4	04:57	05:38	06:31	07:23	17:52 (7) 07:20	16:04	
	21:47	21:09	20:02	18:50	18:12 (7) 16:42	16:03	
5	04:58	05:40	06:33	07:25	17:51 (7) 07:22	15:22 (10) 08:14	
	21:46	21:07	20:00	18:47	18:12 (7) 16:40	15:24 (10) 16:02	
6	04:59	05:41	06:35	07:26	17:51 (7) 07:24	15:17 (10) 08:15	
	21:46	21:05	19:57	18:45	18:11 (7) 16:39	15:29 (10) 16:02	
7	05:00	05:43	06:36	07:28	17:51 (6) 07:26	15:16 (10) 08:16	
	21:45	21:03	19:55	18:43	18:10 (7) 16:37	15:32 (10) 16:02	
8	05:01	05:45	06:38	07:30	17:50 (6) 07:28	15:15 (10) 08:18	
	21:44	21:01	19:53	18:40	18:09 (7) 16:35	15:34 (10) 16:01	
9	05:02	05:47	06:40	07:32	17:49 (6) 07:29	15:14 (10) 08:19	
	21:44	20:59	19:50	18:38	18:08 (7) 16:33	15:35 (10) 16:01	
10	05:03	05:48	06:41	07:34	17:49 (6) 07:31	15:13 (10) 08:20	
	21:43	20:57	19:48	18:36	18:06 (7) 16:32	15:36 (10) 16:01	
11	05:04	05:50	06:43	07:35	17:49 (6) 07:33	15:12 (10) 08:21	
	21:42	20:55	19:45	18:33	18:05 (6) 16:30	15:36 (10) 16:00	
12	05:05	05:52	06:45	07:37	17:49 (6) 07:35	15:12 (10) 08:22	
	21:41	20:53	19:43	18:31	18:02 (6) 16:28	15:37 (10) 16:00	
13	05:06	05:53	06:47	07:39	17:50 (6) 07:37	15:12 (10) 08:23	
	21:40	20:51	19:41	18:29	18:00 (6) 16:27	15:37 (10) 16:00	
14	05:07	05:55	06:48	07:41	17:50 (6) 07:39	15:12 (10) 08:24	
	21:39	20:49	19:38	18:26	17:57 (6) 16:25	15:38 (10) 16:00	
15	05:08	05:57	06:50	07:43	17:52 (6) 07:41	15:12 (10) 08:25	
	21:38	20:47	19:36	18:24	17:55 (6) 16:24	15:38 (10) 16:00	
16	05:10	05:58	06:52	07:44	17:55 (6) 07:42	15:12 (10) 08:26	
	21:37	20:45	19:33	18:22	18:22	16:22	15:38 (10) 16:00
17	05:11	06:00	06:53	07:46	17:55 (6) 07:44	15:12 (10) 08:27	
	21:36	20:43	19:31	18:20	18:21	16:21	15:39 (10) 16:00
18	05:12	06:02	06:55	07:48	17:55 (6) 07:46	15:12 (10) 08:28	
	21:35	20:41	19:28	18:17	18:19	16:19	15:39 (10) 16:01
19	05:14	06:04	06:57	07:50	17:10 (9) 07:48	15:13 (10) 08:28	
	21:34	20:39	19:26	18:15	17:19 (9) 16:18	15:39 (10) 16:01	
20	05:15	06:05	06:59	07:52	17:07 (9) 07:50	15:13 (10) 08:29	
	21:32	20:36	19:24	18:13	17:21 (9) 16:17	15:39 (10) 16:01	
21	05:16	06:07	07:00	07:54	17:06 (9) 07:51	15:14 (10) 08:30	
	21:31	20:34	19:21	18:11	17:22 (9) 16:15	15:39 (10) 16:02	
22	05:18	06:09	07:02	18:31 (5) 07:56	17:05 (9) 07:53	15:14 (10) 08:30	
	21:30	20:32	19:19	18:38 (5) 18:09	17:24 (8) 16:14	15:39 (10) 16:02	
23	05:19	06:10	07:04	18:29 (5) 07:57	17:04 (9) 07:55	14:58 (3) 08:31	
	21:28	20:30	19:16	18:40 (5) 18:06	17:25 (8) 16:13	15:38 (10) 16:03	
24	05:21	06:12	07:05	18:27 (5) 07:59	17:04 (9) 07:57	14:56 (3) 08:31	
	21:27	20:28	19:14	18:40 (5) 18:04	17:26 (8) 16:12	15:37 (10) 16:03	
25	05:22	06:14	07:07	18:26 (5) 07:01	16:03 (9) 07:58	14:55 (3) 08:31	
	21:25	20:25	19:11	18:40 (5) 17:02	16:26 (8) 16:11	15:36 (10) 16:04	
26	05:24	06:16	07:09	18:26 (5) 07:03	16:03 (9) 08:00	14:55 (3) 08:32	
	21:24	20:23	19:09	18:41 (5) 17:00	16:26 (8) 16:10	15:35 (10) 16:04	
27	05:25	06:17	07:11	18:26 (5) 07:05	16:03 (9) 08:02	14:55 (3) 08:32	
	21:22	20:21	19:07	18:39 (5) 16:58	16:26 (8) 16:09	15:34 (10) 16:05	
28	05:27	06:19	07:12	18:25 (5) 07:07	16:04 (9) 08:03	14:55 (3) 08:32	
	21:21	20:18	19:04	18:36 (5) 16:56	16:26 (8) 16:08	15:33 (10) 16:06	
29	05:28	06:21	07:14	17:59 (7) 07:09	16:04 (9) 08:05	14:54 (3) 08:32	
	21:19	20:16	19:02	18:34 (5) 16:54	16:24 (8) 16:07	15:32 (10) 16:07	
30	05:30	06:22	07:16	17:57 (7) 07:11	16:05 (9) 08:06	14:54 (3) 08:32	
	21:17	20:14	18:59	18:31 (5) 16:52	16:21 (9) 16:06	15:31 (10) 16:08	
31	05:32	06:24		07:12	16:06 (9)		08:32
	21:16	20:11		16:50	16:19 (9)		16:09
Sonnenscheinstunden	509	458	382	330	262	237	682
astr. max.mögl. Beschattung			117	479	662		0.14
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19		0.96
Reduktion Betriebsdauer			0.72	0.72	0.69		0.68
Gesamte Reduktion			0.24	0.20	0.13		0.09
Met. wahrsch. Beschattung			28	96	84		61

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: H - IO8

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:12 (3) 08:03	15:47 (10) 07:07	17:20 (6) 06:54	05:46	04:58	
16:10	21 15:33 (3) 17:00	25 16:12 (10) 17:54	7 17:27 (6) 19:51	20:45	21:34	
2 08:32	15:12 (3) 08:02	15:47 (10) 07:05	17:19 (6) 06:51	05:44	04:57	
16:11	22 15:34 (3) 17:02	24 16:11 (10) 17:56	10 17:29 (6) 19:53	20:47	21:35	
3 08:32	15:13 (3) 08:00	15:48 (10) 07:03	17:18 (6) 06:49	05:42	04:57	
16:12	22 15:35 (3) 17:04	22 16:10 (10) 17:58	14 17:32 (6) 19:55	20:49	21:36	
4 08:32	15:13 (3) 07:58	15:49 (10) 07:01	17:17 (6) 06:47	05:40	04:56	
16:14	22 15:35 (3) 17:06	21 16:10 (10) 18:00	16 17:33 (6) 19:57	20:50	21:37	
5 08:31	15:14 (3) 07:57	15:50 (10) 06:58	17:17 (6) 06:44	05:38	04:55	
16:15	22 15:36 (3) 17:08	18 16:08 (10) 18:02	18 17:35 (7) 19:58	20:52	21:38	
6 08:31	15:14 (3) 07:55	15:52 (10) 06:56	17:18 (6) 06:42	05:36	04:54	
16:16	22 15:36 (3) 17:10	15 16:07 (10) 18:04	19 17:37 (7) 20:00	20:54	21:39	
7 08:31	15:15 (3) 07:53	15:54 (10) 06:54	17:18 (6) 06:40	05:35	04:54	
16:17	22 15:37 (3) 17:12	11 16:05 (10) 18:06	19 17:37 (7) 20:02	20:56	21:40	
8 08:30	15:15 (3) 07:51	06:51	17:19 (6) 06:37	05:33	04:53	
16:19	22 15:37 (3) 17:14	18:08	19 17:38 (7) 20:04	20:57	21:41	
9 08:30	15:15 (3) 07:49	06:49	17:19 (7) 06:35	05:31	04:53	
16:20	22 15:37 (3) 17:16	18:09	19 17:38 (7) 20:06	20:59	21:42	
10 08:29	15:15 (3) 07:47	06:47	17:18 (7) 06:33	05:29	04:52	
16:22	22 15:37 (3) 17:18	18:11	20 17:38 (7) 20:07	21:01	21:43	
11 08:28	15:17 (3) 07:45	16:46 (9) 06:44	17:18 (7) 06:30	05:27	04:52	
16:23	21 15:38 (3) 17:20	4 16:50 (8) 18:13	20 17:38 (7) 20:09	21:02	21:43	
12 08:28	15:17 (3) 07:44	16:43 (9) 06:42	17:18 (7) 06:28	05:25	04:51	
16:25	21 15:38 (3) 17:22	9 16:52 (9) 18:15	18 17:36 (7) 20:11	21:04	21:44	
13 08:27	15:18 (3) 07:42	16:41 (9) 06:39	17:18 (7) 06:26	05:24	04:51	
16:26	21 15:39 (3) 17:24	13 16:54 (9) 18:17	18 17:36 (7) 20:13	21:06	21:45	
14 08:26	15:18 (3) 07:40	16:40 (9) 06:37	17:20 (7) 06:23	05:22	04:51	
16:28	21 15:39 (3) 17:26	17 16:57 (8) 18:19	17 17:53 (5) 20:15	21:07	21:46	
15 08:25	15:19 (3) 07:38	16:39 (9) 06:35	17:21 (7) 06:21	05:20	04:50	
16:29	24 15:55 (10) 17:27	20 16:59 (8) 18:21	17 17:54 (5) 20:16	21:09	21:46	
16 08:24	15:20 (3) 07:36	16:39 (9) 06:32	17:24 (7) 06:19	05:19	04:50	
16:31	27 15:57 (10) 17:29	21 17:00 (8) 18:22	15 17:57 (5) 20:18	21:11	21:47	
17 08:23	15:20 (3) 07:33	16:39 (9) 06:30	17:46 (5) 06:16	05:17	04:50	
16:33	29 15:58 (10) 17:31	22 17:01 (8) 18:24	12 17:58 (5) 20:20	21:12	21:47	
18 08:22	15:21 (3) 07:31	16:38 (9) 06:28	17:46 (5) 06:14	05:16	04:50	
16:34	30 16:00 (10) 17:33	21 16:59 (8) 18:26	14 18:00 (5) 20:22	21:14	21:48	
19 08:21	15:23 (3) 07:29	16:38 (9) 06:25	17:45 (5) 06:12	05:14	04:50	
16:36	30 16:02 (10) 17:35	21 16:59 (8) 18:28	14 17:59 (5) 20:24	21:15	21:48	
20 08:20	15:25 (3) 07:27	16:38 (9) 06:23	17:46 (5) 06:10	05:13	04:50	
16:38	31 16:05 (10) 17:37	20 16:58 (9) 18:30	13 17:59 (5) 20:25	21:17	21:48	
21 08:19	15:26 (3) 07:25	16:39 (9) 06:20	17:47 (5) 06:07	05:11	04:50	
16:40	30 16:06 (10) 17:39	18 16:57 (9) 18:31	11 17:58 (5) 20:27	21:19	21:48	
22 08:18	15:45 (10) 07:23	16:40 (9) 06:18	17:48 (5) 06:05	05:10	04:51	
16:41	23 16:08 (10) 17:41	17 16:57 (9) 18:33	7 17:55 (5) 20:29	21:20	21:49	
23 08:17	15:44 (10) 07:21	16:40 (9) 06:15	06:03	05:09	04:51	
16:43	24 16:08 (10) 17:43	15 16:55 (9) 18:35	20:31	21:21	21:49	
24 08:15	15:45 (10) 07:19	16:43 (9) 06:13	06:01	05:07	04:51	
16:45	25 16:10 (10) 17:45	10 16:53 (9) 18:37	20:33	21:23	21:49	
25 08:14	15:44 (10) 07:16	06:11	05:59	05:06	04:51	
16:47	26 16:10 (10) 17:47	18:39	20:34	21:24	21:49	
26 08:12	15:45 (10) 07:14	06:08	05:57	05:05	04:52	
16:49	26 16:11 (10) 17:49	18:40	20:36	21:26	21:49	
27 08:11	15:44 (10) 07:12	06:06	05:55	05:04	04:52	
16:51	27 16:11 (10) 17:51	18:42	20:38	21:27	21:49	
28 08:10	15:45 (10) 07:10	17:23 (6) 06:03	05:52	05:02	04:53	
16:53	27 16:12 (10) 17:53	3 17:26 (6) 18:44	20:40	21:28	21:49	
29 08:08	15:45 (10)	07:01	05:50	05:01	04:53	
16:54	27 16:12 (10)	19:46	20:42	21:30	21:49	
30 08:07	15:45 (10)	06:59	05:48	05:00	04:54	
16:56	26 16:11 (10)	19:48	20:43	21:31	21:48	
31 08:05	15:45 (10)	06:56	05:49	04:59	04:54	
16:58	26 16:11 (10)	19:49	20:44	21:32	21:48	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	761	367	337			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	85	59	64			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: H - IO8

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:55	05:33	06:26	07:18	17:58 (7) 07:14	08:08
	21:48	21:14	20:09	18:57	18:16 (7) 16:48	15:05
2	04:55	05:35	06:28	07:19	17:56 (7) 07:16	08:09
	21:48	21:12	20:07	18:55	18:15 (7) 16:46	16:04
3	04:56	05:37	06:29	07:21	17:56 (7) 07:18	15:27 (10) 08:11
	21:47	21:11	20:04	18:52	18:15 (7) 16:44	16:04
4	04:57	05:38	06:31	07:23	17:55 (7) 07:20	15:23 (10) 08:12
	21:47	21:09	20:02	18:50	18:15 (7) 16:42	15:35 (10) 16:03
5	04:58	05:40	06:33	07:25	17:56 (7) 07:22	15:21 (10) 08:14
	21:46	21:07	20:00	18:47	18:15 (7) 16:40	16:15:37 (10) 16:02
6	04:59	05:41	06:34	07:26	17:55 (6) 07:24	15:20 (10) 08:15
	21:46	21:05	19:57	18:45	18:14 (7) 16:39	18:15:38 (10) 16:02
7	05:00	05:43	06:36	07:28	17:53 (6) 07:26	15:19 (10) 08:16
	21:45	21:03	19:55	18:43	18:12 (7) 16:37	21:15:40 (10) 16:02
8	05:01	05:45	06:38	07:30	17:53 (6) 07:28	15:19 (10) 08:18
	21:44	21:01	19:53	18:40	18:11 (7) 16:35	22:15:41 (10) 16:01
9	05:02	05:47	06:40	07:32	17:52 (6) 07:29	15:18 (10) 08:19
	21:44	20:59	19:50	18:38	17:52 (6) 16:33	24:15:42 (10) 16:01
10	05:03	05:48	06:41	07:34	17:52 (6) 07:31	15:18 (10) 08:20
	21:43	20:57	19:48	18:36	18:07 (6) 16:32	24:15:42 (10) 16:01
11	05:04	05:50	06:43	07:35	17:53 (6) 07:33	15:17 (10) 08:21
	21:42	20:55	19:45	18:33	18:05 (6) 16:30	26:15:43 (10) 16:00
12	05:05	05:52	06:45	07:37	17:53 (6) 07:35	15:17 (10) 08:22
	21:41	20:53	19:43	18:31	9:18:02 (6) 16:28	26:15:43 (10) 16:00
13	05:06	05:53	06:47	07:39	17:55 (6) 07:37	15:17 (10) 08:23
	21:40	20:51	19:41	18:29	5:18:00 (6) 16:27	26:15:43 (10) 16:00
14	05:07	05:55	06:48	07:41	17:56 (6) 07:39	15:17 (10) 08:24
	21:39	20:49	19:38	18:26	1:17:57 (6) 16:25	27:15:44 (10) 16:00
15	05:08	05:57	06:50	07:43	17:57 (6) 07:41	15:17 (10) 08:25
	21:38	20:47	19:36	18:24	16:24	27:15:44 (10) 16:00
16	05:10	05:58	06:52	07:44	17:57 (6) 07:42	15:18 (10) 08:26
	21:37	20:45	19:33	18:22	16:22	26:15:44 (10) 16:00
17	05:11	06:00	06:53	07:46	17:16 (9) 07:44	15:18 (10) 08:27
	21:36	20:43	19:31	18:20	6:17:22 (9) 16:21	26:15:44 (10) 16:00
18	05:12	06:02	06:55	07:48	17:13 (9) 07:46	15:19 (10) 08:28
	21:35	20:41	19:28	18:17	12:17:25 (9) 16:19	25:15:44 (10) 16:01
19	05:14	06:04	06:57	07:50	17:11 (9) 07:48	15:19 (10) 08:28
	21:34	20:39	19:26	18:15	15:17:26 (9) 16:18	24:15:43 (10) 16:01
20	05:15	06:05	06:59	07:52	17:10 (9) 07:50	15:20 (10) 08:29
	21:32	20:36	19:24	18:13	17:17:27 (9) 16:17	23:15:43 (10) 16:01
21	05:16	06:07	07:00	18:35 (5) 07:54	17:09 (9) 07:51	15:02 (3) 08:30
	21:31	20:34	19:21	18:40 (5) 18:11	19:17:28 (9) 16:15	30:15:42 (10) 16:02
22	05:18	06:09	07:02	18:32 (5) 07:56	17:08 (9) 07:53	15:01 (3) 08:30
	21:30	20:32	19:19	18:42 (5) 18:09	20:17:29 (8) 16:14	31:15:41 (10) 16:02
23	05:19	06:10	07:04	18:31 (5) 07:57	17:08 (9) 07:55	14:59 (3) 08:31
	21:28	20:30	19:16	18:43 (5) 18:06	22:17:30 (8) 16:13	30:15:38 (10) 16:03
24	05:21	06:12	07:05	18:29 (5) 07:59	17:08 (9) 07:57	14:58 (3) 08:31
	21:27	20:28	19:14	18:43 (5) 18:04	22:17:30 (8) 16:12	30:15:37 (10) 16:03
25	05:22	06:14	07:07	18:28 (5) 07:01	16:08 (9) 07:58	14:58 (3) 08:31
	21:25	20:25	19:11	18:43 (5) 17:02	22:16:30 (8) 16:11	29:15:36 (10) 16:04
26	05:24	06:16	07:09	18:28 (5) 07:03	16:08 (9) 08:00	14:58 (3) 08:32
	21:24	20:23	19:09	18:41 (5) 17:00	22:16:30 (8) 16:10	27:15:35 (10) 16:04
27	05:25	06:17	07:11	18:29 (5) 07:05	16:09 (9) 08:02	14:56 (3) 08:32
	21:22	20:21	19:07	18:39 (5) 16:58	19:16:28 (8) 16:09	25:15:34 (10) 16:05
28	05:27	06:19	07:12	18:02 (7) 07:07	16:10 (9) 08:03	14:58 (3) 08:32
	21:21	20:18	19:04	18:36 (5) 16:56	16:16:26 (9) 16:08	21:15:19 (3) 16:06
29	05:28	06:21	07:14	18:00 (7) 07:09	16:11 (9) 08:05	14:58 (3) 08:32
	21:19	20:16	19:02	18:34 (5) 16:54	13:16:24 (9) 16:07	21:15:19 (3) 16:07
30	05:30	06:22	07:16	17:59 (7) 07:11	16:13 (9) 08:06	14:58 (3) 08:32
	21:17	20:14	18:59	18:15 (7) 16:52	8:16:21 (9) 16:06	21:15:19 (3) 16:08
31	05:32	06:24	07:18	07:12		08:32
	21:16	20:11	16:50	16:50		16:09
Sonnenscheinstunden	509	458	382	330	262	237
astr. max.mögl. Beschattung			131	443	662	604
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19	0.14
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.72	0.69	0.68
Gesamte Reduktion			0.24	0.20	0.13	0.09
Met. wahrsch. Beschattung			31	89	84	55

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: I - IO9

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:14 (3) 08:03	15:48 (10) 07:07	17:24 (6) 06:54	05:46	04:58	
16:10	19 15:33 (3) 17:00	26 16:14 (10) 17:54	3 17:27 (6) 19:51	20:45	21:34	
2 08:32	15:14 (3) 08:02	15:49 (10) 07:05	7 17:22 (6) 06:51	05:44	04:57	
16:11	21 15:35 (3) 17:02	25 16:14 (10) 17:56	17:29 (6) 19:53	20:47	21:35	
3 08:32	15:15 (3) 08:00	15:49 (10) 07:03	17:21 (6) 06:49	05:42	04:57	
16:12	21 15:36 (3) 17:04	25 16:14 (10) 17:58	11 17:32 (6) 19:55	20:49	21:36	
4 08:32	15:15 (3) 07:58	15:50 (10) 07:01	17:20 (6) 06:47	05:40	04:56	
16:14	15:36 (3) 17:06	23 16:13 (10) 18:00	13 17:33 (6) 19:57	20:50	21:37	
5 08:31	15:15 (3) 07:57	15:51 (10) 06:58	17:19 (6) 06:44	05:38	04:55	
16:15	21 15:37 (3) 17:08	21 16:12 (10) 18:02	16 17:35 (6) 19:58	20:52	21:38	
6 08:31	15:15 (3) 07:55	15:52 (10) 06:56	17:20 (6) 06:42	05:36	04:54	
16:16	22 15:37 (3) 17:10	19 16:11 (10) 18:04	17 17:37 (7) 20:00	20:54	21:39	
7 08:31	15:16 (3) 07:53	15:53 (10) 06:54	17:19 (6) 06:40	05:35	04:54	
16:17	22 15:38 (3) 17:12	17 16:10 (10) 18:06	19 17:38 (7) 20:02	20:56	21:40	
8 08:30	15:16 (3) 07:51	15:55 (10) 06:51	17:20 (6) 06:37	05:33	04:53	
16:19	23 15:39 (3) 17:14	13 16:08 (10) 18:08	19 17:39 (7) 20:04	20:57	21:41	
9 08:30	15:16 (3) 07:49	15:59 (10) 06:49	17:21 (6) 06:35	05:31	04:53	
16:20	23 15:39 (3) 17:16	5 16:04 (10) 18:09	19 17:40 (7) 20:06	20:59	21:42	
10 08:29	15:17 (3) 07:47	06:47	17:20 (7) 06:33	05:29	04:52	
16:22	22 15:39 (3) 17:18	18:11	20 17:40 (7) 20:07	21:01	21:43	
11 08:28	15:18 (3) 07:45	06:44	17:20 (7) 06:30	05:27	04:52	
16:23	22 15:40 (3) 17:20	18:13	20 17:40 (7) 20:09	21:02	21:43	
12 08:28	15:18 (3) 07:44	16:51 (8) 06:42	17:20 (7) 06:28	05:25	04:51	
16:25	22 15:40 (3) 17:22	1 16:52 (8) 18:15	19 17:39 (7) 20:11	21:04	21:44	
13 08:27	15:19 (3) 07:42	16:46 (9) 06:39	17:20 (7) 06:26	05:24	04:51	
16:26	22 15:41 (3) 17:24	8 16:54 (9) 18:17	19 17:39 (7) 20:13	21:06	21:45	
14 08:26	15:19 (3) 07:40	16:44 (9) 06:37	17:21 (7) 06:23	05:22	04:51	
16:28	22 15:41 (3) 17:26	13 16:57 (9) 18:19	18 17:39 (7) 20:15	21:07	21:46	
15 08:25	15:20 (3) 07:38	16:43 (9) 06:35	17:21 (7) 06:21	05:20	04:50	
16:29	21 15:41 (3) 17:27	16 16:59 (9) 18:21	18 17:54 (5) 20:16	21:09	21:46	
16 08:24	15:21 (3) 07:36	16:42 (9) 06:32	17:23 (7) 06:19	05:19	04:50	
16:31	20 15:41 (3) 17:29	19 17:01 (8) 18:22	19 17:57 (5) 20:18	21:11	21:47	
17 08:23	15:21 (3) 07:33	16:41 (9) 06:30	17:24 (7) 06:16	05:17	04:50	
16:33	25 15:58 (10) 17:31	22 17:03 (8) 18:24	18 17:58 (5) 20:20	21:12	21:47	
18 08:22	15:22 (3) 07:31	16:40 (9) 06:28	17:48 (5) 06:14	05:16	04:50	
16:34	27 16:00 (10) 17:33	22 17:02 (8) 18:26	12 18:00 (5) 20:22	21:14	21:48	
19 08:21	15:23 (3) 07:29	16:40 (9) 06:25	17:47 (5) 06:12	05:14	04:50	
16:36	29 16:02 (10) 17:35	22 17:02 (8) 18:28	14 18:01 (5) 20:24	21:15	21:48	
20 08:20	15:25 (3) 07:27	16:40 (9) 06:23	17:47 (5) 06:10	05:13	04:50	
16:38	30 16:05 (10) 17:37	21 17:01 (8) 18:30	14 18:01 (5) 20:25	21:17	21:48	
21 08:19	15:26 (3) 07:25	16:41 (9) 06:20	17:48 (5) 06:07	05:11	04:50	
16:40	30 16:06 (10) 17:39	19 17:00 (9) 18:31	13 18:01 (5) 20:27	21:18	21:48	
22 08:18	15:28 (3) 07:23	16:41 (9) 06:18	17:48 (5) 06:05	05:10	04:51	
16:41	29 16:08 (10) 17:41	19 17:00 (9) 18:33	11 17:59 (5) 20:29	21:20	21:49	
23 08:17	15:32 (3) 07:21	16:41 (9) 06:15	17:50 (5) 06:03	05:09	04:51	
16:43	24 16:10 (10) 17:43	17 16:58 (9) 18:35	7 17:57 (5) 20:31	21:21	21:49	
24 08:15	15:48 (10) 07:19	16:43 (9) 06:13	06:01	05:07	04:51	
16:45	23 16:11 (10) 17:45	14 16:57 (9) 18:37	20:33	21:23	21:49	
25 08:14	15:47 (10) 07:16	16:45 (9) 06:11	05:59	05:06	04:51	
16:47	25 16:12 (10) 17:47	11 16:56 (9) 18:39	20:34	21:24	21:49	
26 08:12	15:47 (10) 07:14	16:47 (9) 06:08	05:57	05:05	04:52	
16:49	26 16:13 (10) 17:49	4 16:51 (9) 18:40	20:36	21:26	21:49	
27 08:11	15:47 (10) 07:12	06:06	05:55	05:04	04:52	
16:51	26 16:13 (10) 17:51	18:42	20:38	21:27	21:49	
28 08:10	15:48 (10) 07:10	06:03	05:52	05:02	04:53	
16:53	26 16:14 (10) 17:53	18:44	20:40	21:28	21:49	
29 08:08	15:47 (10)	07:01	05:50	05:01	04:53	
16:54	27 16:14 (10)	19:46	20:42	21:30	21:49	
30 08:07	15:47 (10)	06:59	05:48	05:00	04:54	
16:56	27 16:14 (10)	19:48	20:43	21:31	21:48	
31 08:05	15:47 (10)	06:56	05:49	04:59	04:54	
16:58	27 16:14 (10)	19:49	20:44	21:32	21:48	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	746	402	346			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	83	65	65			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: I - IO9

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:55	05:33	06:26	07:18	18:00 (7) 07:14	08:08
	21:48	21:14	20:09	18:57	19 18:19 (7) 16:48	16:05 22 15:22 (3)
2	04:55	05:35	06:28	07:19	17:58 (7) 07:16	15:28 (10) 08:09
	21:48	21:12	20:07	18:55	20 18:18 (7) 16:46	7 15:35 (10) 16:04 22 15:22 (3)
3	04:56	05:37	06:29	07:21	17:58 (7) 07:18	15:25 (10) 08:11
	21:47	21:11	20:04	18:52	20 18:18 (7) 16:44	13 15:38 (10) 16:04 22 15:23 (3)
4	04:57	05:38	06:31	07:23	17:58 (7) 07:20	15:23 (10) 08:12
	21:47	21:09	20:02	18:50	20 18:18 (7) 16:42	17 15:40 (10) 16:03 23 15:23 (3)
5	04:58	05:40	06:33	07:25	17:57 (6) 07:22	15:21 (10) 08:14
	21:46	21:07	20:00	18:47	20 18:17 (7) 16:40	20 15:41 (10) 16:02 23 15:24 (3)
6	04:59	05:41	06:34	07:26	17:56 (6) 07:24	15:20 (10) 08:15
	21:46	21:05	19:57	18:45	20 18:16 (7) 16:39	22 15:42 (10) 16:02 22 15:23 (3)
7	05:00	05:43	06:36	07:28	17:55 (6) 07:26	15:21 (10) 08:16
	21:45	21:03	19:55	18:43	18 18:13 (7) 16:37	23 15:44 (10) 16:02 21 15:24 (3)
8	05:01	05:45	06:38	07:30	17:54 (6) 07:28	15:20 (10) 08:18
	21:44	21:01	19:53	18:40	17 18:11 (7) 16:35	24 15:44 (10) 16:01 21 15:24 (3)
9	05:02	05:47	06:40	07:32	17:54 (6) 07:29	15:20 (10) 08:19
	21:44	20:59	19:50	18:38	15 18:09 (6) 16:33	25 15:45 (10) 16:01 21 15:24 (3)
10	05:03	05:48	06:41	07:34	17:55 (6) 07:31	15:19 (10) 08:20
	21:43	20:57	19:48	18:36	12 18:07 (6) 16:32	26 15:45 (10) 16:01 21 15:24 (3)
11	05:04	05:50	06:43	07:35	17:55 (6) 07:33	15:19 (10) 08:21
	21:42	20:55	19:45	18:33	10 18:05 (6) 16:30	27 15:46 (10) 16:00 19 15:24 (3)
12	05:05	05:52	06:45	07:37	17:57 (6) 07:35	15:19 (10) 08:22
	21:41	20:53	19:43	18:31	5 18:02 (6) 16:28	27 15:46 (10) 16:00 19 15:24 (3)
13	05:06	05:53	06:47	07:39	07:37	15:19 (10) 08:23
	21:40	20:51	19:41	18:29	16:27	27 15:46 (10) 16:00 18 15:24 (3)
14	05:07	05:55	06:48	07:41	07:39	15:19 (10) 08:24
	21:39	20:49	19:38	18:26	16:25	27 15:46 (10) 16:00 18 15:24 (3)
15	05:08	05:57	06:50	07:43	07:41	15:20 (10) 08:25
	21:38	20:47	19:36	18:24	16:24	26 15:46 (10) 16:00 17 15:24 (3)
16	05:10	05:58	06:52	07:44	17:18 (9) 07:42	15:20 (10) 08:26
	21:37	20:45	19:33	18:22	7 17:25 (9) 16:22	26 15:46 (10) 16:00 16 15:24 (3)
17	05:11	06:00	06:53	07:46	17:15 (9) 07:44	15:21 (10) 08:27
	21:36	20:43	19:31	18:20	13 17:28 (9) 16:21	25 15:46 (10) 16:00 16 15:23 (3)
18	05:12	06:02	06:55	07:48	17:13 (9) 07:46	15:22 (10) 08:28
	21:35	20:41	19:28	18:17	16 17:29 (9) 16:19	23 15:45 (10) 16:01 15 15:23 (3)
19	05:14	06:04	06:57	07:50	17:12 (9) 07:48	15:07 (3) 08:28
	21:34	20:39	19:26	18:15	18 17:30 (9) 16:18	24 15:45 (10) 16:01 15 15:24 (3)
20	05:15	06:05	06:59	07:52	17:11 (9) 07:50	15:03 (3) 08:29
	21:32	20:36	19:24	4 18:37 (5) 07:52	19 17:30 (9) 16:17	29 15:43 (10) 16:01 15 15:24 (3)
21	05:16	06:07	07:00	18:34 (5) 07:54	17:11 (9) 07:51	15:02 (3) 08:30
	21:31	20:34	19:21	10 18:44 (5) 07:56	20 17:31 (9) 16:15	30 15:42 (10) 16:02 15 15:25 (3)
22	05:18	06:09	07:02	18:33 (5) 07:55	17:11 (9) 07:53	15:01 (3) 08:30
	21:30	20:32	19:19	12 18:45 (5) 08:09	21 17:32 (8) 16:14	30 15:41 (10) 16:02 15 15:26 (3)
23	05:19	06:10	07:04	18:32 (5) 07:57	17:10 (9) 07:55	14:59 (3) 08:31
	21:28	20:30	19:16	14 18:46 (5) 08:06	22 17:32 (8) 16:13	29 15:38 (10) 16:03 15 15:26 (3)
24	05:21	06:12	07:05	18:30 (5) 07:59	17:11 (9) 07:57	14:59 (3) 08:31
	21:27	20:28	19:14	15 18:45 (5) 08:04	21 17:32 (8) 16:12	27 15:37 (10) 16:03 15 15:26 (3)
25	05:22	06:14	07:07	18:30 (5) 07:01	16:11 (9) 07:58	14:59 (3) 08:31
	21:25	20:25	19:11	13 18:43 (5) 07:02	21 16:32 (8) 16:11	25 15:36 (10) 16:04 15 15:27 (3)
26	05:24	06:16	07:09	18:09 (7) 07:03	16:11 (9) 08:00	14:59 (3) 08:32
	21:24	20:23	19:09	14 18:41 (5) 07:00	19 16:30 (8) 16:10	20 15:19 (3) 16:04 16 15:28 (3)
27	05:25	06:17	07:11	18:05 (7) 07:05	16:12 (9) 08:02	14:59 (3) 08:32
	21:22	20:21	19:07	20 18:39 (5) 06:58	16 16:28 (9) 16:09	21 15:20 (3) 16:05 16 15:28 (3)
28	05:27	06:19	07:12	18:02 (7) 07:07	16:14 (9) 08:03	14:59 (3) 08:32
	21:21	20:18	19:04	19 18:36 (5) 06:56	12 16:26 (9) 16:08	22 15:21 (3) 16:06 16 15:29 (3)
29	05:28	06:21	07:14	18:01 (7) 07:09	16:16 (9) 08:05	14:59 (3) 08:32
	21:19	20:16	19:02	17 18:18 (7) 06:54	8 16:24 (9) 16:07	22 15:21 (3) 16:07 17 15:30 (3)
30	05:30	06:22	07:16	18:00 (7) 07:11	08:06	14:59 (3) 08:32
	21:17	20:14	18:59	19 18:19 (7) 06:52	16:06	22 15:21 (3) 16:08 17 15:31 (3)
31	05:32	06:24	07:18	07:12		08:32
	21:16	20:11	16:50			16:09 18 15:32 (3)
Sonnenscheinstunden	509	458	382	330	262	237
astr. max.mögl. Beschattung			157	429	686	561
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19	0.14
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.72	0.70	0.69
Gesamte Reduktion			0.24	0.20	0.13	0.09
Met. wahrsch. Beschattung			37	86	87	51

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: J - IO10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:21 (3) 08:03	15:55 (10) 07:07		06:54	05:46	04:58
16:10	12 15:33 (3) 17:00	26 16:21 (10) 17:54		19:51	20:45	21:34
2 08:32	15:21 (3) 08:02	15:55 (10) 07:05		17:28 (6) 06:51	05:44	04:57
16:11	14 15:35 (3) 17:02	26 16:21 (10) 17:56	1	17:29 (6) 19:53	20:47	21:35
3 08:32	15:22 (3) 08:00	15:55 (10) 07:03		17:25 (6) 06:49	05:42	04:57
16:12	14 15:36 (3) 17:04	26 16:21 (10) 17:58	7	17:32 (6) 19:55	20:49	21:36
4 08:32	15:22 (3) 07:58	15:55 (10) 07:01		17:23 (6) 06:47	05:40	04:56
16:14	15 15:37 (3) 17:06	25 16:20 (10) 18:00	10	17:33 (6) 19:57	20:50	21:37
5 08:31	15:22 (3) 07:57	15:56 (10) 06:58		17:23 (6) 06:44	05:38	04:55
16:15	17 15:39 (3) 17:08	24 16:20 (10) 18:02	12	17:35 (6) 19:58	20:52	21:38
6 08:31	15:22 (3) 07:55	15:56 (10) 06:56		17:23 (6) 06:42	05:36	04:54
16:16	18 15:40 (3) 17:10	23 16:19 (10) 18:04	15	17:38 (6) 20:00	20:54	21:39
7 08:31	15:23 (3) 07:53	15:57 (10) 06:54		17:22 (6) 06:40	05:35	04:54
16:17	19 15:42 (3) 17:12	22 16:19 (10) 18:06	17	17:39 (7) 20:02	20:56	21:40
8 08:30	15:23 (3) 07:51	15:58 (10) 06:51		17:22 (6) 06:37	05:33	04:53
16:19	20 15:43 (3) 17:14	20 16:18 (10) 18:08	19	17:41 (7) 20:04	20:57	21:41
9 08:30	15:23 (3) 07:49	16:00 (10) 06:49		17:23 (6) 06:35	05:31	04:53
16:20	21 15:44 (3) 17:16	17 16:17 (10) 18:09	20	17:43 (7) 20:06	20:59	21:42
10 08:29	15:23 (3) 07:47	16:02 (10) 06:47		17:23 (6) 06:33	05:29	04:52
16:22	21 15:44 (3) 17:18	13 16:15 (10) 18:11	20	17:43 (7) 20:07	21:01	21:43
11 08:28	15:24 (3) 07:45	16:05 (10) 06:44		17:24 (7) 06:30	05:27	04:52
16:23	22 15:46 (3) 17:20	7 16:12 (10) 18:13	19	17:43 (7) 20:09	21:02	21:43
12 08:28	15:24 (3) 07:44	06:42		17:23 (7) 06:28	05:25	04:51
16:25	22 15:46 (3) 17:22	18:15	20	17:43 (7) 20:11	21:04	21:44
13 08:27	15:24 (3) 07:42	06:39		17:23 (7) 06:26	05:24	04:51
16:26	22 15:46 (3) 17:24	18:17	20	17:43 (7) 20:13	21:06	21:45
14 08:26	15:25 (3) 07:40	16:54 (8) 06:37		17:24 (7) 06:23	05:22	04:51
16:28	22 15:47 (3) 17:26	3 16:57 (8) 18:19	19	17:43 (7) 20:15	21:07	21:46
15 08:25	15:25 (3) 07:38	16:51 (9) 06:35		17:24 (7) 06:21	05:20	04:50
16:29	22 15:47 (3) 17:27	8 16:59 (9) 18:21	17	17:41 (7) 20:16	21:09	21:46
16 08:24	15:26 (3) 07:36	16:49 (9) 06:32		17:25 (7) 06:19	05:19	04:50
16:31	22 15:48 (3) 17:29	12 17:01 (9) 18:22	18	17:57 (5) 20:18	21:11	21:47
17 08:23	15:26 (3) 07:33	16:48 (9) 06:30		17:25 (7) 06:16	05:17	04:50
16:33	21 15:47 (3) 17:31	15 17:03 (9) 18:24	20	17:58 (5) 20:20	21:12	21:47
18 08:22	15:27 (3) 07:31	16:46 (9) 06:28		17:28 (7) 06:14	05:16	04:50
16:34	20 15:47 (3) 17:33	19 17:05 (8) 18:26	18	18:00 (5) 20:22	21:14	21:48
19 08:21	15:28 (3) 07:29	16:45 (9) 06:25		17:49 (5) 06:12	05:14	04:50
16:36	19 15:47 (3) 17:35	20 17:05 (8) 18:28	12	18:01 (5) 20:24	21:15	21:48
20 08:20	15:29 (3) 07:27	16:45 (9) 06:23		17:49 (5) 06:10	05:13	04:50
16:38	19 16:05 (10) 17:37	20 17:05 (9) 18:30	14	18:03 (5) 20:25	21:17	21:48
21 08:19	15:29 (3) 07:25	16:45 (9) 06:20		17:50 (5) 06:07	05:11	04:50
16:40	23 16:06 (10) 17:39	20 17:05 (9) 18:31	13	18:03 (5) 20:27	21:18	21:48
22 08:18	15:30 (3) 07:23	16:45 (9) 06:18		17:49 (5) 06:05	05:10	04:51
16:41	25 16:08 (10) 17:41	20 17:05 (9) 18:33	12	18:01 (5) 20:29	21:20	21:49
23 08:17	15:31 (3) 07:21	16:45 (9) 06:15		17:51 (5) 06:03	05:09	04:51
16:43	27 16:10 (10) 17:43	19 17:04 (9) 18:35	9	18:00 (5) 20:31	21:21	21:49
24 08:15	15:34 (3) 07:19	16:46 (9) 06:13		17:53 (5) 06:01	05:07	04:51
16:45	25 16:12 (10) 17:45	17 17:03 (9) 18:37	3	17:56 (5) 20:33	21:23	21:49
25 08:14	15:36 (3) 07:16	16:47 (9) 06:11		05:59	05:06	04:51
16:47	25 16:14 (10) 17:47	16 17:03 (9) 18:39		20:34	21:24	21:49
26 08:12	15:55 (10) 07:14	16:47 (9) 06:08		05:57	05:05	04:52
16:49	22 16:17 (10) 17:49	14 17:01 (9) 18:40		20:36	21:26	21:49
27 08:11	15:55 (10) 07:12	16:50 (9) 06:06		05:55	05:04	04:52
16:51	23 16:18 (10) 17:51	8 16:58 (9) 18:42		20:38	21:27	21:49
28 08:10	15:55 (10) 07:10	06:03		05:52	05:02	04:53
16:53	24 16:19 (10) 17:53	18:44		20:40	21:28	21:49
29 08:08	15:55 (10)	07:01		05:50	05:01	04:53
16:54	25 16:20 (10)	19:46		20:42	21:30	21:49
30 08:07	15:54 (10)	06:59		05:48	05:00	04:54
16:56	26 16:20 (10)	19:48		20:43	21:31	21:48
31 08:05	15:54 (10)	06:56		05:49	05:01	04:54
16:58	26 16:20 (10)	19:49		21:32		
Sonnenscheinstunden	253	275	367	419	491	506
astr. max.mögl. Beschattung	653	440	335			
Red. Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met. wahrsch. Beschattung	73	71	63			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: J - IO10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember					
1	04:55	05:33	06:26	07:18	18:03 (7)	07:14	15:31 (10) 08:08	15:06 (3)			
	21:48	21:14	20:09	18:57	20	18:23 (7) 16:48	14	15:45 (10) 16:05	22	15:28 (3)	
2	04:55	05:35	06:28	07:19	18:02 (7) 07:16			15:29 (10) 08:09		15:06 (3)	
	21:48	21:12	20:07	18:55	19	18:21 (7) 16:46	18	15:47 (10) 16:04	21	15:27 (3)	
3	04:56	05:37	06:29	07:21	18:02 (6) 07:18			15:28 (10) 08:11		15:07 (3)	
	21:47	21:11	20:04	18:52	19	18:21 (7) 16:44	20	15:48 (10) 16:04	21	15:28 (3)	
4	04:57	05:38	06:31	07:23	18:00 (6) 07:20			15:27 (10) 08:12		15:07 (3)	
	21:47	21:09	20:02	18:50	20	18:20 (7) 16:42	22	15:49 (10) 16:03	20	15:27 (3)	
5	04:58	05:40	06:33	07:25	17:59 (6) 07:22			15:26 (10) 08:14		15:08 (3)	
	21:46	21:07	20:00	18:47	20	18:19 (7) 16:40	23	15:49 (10) 16:02	19	15:27 (3)	
6	04:59	05:41	06:34	07:26	17:59 (6) 07:24			15:25 (10) 08:15		15:08 (3)	
	21:46	21:05	19:57	18:45	18	18:17 (7) 16:39	25	15:50 (10) 16:02	18	15:26 (3)	
7	05:00	05:43	06:36	07:28	17:58 (6) 07:26			15:25 (10) 08:16		15:09 (3)	
	21:45	21:03	19:55	18:43	15	18:13 (6) 16:37	25	15:50 (10) 16:02	17	15:26 (3)	
8	05:01	05:45	06:38	07:30	17:58 (6) 07:28			15:26 (10) 08:18		15:10 (3)	
	21:44	21:01	19:53	18:40	14	18:12 (6) 16:35	25	15:51 (10) 16:01	15	15:25 (3)	
9	05:02	05:47	06:40	07:32	17:58 (6) 07:29			15:26 (10) 08:19		15:10 (3)	
	21:44	20:59	19:50	18:38	11	18:09 (6) 16:33	26	15:52 (10) 16:01	14	15:24 (3)	
10	05:03	05:48	06:41	07:34	17:59 (6) 07:31			15:26 (10) 08:20		15:11 (3)	
	21:43	20:57	19:48	18:36	8	18:07 (6) 16:32	26	15:52 (10) 16:01	13	15:24 (3)	
11	05:04	05:50	06:43	07:35	18:00 (6) 07:33			15:26 (10) 08:21		15:12 (3)	
	21:42	20:55	19:45	18:33	5	18:05 (6) 16:30	26	15:52 (10) 16:00	12	15:24 (3)	
12	05:05	05:52	06:45	07:37		07:35		15:26 (10) 08:22		15:13 (3)	
	21:41	20:53	19:43	18:31		16:28	26	15:52 (10) 16:00	11	15:24 (3)	
13	05:06	05:53	06:46	07:39		07:37		15:26 (10) 08:23		15:13 (3)	
	21:40	20:51	19:41	18:29		16:27	25	15:51 (10) 16:00	11	15:24 (3)	
14	05:07	05:55	06:48	07:41		17:26 (9) 07:39		15:27 (10) 08:24		15:14 (3)	
	21:39	20:49	19:38	18:26	1	17:27 (9) 16:25	24	15:51 (10) 16:00	10	15:24 (3)	
15	05:08	05:57	06:50	07:43		17:21 (9) 07:41		15:28 (10) 08:25		15:15 (3)	
	21:38	20:47	19:36	18:24	11	17:32 (9) 16:24	23	15:51 (10) 16:00	9	15:24 (3)	
16	05:10	05:58	06:52	07:44		17:19 (9) 07:42		15:28 (10) 08:26		15:16 (3)	
	21:37	20:45	19:33	18:22	14	17:33 (9) 16:22	21	15:49 (10) 16:00	8	15:24 (3)	
17	05:11	06:00	06:53	07:46		17:18 (9) 07:44		15:10 (3) 08:27		15:15 (3)	
	21:36	20:43	19:31	18:20	16	17:34 (9) 16:21	25	15:48 (10) 16:00	8	15:23 (3)	
18	05:12	06:02	06:55	07:48		17:17 (9) 07:46		15:08 (3) 08:28		15:16 (3)	
	21:35	20:41	19:28	18:17	18	17:35 (9) 16:19	25	15:46 (10) 16:01	7	15:23 (3)	
19	05:14	06:04	06:57	07:50		17:16 (9) 07:48		15:06 (3) 08:28		15:17 (3)	
	21:34	20:39	19:26	18:15	19	17:35 (9) 16:18	27	15:45 (10) 16:01	7	15:24 (3)	
20	05:15	06:05	06:59		17:16 (9) 07:50			15:05 (3) 08:29		15:17 (3)	
	21:32	20:36	19:24	8	18:45 (5) 18:13	19	17:35 (9) 16:17	25	15:43 (10) 16:01	7	15:24 (3)
21	05:16	06:07	07:00		18:35 (5) 07:54		17:16 (9) 07:51		15:05 (3) 08:30		15:18 (3)
	21:31	20:34	19:21	12	18:47 (5) 18:11	20	17:36 (8) 16:15	24	15:42 (10) 16:02	7	15:25 (3)
22	05:18	06:09	07:02		18:34 (5) 07:56		17:16 (9) 07:53		15:05 (3) 08:30		15:19 (3)
	21:30	20:32	19:19	13	18:47 (5) 18:09	20	17:36 (8) 16:14	19	15:41 (10) 16:02	7	15:26 (3)
23	05:19	06:10	07:04		18:34 (5) 07:57		17:16 (9) 07:55		15:04 (3) 08:31		15:19 (3)
	21:28	20:30	19:16	14	18:48 (5) 18:06	20	17:36 (8) 16:13	19	15:23 (3) 16:03	7	15:26 (3)
24	05:21	06:12	07:05		18:33 (5) 07:59		17:16 (9) 07:57		15:04 (3) 08:31		15:19 (3)
	21:27	20:28	19:14	13	18:46 (5) 18:04	19	17:35 (8) 16:12	20	15:24 (3) 16:03	7	15:26 (3)
25	05:22	06:14	07:07		18:12 (7) 07:01		16:17 (9) 07:58		15:04 (3) 08:31		15:20 (3)
	21:25	20:25	19:11	15	18:43 (5) 17:02	15	16:32 (9) 16:11	21	15:25 (3) 16:04	7	15:27 (3)
26	05:24	06:16	07:09		18:09 (7) 07:03		16:19 (9) 08:00		15:04 (3) 08:32		15:20 (3)
	21:24	20:23	19:09	19	18:41 (5) 17:00	11	16:30 (9) 16:10	22	15:26 (3) 16:04	8	15:28 (3)
27	05:25	06:17	07:11		18:07 (7) 07:05		16:21 (9) 08:02		15:04 (3) 08:32		15:20 (3)
	21:22	20:21	19:07	19	18:39 (5) 16:58	7	16:28 (9) 16:09	22	15:26 (3) 16:05	8	15:28 (3)
28	05:27	06:19	07:12		18:05 (7) 07:07		16:24 (8) 08:03		15:05 (3) 08:32		15:21 (3)
	21:21	20:18	19:04	17	18:22 (7) 16:56	2	16:26 (8) 16:08	22	15:27 (3) 16:06	8	15:29 (3)
29	05:28	06:21	07:14		18:04 (7) 07:09		08:05		15:05 (3) 08:32		15:21 (3)
	21:19	20:16	19:02	18	18:22 (7) 16:54		16:07	22	15:27 (3) 16:07	9	15:30 (3)
30	05:30	06:22	07:16		18:03 (7) 07:11		08:06		15:05 (3) 08:32		15:21 (3)
	21:17	20:14	18:59	20	18:23 (7) 16:52		16:06	22	15:27 (3) 16:08	10	15:31 (3)
31	05:32	06:24			07:12		15:34 (10)		08:32		15:22 (3)
	21:16	20:11			16:50	8	15:42 (10)		16:09	10	15:32 (3)
Sonnenscheinstunden	509	458	382	330			262		237		
astr. max. mögl. Beschattung											
Red. Sonnenscheinwahrsch.			168		389		684		358		
Reduktion Betriebsdauer			0.35		0.29		0.19		0.14		
Reduktion Windrichtung			0.96		0.96		0.96		0.96		
Gesamte Reduktion			0.72		0.72		0.70		0.69		
Met. wahrsch. Beschattung			0.24		0.20		0.13		0.09		
			40		78		88		32		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: K - IO11

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:18 (3) 08:03	15:52 (10) 07:07	17:23 (6) 06:54	05:46	04:58	
16:10	15:33 (3) 17:00	25 16:17 (10) 17:54	4 17:27 (6) 19:51	20:45	21:34	
2 08:32	15:18 (3) 08:02	15:52 (10) 07:05	17:21 (6) 06:51	05:44	04:57	
16:11	15:35 (3) 17:02	25 16:17 (10) 17:56	8 17:29 (6) 19:53	20:47	21:35	
3 08:32	15:19 (3) 08:00	15:53 (10) 07:03	17:21 (6) 06:49	05:42	04:57	
16:12	15:36 (3) 17:04	23 16:16 (10) 17:58	11 17:32 (6) 19:55	20:49	21:36	
4 08:32	15:19 (3) 07:58	15:53 (10) 07:01	17:19 (6) 06:47	05:40	04:56	
16:14	15:37 (3) 17:06	23 16:16 (10) 18:00	14 17:33 (6) 19:57	20:50	21:37	
5 08:31	15:19 (3) 07:57	15:54 (10) 06:58	17:19 (6) 06:44	05:38	04:55	
16:15	20 15:39 (3) 17:08	21 16:15 (10) 18:02	16 17:35 (6) 19:58	20:52	21:38	
6 08:31	15:19 (3) 07:55	15:55 (10) 06:56	17:20 (6) 06:42	05:36	04:54	
16:16	21 15:40 (3) 17:10	19 16:14 (10) 18:04	18 17:38 (7) 20:00	20:54	21:39	
7 08:31	15:20 (3) 07:53	15:56 (10) 06:54	17:19 (6) 06:40	05:35	04:54	
16:17	21 15:41 (3) 17:12	17 16:13 (10) 18:06	19 17:38 (7) 20:02	20:56	21:40	
8 08:30	15:20 (3) 07:51	15:58 (10) 06:51	17:20 (6) 06:37	05:33	04:53	
16:19	21 15:41 (3) 17:14	13 16:11 (10) 18:08	19 17:39 (7) 20:04	20:57	21:41	
9 08:30	15:20 (3) 07:49	16:02 (10) 06:49	17:21 (7) 06:35	05:31	04:53	
16:20	22 15:42 (3) 17:16	6 16:08 (10) 18:09	19 17:40 (7) 20:06	20:59	21:42	
10 08:29	15:20 (3) 07:47	06:47	17:20 (7) 06:33	05:29	04:52	
16:22	22 15:42 (3) 17:18	18:11	19 17:39 (7) 20:07	21:01	21:43	
11 08:28	15:22 (3) 07:45	06:44	17:20 (7) 06:30	05:27	04:52	
16:23	21 15:43 (3) 17:20	18:13	19 17:39 (7) 20:09	21:02	21:43	
12 08:28	15:22 (3) 07:44	06:42	17:20 (7) 06:28	05:25	04:51	
16:25	21 15:43 (3) 17:22	18:15	18 17:38 (7) 20:11	21:04	21:44	
13 08:27	15:22 (3) 07:42	16:47 (9) 06:39	17:20 (7) 06:26	05:24	04:51	
16:26	22 15:44 (3) 17:24	7 16:54 (9) 18:17	18 17:38 (7) 20:13	21:06	21:45	
14 08:26	15:23 (3) 07:40	16:45 (9) 06:37	17:22 (7) 06:23	05:22	04:51	
16:28	21 15:44 (3) 17:26	12 16:57 (9) 18:19	15 17:37 (7) 20:15	21:07	21:46	
15 08:25	15:23 (3) 07:38	16:44 (9) 06:35	17:22 (7) 06:21	05:20	04:50	
16:29	21 15:44 (3) 17:27	15 16:59 (9) 18:21	18 17:54 (5) 20:16	21:09	21:46	
16 08:24	15:24 (3) 07:36	16:43 (9) 06:32	17:25 (7) 06:19	05:19	04:50	
16:31	20 15:44 (3) 17:29	18 17:01 (9) 18:22	16 17:57 (5) 20:18	21:11	21:47	
17 08:23	15:24 (3) 07:33	16:43 (9) 06:30	17:47 (5) 06:16	05:17	04:50	
16:33	20 15:44 (3) 17:31	20 17:03 (8) 18:24	11 17:58 (5) 20:20	21:12	21:47	
18 08:22	15:25 (3) 07:31	16:41 (9) 06:28	17:47 (5) 06:14	05:16	04:50	
16:34	22 16:00 (10) 17:33	21 17:02 (8) 18:26	13 18:00 (5) 20:22	21:14	21:48	
19 08:21	15:26 (3) 07:29	16:41 (9) 06:25	17:46 (5) 06:12	05:14	04:50	
16:36	25 16:02 (10) 17:35	21 17:02 (8) 18:28	14 18:00 (5) 20:24	21:15	21:48	
20 08:20	15:28 (3) 07:27	16:42 (9) 06:23	17:47 (5) 06:10	05:13	04:50	
16:38	27 16:05 (10) 17:37	19 17:01 (9) 18:30	13 18:00 (5) 20:25	21:17	21:48	
21 08:19	15:28 (3) 07:25	16:42 (9) 06:20	17:48 (5) 06:07	05:11	04:50	
16:40	27 16:06 (10) 17:39	19 17:01 (9) 18:31	11 17:59 (5) 20:27	21:18	21:48	
22 08:18	15:30 (3) 07:23	16:43 (9) 06:18	17:49 (5) 06:05	05:10	04:51	
16:41	28 16:08 (10) 17:41	17 17:00 (9) 18:33	7 17:56 (5) 20:29	21:20	21:49	
23 08:17	15:32 (3) 07:21	16:43 (9) 06:15	06:03	05:09	04:51	
16:43	26 16:10 (10) 17:43	16 16:59 (9) 18:35	20:31	21:21	21:49	
24 08:15	15:51 (10) 07:19	16:44 (9) 06:13	06:01	05:07	04:51	
16:45	21 16:12 (10) 17:45	14 16:58 (9) 18:37	20:33	21:23	21:49	
25 08:14	15:51 (10) 07:16	16:47 (9) 06:11	05:59	05:06	04:51	
16:47	23 16:14 (10) 17:47	9 16:56 (9) 18:39	20:34	21:24	21:49	
26 08:12	15:51 (10) 07:14	06:08	05:57	05:05	04:52	
16:49	24 16:15 (10) 17:49	18:40	20:36	21:26	21:49	
27 08:11	15:51 (10) 07:12	06:06	05:55	05:04	04:52	
16:51	24 16:15 (10) 17:51	18:42	20:38	21:27	21:49	
28 08:10	15:51 (10) 07:10	06:03	05:52	05:02	04:53	
16:53	25 16:16 (10) 17:53	18:44	20:40	21:28	21:49	
29 08:08	15:51 (10)	07:01	05:50	05:01	04:53	
16:54	25 16:16 (10)	19:46	20:42	21:30	21:49	
30 08:07	15:51 (10)	06:59	05:48	05:00	04:54	
16:56	25 16:16 (10)	19:48	20:43	21:31	21:48	
31 08:05	15:51 (10)	06:56	05:49	04:59		
16:58	25 16:16 (10)	19:49	20:44	21:32		
Sonnenscheinstunden	253	275	367	419	491	506
astr. max.mögl. Beschattung	687	380	320			
Red. Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met. wahrsch. Beschattung	76	62	61			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: K - IO11

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55	05:33	06:26	07:18	18:00 (7) 07:14	08:08
	21:48	21:14	20:09	18:57	18:18 (7) 16:48	16:05 21
2	04:55	05:35	06:28	07:19	17:58 (7) 07:16	15:31 (10) 08:09
	21:48	21:12	20:07	18:55	18:17 (7) 16:46	7 15:38 (10) 16:04 22
3	04:56	05:37	06:29	07:21	17:58 (7) 07:18	15:28 (10) 08:11
	21:47	21:11	20:04	18:52	18:17 (7) 16:44	13 15:41 (10) 16:04 22
4	04:57	05:38	06:31	07:23	17:58 (7) 07:20	15:26 (10) 08:12
	21:47	21:09	20:02	18:50	18:17 (7) 16:42	17 15:43 (10) 16:03 22
5	04:58	05:40	06:33	07:25	17:58 (6) 07:22	15:25 (10) 08:14
	21:46	21:07	20:00	18:47	18:17 (7) 16:40	19 15:44 (10) 16:02 21
6	04:59	05:41	06:34	07:26	17:57 (6) 07:24	15:24 (10) 08:15
	21:46	21:05	19:57	18:45	18:16 (7) 16:39	21 15:45 (10) 16:02 21
7	05:00	05:43	06:36	07:28	17:55 (6) 07:26	15:23 (10) 08:16
	21:45	21:03	19:55	18:43	18:14 (7) 16:37	23 15:46 (10) 16:02 20
8	05:01	05:45	06:38	07:30	17:54 (6) 07:28	15:23 (10) 08:18
	21:44	21:01	19:53	18:40	18:12 (7) 16:35	24 15:47 (10) 16:01 18
9	05:02	05:46	06:40	07:32	17:54 (6) 07:29	15:23 (10) 08:19
	21:44	20:59	19:50	18:38	18:09 (6) 16:33	25 15:48 (10) 16:01 17
10	05:03	05:48	06:41	07:34	17:54 (6) 07:31	15:23 (10) 08:20
	21:43	20:57	19:48	18:36	18:07 (6) 16:32	25 15:48 (10) 16:01 17
11	05:04	05:50	06:43	07:35	17:55 (6) 07:33	15:23 (10) 08:21
	21:42	20:55	19:45	18:33	18:05 (6) 16:30	25 15:48 (10) 16:00 15
12	05:05	05:52	06:45	07:37	17:56 (6) 07:35	15:23 (10) 08:22
	21:41	20:53	19:43	18:31	6 18:02 (6) 16:28	25 15:48 (10) 16:00 15
13	05:06	05:53	06:46	07:39	17:58 (6) 07:37	15:23 (10) 08:23
	21:40	20:51	19:41	18:29	2 18:00 (6) 16:27	25 15:48 (10) 16:00 14
14	05:07	05:55	06:48	07:41	17:59 (6) 07:39	15:23 (10) 08:24
	21:39	20:49	19:38	18:26		25 15:48 (10) 16:00 14
15	05:08	05:57	06:50	07:43	16:25	25 15:48 (10) 16:00 14
	21:38	20:47	19:36	18:24	07:41	15:23 (10) 08:25
16	05:10	05:58	06:52	07:44	16:24	25 15:48 (10) 16:00 13
	21:37	20:45	19:33	18:22	3 17:24 (9) 16:22	24 15:48 (10) 16:00 12
17	05:11	06:00	06:53	07:46	17:21 (9) 16:24	24 15:48 (10) 16:00 12
	21:36	20:43	19:31	18:20	17:17 (9) 16:22	24 15:48 (10) 16:00 11
18	05:12	06:02	06:55	07:48	17:18 (9) 16:23	23 15:48 (10) 16:00 11
	21:35	20:41	19:28	18:17	14 17:29 (9) 16:19	21 15:46 (10) 16:01 11
19	05:14	06:04	06:57	07:50	17:15 (9) 16:21	23 15:48 (10) 16:00 11
	21:34	20:39	19:26	18:15	16 17:14 (9) 16:18	26 15:45 (10) 16:01 11
20	05:15	06:05	06:59	07:52	17:13 (9) 16:17	28 15:05 (3) 08:29
	21:32	20:36	19:24	18:13	18 17:31 (9) 16:17	28 15:43 (10) 16:01 11
21	05:16	06:07	07:00	07:54	17:12 (9) 16:17	28 15:04 (3) 08:30
	21:31	20:34	19:21	18:40 (5) 18:11	19 17:31 (9) 16:15	27 15:42 (10) 16:02 11
22	05:18	06:09	07:02	07:56	17:12 (9) 16:15	15:04 (3) 08:30
	21:30	20:32	19:19	18:43 (5) 18:09	20 17:32 (8) 16:14	27 15:41 (10) 16:02 11
23	05:19	06:10	07:04	07:57	17:12 (9) 16:15	15:02 (3) 08:31
	21:28	20:30	19:16	18:44 (5) 18:06	20 17:32 (8) 16:13	25 15:38 (10) 16:03 11
24	05:21	06:12	07:05	07:59	17:12 (9) 16:15	15:02 (3) 08:31
	21:27	20:28	19:14	18:43 (5) 18:04	21 17:33 (8) 16:12	22 15:37 (10) 16:03 11
25	05:22	06:14	07:07	08:00	16:12 (9) 16:12	15:02 (3) 08:31
	21:25	20:25	19:11	18:43 (5) 17:02	20 16:32 (8) 16:11	20 15:22 (3) 16:04 11
26	05:24	06:16	07:09	08:00	16:13 (9) 16:11	15:02 (3) 08:32
	21:24	20:23	19:09	18:41 (5) 17:00	17 16:30 (9) 16:10	20 15:22 (3) 16:04 11
27	05:25	06:17	07:11	08:01	16:14 (9) 16:10	15:03 (3) 08:32
	21:22	20:21	19:07	18:39 (5) 16:58	14 16:28 (9) 16:09	20 15:23 (3) 16:05 11
28	05:27	06:19	07:12	08:04 (7) 07:07	16:15 (9) 16:08	15:03 (3) 08:32
	21:21	20:18	19:04	18:36 (5) 16:56	11 16:26 (9) 16:08	21 15:24 (3) 16:06 12
29	05:28	06:21	07:14	08:02 (7) 07:09	16:17 (9) 16:05	15:02 (3) 08:32
	21:19	20:16	19:02	18:34 (5) 16:54	7 16:24 (9) 16:07	22 15:24 (3) 16:07 13
30	05:30	06:22	07:16	08:01 (7) 07:11		15:03 (3) 08:32
	21:17	20:14	18:59	18:17 (7) 16:52		15:25 (3) 16:08 13
31	05:32	06:24		07:12		08:32
	21:16	20:11		16:50		16:09 14
Sonnenscheinstunden	509	458	382	330	262	237
astr. max.mögl. Beschattung			126	407	647	457
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19	0.14
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.72	0.70	0.69
Gesamte Reduktion			0.24	0.20	0.13	0.09
Met. wahrsch. Beschattung			30	82	83	41

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: L - IO12

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1 08:32	15:24 (3) 08:03	15:57 (10) 07:07		06:54	05:46	04:58	
16:10	9 15:33 (3) 17:00	25 16:22 (10) 17:54		19:51	20:45	21:34	
2 08:32	15:24 (3) 08:02	15:57 (10) 07:05		17:25 (6) 06:51	05:44	04:57	
16:11	11 15:35 (3) 17:02	25 16:22 (10) 17:56	4 17:29 (6) 19:53	20:47	21:35		
3 08:32	15:25 (3) 08:00	15:57 (10) 07:03		17:23 (6) 06:49	05:42	04:57	
16:12	11 15:36 (3) 17:04	24 16:21 (10) 17:58	9 17:32 (6) 19:55	20:49	21:36		
4 08:32	15:24 (3) 07:58	15:57 (10) 07:01		17:22 (6) 06:47	05:40	04:56	
16:14	13 15:37 (3) 17:06	24 16:21 (10) 18:00	11 17:33 (6) 19:57	20:50	21:37		
5 08:31	15:25 (3) 07:57	15:57 (10) 06:58		17:21 (6) 06:44	05:38	04:55	
16:15	14 15:39 (3) 17:08	24 16:21 (10) 18:02	14 17:35 (6) 19:58	20:52	21:38		
6 08:31	15:24 (3) 07:55	15:58 (10) 06:56		17:21 (6) 06:42	05:36	04:54	
16:16	16 15:40 (3) 17:10	22 16:20 (10) 18:04	17 17:38 (7) 20:00	20:54	21:39		
7 08:31	15:25 (3) 07:53	15:59 (10) 06:54		17:21 (6) 06:40	05:35	04:54	
16:17	17 15:42 (3) 17:12	20 16:19 (10) 18:06	18 17:39 (7) 20:02	20:56	21:40		
8 08:30	15:25 (3) 07:51	16:00 (10) 06:51		17:22 (6) 06:37	05:33	04:53	
16:19	18 15:43 (3) 17:14	18 16:18 (10) 18:08	19 17:41 (7) 20:04	20:57	21:41		
9 08:30	15:25 (3) 07:49	16:02 (10) 06:49		17:23 (6) 06:35	05:31	04:53	
16:20	19 15:44 (3) 17:16	15 16:17 (10) 18:09	19 17:42 (7) 20:06	20:59	21:42		
10 08:29	15:25 (3) 07:47	16:04 (10) 06:47		17:23 (7) 06:33	05:29	04:52	
16:22	21 15:46 (3) 17:18	11 16:15 (10) 18:11	18 17:41 (7) 20:07	21:01	21:43		
11 08:28	15:26 (3) 07:45	16:04 (10) 06:44		17:23 (7) 06:30	05:27	04:52	
16:23	21 15:47 (3) 17:20	18:13	19 17:42 (7) 20:09	21:02	21:43		
12 08:28	15:26 (3) 07:44	16:04 (10) 06:42		17:22 (7) 06:28	05:25	04:51	
16:25	21 15:47 (3) 17:22	18:15	19 17:41 (7) 20:11	21:04	21:44		
13 08:27	15:27 (3) 07:42	16:06 (10) 06:39		17:22 (7) 06:26	05:24	04:51	
16:26	21 15:48 (3) 17:24	18:17	18 17:40 (7) 20:13	21:06	21:45		
14 08:26	15:27 (3) 07:40	16:52 (9) 06:37		17:23 (7) 06:23	05:22	04:51	
16:28	21 15:48 (3) 17:26	5 16:57 (9) 18:19	17 17:40 (7) 20:15	21:07	21:46		
15 08:25	15:27 (3) 07:38	16:49 (9) 06:35		17:23 (7) 06:21	05:20	04:50	
16:29	22 15:49 (3) 17:27	10 16:59 (9) 18:21	17 17:54 (5) 20:16	21:09	21:46		
16 08:24	15:28 (3) 07:36	16:48 (9) 06:32		17:25 (7) 06:19	05:19	04:50	
16:31	21 15:49 (3) 17:29	13 17:01 (9) 18:22	18 17:57 (5) 20:18	21:11	21:47		
17 08:23	15:28 (3) 07:33	16:47 (9) 06:30		17:28 (7) 06:16	05:17	04:50	
16:33	20 15:48 (3) 17:31	16 17:03 (9) 18:24	13 17:58 (5) 20:20	21:12	21:47		
18 08:22	15:29 (3) 07:31	16:45 (9) 06:28		17:48 (5) 06:14	05:16	04:50	
16:34	20 15:49 (3) 17:33	20 17:05 (8) 18:26	12 18:00 (5) 20:22	21:14	21:48		
19 08:21	15:29 (3) 07:29	16:45 (9) 06:25		17:47 (5) 06:12	05:14	04:50	
16:36	20 15:49 (3) 17:35	20 17:05 (8) 18:28	14 18:01 (5) 20:24	21:15	21:48		
20 08:20	15:31 (3) 07:27	16:45 (9) 06:23		17:48 (5) 06:10	05:13	04:50	
16:38	18 15:49 (3) 17:37	20 17:05 (8) 18:30	13 18:01 (5) 20:25	21:17	21:48		
21 08:19	15:31 (3) 07:25	16:45 (9) 06:20		17:49 (5) 06:07	05:11	04:50	
16:40	21 16:06 (10) 17:39	19 17:04 (9) 18:31	11 18:00 (5) 20:27	21:18	21:48		
22 08:18	15:32 (3) 07:23	16:46 (9) 06:18		17:49 (5) 06:05	05:10	04:51	
16:41	23 16:08 (10) 17:41	18 17:04 (9) 18:33	9 17:58 (5) 20:29	21:20	21:49		
23 08:17	15:33 (3) 07:21	16:45 (9) 06:15		17:50 (5) 06:03	05:09	04:51	
16:43	25 16:10 (10) 17:43	18 17:03 (9) 18:35		20:31	21:21	21:49	
24 08:15	15:35 (3) 07:19	16:46 (9) 06:13		17:51 (5) 06:01	05:07	04:51	
16:45	25 16:12 (10) 17:45	16 17:02 (9) 18:37		20:33	21:23	21:49	
25 08:14	15:37 (3) 07:16	16:48 (9) 06:11		17:52 (5) 05:59	05:06	04:51	
16:47	24 16:14 (10) 17:47	13 17:01 (9) 18:39		20:34	21:24	21:49	
26 08:12	15:57 (10) 07:14	16:49 (9) 06:08		17:53 (5) 05:57	05:05	04:52	
16:49	20 16:17 (10) 17:49	9 16:58 (9) 18:40		20:36	21:26	21:49	
27 08:11	15:56 (10) 07:12	16:06		17:54 (5) 05:55	05:04	04:52	
16:51	22 16:18 (10) 17:51	18:42		20:38	21:27	21:49	
28 08:10	15:57 (10) 07:10	16:03		17:55 (5) 05:52	05:02	04:53	
16:53	23 16:20 (10) 17:53	18:44		20:40	21:28	21:49	
29 08:08	15:56 (10) 07:07	16:04		17:56 (5) 05:50	05:01	04:53	
16:54	24 16:20 (10) 17:52	19:46		20:42	21:30	21:49	
30 08:07	15:56 (10) 07:05	16:05		17:57 (5) 05:48	05:00	04:54	
16:56	25 16:21 (10) 17:53	19:48		20:43	21:31	21:48	
31 08:05	15:56 (10) 07:03	16:06		17:58 (5) 05:49	05:01	04:54	
16:58	25 16:21 (10) 17:53	19:49		20:44	21:32	21:48	
Sonnenscheinstunden	253	275	367	419	491	506	
astr.max.mögl.Beschattung	611	405	309				
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28				
Reduktion Betriebsdauer	0.96	0.96	0.96				
Reduktion Windrichtung	0.69	0.72	0.72				
Gesamte Reduktion	0.11	0.16	0.19				
Met.wahrsch.Beschattung	68	66	59				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: L - IO12

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember						
1	04:55	05:33	06:26	07:18	18:02 (7)	07:14	15:33 (10) 08:08	15:08 (3)				
	21:48	21:14	20:09	18:57	18:20 (7)	16:48	12	15:45 (10) 16:05	21	15:29 (3)		
2	04:55	05:35	06:28	07:19	18:01 (7)	07:16	15:31 (10) 08:09	15:08 (3)				
	21:48	21:12	20:07	18:55	18:19 (7)	16:46	16	15:47 (10) 16:04	21	15:29 (3)		
3	04:56	05:37	06:29	07:21	18:01 (7)	07:18	15:30 (10) 08:11	15:09 (3)				
	21:47	21:11	20:04	18:52	18:19 (7)	16:44	18	15:48 (10) 16:04	19	15:28 (3)		
4	04:57	05:38	06:31	07:23	18:01 (6)	07:20	15:29 (10) 08:12	15:09 (3)				
	21:47	21:09	20:02	18:50	18:19 (7)	16:42	20	15:49 (10) 16:03	18	15:27 (3)		
5	04:58	05:40	06:33	07:25	17:59 (6)	07:22	15:28 (10) 08:14	15:10 (3)				
	21:46	21:07	20:00	18:47	18:18 (7)	16:40	22	15:50 (10) 16:02	17	15:27 (3)		
6	04:59	05:41	06:34	07:26	17:58 (6)	07:24	15:27 (10) 08:15	15:10 (3)				
	21:46	21:05	19:57	18:45	18:17 (7)	16:39	24	15:51 (10) 16:02	16	15:26 (3)		
7	05:00	05:43	06:36	07:28	17:57 (6)	07:26	15:27 (10) 08:16	15:12 (3)				
	21:45	21:03	19:55	18:43	18:14 (7)	16:37	24	15:51 (10) 16:02	14	15:26 (3)		
8	05:01	05:45	06:38	07:30	17:56 (6)	07:28	15:27 (10) 08:18	15:12 (3)				
	21:44	21:01	19:53	18:40	18:12 (6)	16:35	25	15:52 (10) 16:01	13	15:25 (3)		
9	05:02	05:46	06:40	07:32	17:57 (6)	07:29	15:27 (10) 08:19	15:13 (3)				
	21:44	20:59	19:50	18:38	18:09 (6)	16:33	25	15:52 (10) 16:01	11	15:24 (3)		
10	05:03	05:48	06:41	07:34	17:57 (6)	07:31	15:27 (10) 08:20	15:13 (3)				
	21:43	20:57	19:48	18:36	18:07 (6)	16:32	25	15:52 (10) 16:01	11	15:24 (3)		
11	05:04	05:50	06:43	07:35	17:58 (6)	07:33	15:28 (10) 08:21	15:15 (3)				
	21:42	20:55	19:45	18:33	7	18:05 (6)	16:30	24	15:52 (10) 16:00	9	15:24 (3)	
12	05:05	05:52	06:45	07:37	18:00 (6)	07:35	15:28 (10) 08:22	15:15 (3)				
	21:41	20:53	19:43	18:31	2	18:02 (6)	16:28	24	15:52 (10) 16:00	9	15:24 (3)	
13	05:06	05:53	06:46	07:39		07:37	15:28 (10) 08:23	15:16 (3)				
	21:40	20:51	19:41	18:29		16:27	24	15:52 (10) 16:00	8	15:24 (3)		
14	05:07	05:55	06:48	07:41		07:39	15:29 (10) 08:24	15:17 (3)				
	21:39	20:49	19:38	18:26		16:25	23	15:52 (10) 16:00	7	15:24 (3)		
15	05:08	05:57	06:50	07:43		07:41	15:29 (10) 08:25	15:18 (3)				
	21:38	20:47	19:36	18:24	5	17:28 (9)	16:24	22	15:51 (10) 16:00	6	15:24 (3)	
16	05:10	05:58	06:52	07:44		07:42	17:20 (9)	16:22	19	15:49 (10) 16:00	6	15:24 (3)
	21:37	20:45	19:33	18:22	11	17:31 (9)	16:22	19	15:49 (10) 16:00	6	15:24 (3)	
17	05:11	06:00	06:53	07:46		07:44	15:11 (3) 08:27	15:18 (3)				
	21:36	20:43	19:31	18:20	15	17:33 (9)	16:21	24	15:48 (10) 16:00	5	15:23 (3)	
18	05:12	06:02	06:55	07:48		07:46	15:09 (3) 08:28	15:19 (3)				
	21:35	20:41	19:28	18:17	17	17:34 (9)	16:19	25	15:46 (10) 16:01	4	15:23 (3)	
19	05:14	06:04	06:57	07:50		07:48	15:08 (3) 08:28	15:20 (3)				
	21:34	20:39	19:26	18:15	18	17:34 (9)	16:18	25	15:45 (10) 16:01	4	15:24 (3)	
20	05:15	06:05	06:59	07:52		07:50	15:07 (3) 08:29	15:20 (3)				
	21:32	20:36	19:24	18:13	19	17:35 (9)	16:17	23	15:43 (10) 16:01	4	15:24 (3)	
21	05:16	06:07	07:00	07:54		07:51	15:07 (3) 08:30	15:21 (3)				
	21:31	20:34	19:21	18:43 (5)	18:11	20	17:35 (9)	16:15	21	15:42 (10) 16:02	4	15:25 (3)
22	05:18	06:09	07:02	07:56		07:53	15:07 (3) 08:30	15:22 (3)				
	21:30	20:32	19:19	18:45 (5)	18:09	20	17:35 (8)	16:14	18	15:25 (3) 16:02	4	15:26 (3)
23	05:19	06:10	07:04	07:57		07:55	15:06 (3) 08:31	15:22 (3)				
	21:28	20:30	19:16	18:45 (5)	18:06	19	17:35 (8)	16:13	19	15:25 (3) 16:03	4	15:26 (3)
24	05:21	06:12	07:05	07:59		07:57	15:06 (3) 08:31	15:22 (3)				
	21:27	20:28	19:14	18:45 (5)	18:04	18	17:34 (8)	16:12	20	15:26 (3) 16:03	4	15:26 (3)
25	05:22	06:14	07:07	07:01		07:58	15:06 (3) 08:31	15:23 (3)				
	21:25	20:25	19:11	18:43 (5)	17:02	15	16:32 (9)	16:11	20	15:26 (3) 16:04	4	15:27 (3)
26	05:24	06:16	07:09	07:03		08:00	15:06 (3) 08:32	15:23 (3)				
	21:24	20:23	19:09	18:41 (5)	17:00	12	16:30 (9)	16:10	21	15:27 (3) 16:04	5	15:28 (3)
27	05:25	06:17	07:11	07:05		08:02	15:07 (3) 08:32	15:23 (3)				
	21:22	20:21	19:07	18:39 (5)	16:58	9	16:28 (9)	16:09	21	15:28 (3) 16:05	5	15:28 (3)
28	05:27	06:19	07:12	07:07		08:03	15:07 (3) 08:32	15:24 (3)				
	21:21	20:18	19:04	18:36 (5)	16:56	3	16:26 (9)	16:08	21	15:28 (3) 16:06	5	15:29 (3)
29	05:28	06:21	07:14	07:09		08:05	15:07 (3) 08:32	15:24 (3)				
	21:19	20:16	19:02	18:19 (7)	16:54		16:07	21	15:28 (3) 16:07	6	15:30 (3)	
30	05:30	06:22	07:16	07:11		08:06	15:07 (3) 08:32	15:24 (3)				
	21:17	20:14	18:59	18:20 (7)	16:52		16:06	22	15:29 (3) 16:08	7	15:31 (3)	
31	05:32	06:24		07:12		15:37 (10)				08:32		15:24 (3)
	21:16	20:11		16:50	4	15:41 (10)				16:09	8	15:32 (3)
Sonnenscheinstunden	509	458	382	330		262				237		
astr. max. mögl. Beschattung					379		648				279	
Red. Sonnenscheinwahrsch.			133		0.35		0.29			0.19		0.14
Reduktion Betriebsdauer			0.96		0.96		0.96			0.96		0.96
Reduktion Windrichtung			0.72		0.72		0.70			0.69		0.69
Gesamte Reduktion			0.24		0.20		0.13			0.09		0.09
Met. wahrsch. Beschattung			32		76		83			25		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: M - IO13

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1 08:32		08:03	16:05 (10) 07:07		06:54	05:46	
16:10		17:00	23 16:28 (10) 17:54		19:51	20:45	
2 08:32		08:02	16:05 (10) 07:05		17:27 (6) 06:51	05:44	
16:11		17:02	23 16:28 (10) 17:56	2 17:29 (6) 19:53	20:47	21:35	
3 08:32		08:00	16:05 (10) 07:03		17:25 (6) 06:49	05:42	
16:12		17:04	23 16:28 (10) 17:58	7 17:32 (6) 19:55	20:49	21:36	
4 08:32		15:35 (3) 07:58	16:05 (10) 07:00		17:24 (6) 06:47	05:40	
16:14	2 15:37 (3) 17:06	23 16:28 (10) 18:00		9 17:33 (6) 19:57	20:50	21:37	
5 08:31		15:35 (3) 07:57	16:05 (10) 06:58		17:23 (6) 06:44	05:38	
16:15	4 15:39 (3) 17:08	23 16:28 (10) 18:02	12 17:35 (6) 19:58	20:52	21:38		
6 08:31		15:35 (3) 07:55	16:05 (10) 06:56		17:23 (6) 06:42	05:36	
16:16	5 15:40 (3) 17:10	23 16:28 (10) 18:04	15 17:38 (6) 20:00	20:54	21:39		
7 08:31		15:35 (3) 07:53	16:06 (10) 06:54		17:23 (6) 06:40	05:35	
16:17	7 15:42 (3) 17:12	21 16:27 (10) 18:06	16 17:39 (7) 20:02	20:56	21:40		
8 08:30		15:35 (3) 07:51	16:06 (10) 06:51		17:24 (6) 06:37	05:33	
16:19	8 15:43 (3) 17:14	21 16:27 (10) 18:08	17 17:41 (7) 20:04	20:57	21:41		
9 08:30		15:34 (3) 07:49	16:07 (10) 06:49		17:25 (6) 06:35	05:31	
16:20	10 15:44 (3) 17:16	19 16:26 (10) 18:09	18 17:43 (7) 20:06	20:59	21:42		
10 08:29		15:34 (3) 07:47	16:09 (10) 06:47		17:25 (7) 06:33	05:29	
16:22	12 15:46 (3) 17:18	16 16:25 (10) 18:11	17 17:42 (7) 20:07	21:01	21:43		
11 08:28		15:35 (3) 07:45	16:11 (10) 06:44		17:25 (7) 06:30	05:27	
16:23	13 15:48 (3) 17:20	12 16:23 (10) 18:13	18 17:43 (7) 20:09	21:02	21:43		
12 08:28		15:35 (3) 07:44	16:14 (10) 06:42		17:24 (7) 06:28	05:25	
16:25	15 15:50 (3) 17:22	6 16:20 (10) 18:15	18 17:42 (7) 20:11	21:04	21:44		
13 08:27		15:35 (3) 07:42	16:15 (10) 06:39		17:25 (7) 06:26	05:24	
16:26	16 15:51 (3) 17:24		18:17	16 17:41 (7) 20:13	21:06	21:45	
14 08:26		15:35 (3) 07:40	16:16 (10) 06:37		17:26 (7) 06:23	05:22	
16:28	18 15:53 (3) 17:26		18:19	14 17:40 (7) 20:15	21:07	21:45	
15 08:25		15:35 (3) 07:38	16:16 (10) 06:35		17:26 (7) 06:21	05:20	
16:29	20 15:55 (3) 17:27	3 16:59 (9) 18:21	15 17:54 (5) 20:16	21:09	21:46		
16 08:24		15:36 (3) 07:36	16:17 (10) 06:32		17:29 (7) 06:19	05:19	
16:31	20 15:56 (3) 17:29	7 17:01 (9) 18:22	14 17:57 (5) 20:18	21:11	21:47		
17 08:23		15:35 (3) 07:33	16:18 (10) 06:30		17:49 (5) 06:16	05:17	
16:33	21 15:56 (3) 17:31	11 17:03 (9) 18:24	9 17:58 (5) 20:20	21:12	21:47		
18 08:22		15:36 (3) 07:31	16:50 (9) 06:28		17:49 (5) 06:14	05:16	
16:34	20 15:56 (3) 17:33	15 17:05 (9) 18:26	11 18:00 (5) 20:22	21:14	21:48		
19 08:21		15:37 (3) 07:29	16:50 (9) 06:25		17:48 (5) 06:12	05:14	
16:36	20 15:57 (3) 17:35	17 17:07 (9) 18:28	13 18:01 (5) 20:24	21:15	21:48		
20 08:20		15:37 (3) 07:27	16:50 (9) 06:23		17:49 (5) 06:10	05:13	
16:38	20 15:57 (3) 17:37	18 17:08 (8) 18:30	11 18:00 (5) 20:25	21:17	21:48		
21 08:19		15:37 (3) 07:25	16:50 (9) 06:20		17:50 (5) 06:07	05:11	
16:40	19 15:56 (3) 17:39	18 17:08 (9) 18:31	9 17:59 (5) 20:27	21:18	21:48		
22 08:18		15:38 (3) 07:23	16:50 (9) 06:18		17:51 (5) 06:05	05:10	
16:41	19 15:57 (3) 17:41	18 17:08 (9) 18:33	5 17:56 (5) 20:29	21:20	21:49		
23 08:16		15:39 (3) 07:21	16:49 (9) 06:15		06:03	05:09	
16:43	17 15:56 (3) 17:43	18 17:07 (9) 18:35		20:31	21:21	21:49	
24 08:15		15:40 (3) 07:19	16:50 (9) 06:13		06:01	05:07	
16:45	16 15:56 (3) 17:45	16 17:06 (9) 18:37		20:33	21:23	21:49	
25 08:14		15:41 (3) 07:16	16:51 (9) 06:11		05:59	05:06	
16:47	19 16:14 (10) 17:47	14 17:05 (9) 18:39		20:34	21:24	21:49	
26 08:12		15:43 (3) 07:14	16:52 (9) 06:08		05:57	05:05	
16:49	20 16:17 (10) 17:49	11 17:03 (9) 18:40		20:36	21:26	21:49	
27 08:11		15:45 (3) 07:12	16:55 (9) 06:06		05:55	05:04	
16:51	18 16:18 (10) 17:51	5 17:00 (9) 18:42		20:38	21:27	21:49	
28 08:10		16:05 (10) 07:10	16:56 (9) 06:03		05:52	05:02	
16:53	15 16:20 (10) 17:53		18:44		20:40	21:28	21:49
29 08:08		16:06 (10)	07:01		05:50	05:01	04:53
16:54	17 16:23 (10)	19:46			20:42	21:30	21:49
30 08:07		16:05 (10)	06:59		05:48	05:00	04:54
16:56	20 16:25 (10)	19:48			20:43	21:31	21:48
31 08:05		16:04 (10)	06:56			04:59	
16:58	22 16:26 (10)	19:49				21:32	
Sonnenscheinstunden	253	275	367		419	491	506
astr.max.mögl.Beschattung	433	404		266			
Red.Sonnenscheinwahrsch.	0.17	0.24		0.28			
Reduktion Betriebsdauer	0.96	0.96		0.96			
Reduktion Windrichtung	0.69	0.72		0.72			
Gesamte Reduktion	0.11	0.16		0.19			
Met.wahrsch.Beschattung	48	66		50			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: M - IO13

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember		
1	04:55	05:33	06:26	07:18	18:04 (7)	07:14	15:38 (10) 08:08	15:17 (3)
	21:48	21:14	20:09	18:57	18:21 (7)	16:48	15:55 (10) 16:05	13 15:30 (3)
2	04:55	05:35	06:28	07:19	18:03 (7)	07:16	15:37 (10) 08:09	15:17 (3)
	21:48	21:12	20:07	18:55	18:20 (7)	16:46	15:56 (10) 16:04	12 15:29 (3)
3	04:56	05:37	06:29	07:21	18:03 (7)	07:18	15:36 (10) 08:11	15:18 (3)
	21:47	21:11	20:04	18:52	18:20 (7)	16:44	15:56 (10) 16:04	10 15:28 (3)
4	04:57	05:38	06:31	07:23	18:03 (6)	07:20	15:35 (10) 08:12	15:19 (3)
	21:47	21:09	20:02	18:50	18:20 (7)	16:42	15:57 (10) 16:03	8 15:27 (3)
5	04:58	05:40	06:33	07:25	18:01 (6)	07:22	15:35 (10) 08:14	15:20 (3)
	21:46	21:07	20:00	18:47	18:19 (7)	16:40	15:57 (10) 16:02	7 15:27 (3)
6	04:59	05:41	06:34	07:26	18:00 (6)	07:24	15:34 (10) 08:15	15:21 (3)
	21:46	21:05	19:57	18:45	18:17 (7)	16:39	15:58 (10) 16:02	5 15:26 (3)
7	05:00	05:43	06:36	07:28	17:58 (6)	07:26	15:34 (10) 08:16	15:22 (3)
	21:45	21:03	19:55	18:43	18:14 (7)	16:37	15:58 (10) 16:01	4 15:26 (3)
8	05:01	05:45	06:38	07:30	17:58 (6)	07:28	15:35 (10) 08:18	15:23 (3)
	21:44	21:01	19:53	18:40	18:12 (6)	16:35	15:59 (10) 16:01	2 15:25 (3)
9	05:02	05:46	06:40	07:32	17:58 (6)	07:29	15:35 (10) 08:19	
	21:44	20:59	19:50	18:38	18:09 (6)	16:33	15:59 (10) 16:01	
10	05:03	05:48	06:41	07:34	17:59 (6)	07:31	15:36 (10) 08:20	
	21:43	20:57	19:48	18:36	18:07 (6)	16:32	15:59 (10) 16:01	
11	05:04	05:50	06:43	07:35	18:00 (6)	07:33	15:36 (10) 08:21	
	21:42	20:55	19:45	18:33	18:05 (6)	16:30	15:58 (10) 16:00	
12	05:05	05:52	06:45	07:37		07:35	15:37 (10) 08:22	
	21:41	20:53	19:43	18:31		16:28	15:56 (10) 16:00	
13	05:06	05:53	06:46	07:39		07:37	15:37 (10) 08:23	
	21:40	20:51	19:41	18:29		16:27	15:55 (10) 16:00	
14	05:07	05:55	06:48	07:41		07:39	15:38 (10) 08:24	
	21:39	20:49	19:38	18:26		16:25	15:53 (10) 16:00	
15	05:08	05:57	06:50	07:43	17:26 (9)	07:41	15:18 (3) 08:25	
	21:38	20:47	19:36	18:24	17:34 (9)	16:24	15:51 (10) 16:00	
16	05:10	05:58	06:52	07:44	17:24 (9)	07:42	15:16 (3) 08:26	
	21:37	20:45	19:33	18:22	17:36 (9)	16:22	15:49 (10) 16:00	
17	05:11	06:00	06:53	07:46	17:22 (9)	07:44	15:15 (3) 08:27	
	21:36	20:43	19:31	18:20	17:37 (9)	16:21	15:48 (10) 16:00	
18	05:12	06:02	06:55	07:48	17:21 (9)	07:46	15:14 (3) 08:28	
	21:35	20:41	19:28	18:17	17:38 (9)	16:19	15:30 (3) 16:01	
19	05:14	06:04	06:57	07:50	17:20 (9)	07:48	15:14 (3) 08:28	
	21:34	20:39	19:26	18:15	17:38 (9)	16:18	15:31 (3) 16:01	
20	05:15	06:05	06:59	07:52	17:20 (9)	07:50	15:13 (3) 08:29	
	21:32	20:36	19:24	18:13	17:38 (9)	16:16	15:32 (3) 16:01	
21	05:16	06:07	07:00	07:54	17:20 (9)	07:51	15:13 (3) 08:30	
	21:31	20:34	19:21	18:11	17:39 (9)	16:15	15:33 (3) 16:02	
22	05:18	06:09	07:02	18:35 (5)	07:56	17:20 (9)	15:13 (3) 08:30	
	21:30	20:32	19:19	18:43 (5)	18:09	17:38 (9)	15:33 (3) 16:02	
23	05:19	06:10	07:04	18:33 (5)	07:57	17:20 (9)	15:13 (3) 08:31	
	21:28	20:30	19:16	18:45 (5)	18:06	17:37 (9)	15:33 (3) 16:03	
24	05:21	06:12	07:05	18:32 (5)	07:59	17:21 (9)	15:13 (3) 08:31	
	21:27	20:28	19:14	18:44 (5)	18:04	17:34 (9)	15:33 (3) 16:03	
25	05:22	06:14	07:07	18:31 (5)	07:01	16:22 (9)	15:13 (3) 08:31	
	21:25	20:25	19:11	18:43 (5)	17:02	16:32 (9)	15:34 (3) 16:04	
26	05:24	06:16	07:09	18:31 (5)	07:03	16:24 (9)	15:14 (3) 08:32	
	21:24	20:23	19:09	18:41 (5)	17:00	16:30 (9)	15:34 (3) 16:04	
27	05:25	06:17	07:11	18:12 (7)	07:05	16:26 (8)	15:14 (3) 08:32	
	21:22	20:21	19:07	18:39 (5)	16:58	16:28 (8)	15:34 (3) 16:05	
28	05:27	06:19	07:12	18:08 (7)	07:07		15:15 (3) 08:32	
	21:21	20:18	19:04	18:36 (5)	16:56		15:33 (3) 16:06	
29	05:28	06:21	07:14	18:06 (7)	07:09		15:15 (3) 08:32	
	21:19	20:16	19:02	18:34 (5)	16:54		15:32 (3) 16:07	
30	05:30	06:22	07:16	18:05 (7)	07:10	15:43 (10)	15:16 (3) 08:32	
	21:17	20:14	18:59	18:21 (7)	16:52	15:50 (10)	15:31 (3) 16:08	
31	05:32	06:24		07:12		15:40 (10)	08:32	
	21:16	20:11		16:50		15:53 (10)	16:09	
Sonnenscheinstunden	509	458	382	330		262	237	
astr. max.mögl. Beschattung			110		349		592	61
Red. Sonnenscheinwahrsch.			0.35		0.29		0.19	0.14
Reduktion Betriebsdauer			0.96		0.96		0.96	0.96
Reduktion Windrichtung			0.72		0.72		0.70	0.69
Gesamte Reduktion			0.24		0.20		0.13	0.09
Met. wahrsch. Beschattung			26		70		76	6

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: N - IO14

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	16:08 (10) 07:07	06:54	05:46	04:58
	16:10	17:00	21 16:29 (10) 17:54	19:51	20:45	21:34
2	08:32	08:02	16:08 (10) 07:05	06:51	05:44	04:57
	16:11	17:02	22 16:30 (10) 17:56	19:53	20:47	21:35
3	08:32	08:00	16:07 (10) 07:03	17:28 (6)	06:49	05:42
	16:12	17:04	24 16:31 (10) 17:58	4 17:32 (6)	19:55	20:49
4	08:32	07:58	16:07 (10) 07:00	17:26 (6)	06:47	05:40
	16:14	17:06	24 16:31 (10) 18:00	7 17:33 (6)	19:57	20:50
5	08:31	07:57	16:07 (10) 06:58	17:25 (6)	06:44	05:38
	16:15	17:08	24 16:31 (10) 18:02	10 17:35 (6)	19:58	20:52
6	08:31	15:39 (3) 07:55	16:08 (10) 06:56	17:25 (6)	06:42	05:36
	16:16	1 15:40 (3) 17:10	23 16:31 (10) 18:04	13 17:38 (6)	20:00	20:54
7	08:31	15:39 (3) 07:53	16:08 (10) 06:54	17:24 (6)	06:40	05:35
	16:17	3 15:42 (3) 17:12	22 16:30 (10) 18:06	15 17:39 (7)	20:02	20:56
8	08:30	15:38 (3) 07:51	16:08 (10) 06:51	17:25 (6)	06:37	05:33
	16:19	5 15:43 (3) 17:14	22 16:30 (10) 18:08	16 17:41 (7)	20:04	20:57
9	08:30	15:38 (3) 07:49	16:09 (10) 06:49	17:26 (6)	06:35	05:31
	16:20	6 15:44 (3) 17:16	21 16:30 (10) 18:09	18 17:44 (7)	20:06	20:59
10	08:29	15:38 (3) 07:47	16:10 (10) 06:47	17:26 (6)	06:33	05:29
	16:22	8 15:46 (3) 17:18	19 16:29 (10) 18:11	18 17:44 (7)	20:07	21:01
11	08:28	15:38 (3) 07:45	16:12 (10) 06:44	17:27 (7)	06:30	05:27
	16:23	10 15:48 (3) 17:20	16 16:28 (10) 18:13	17 17:44 (7)	20:09	21:02
12	08:28	15:38 (3) 07:44	16:13 (10) 06:42	17:26 (7)	06:28	05:25
	16:25	12 15:50 (3) 17:22	13 16:26 (10) 18:15	17 17:43 (7)	20:11	21:04
13	08:27	15:38 (3) 07:42	16:17 (10) 06:39	17:26 (7)	06:26	05:24
	16:26	13 15:51 (3) 17:24	6 16:23 (10) 18:17	17 17:43 (7)	20:13	21:06
14	08:26	15:38 (3) 07:40	16:18 (10) 06:37	17:27 (7)	06:23	05:22
	16:28	15 15:53 (3) 17:26	18:19	16 17:43 (7)	20:15	21:07
15	08:25	15:38 (3) 07:38	16:19 (10) 06:35	17:27 (7)	06:21	05:20
	16:29	17 15:55 (3) 17:27	18:21	14 17:41 (7)	20:16	21:09
16	08:24	15:38 (3) 07:36	16:58 (8)	06:32	17:29 (7)	06:19
	16:31	19 15:57 (3) 17:29	3 17:01 (9)	18:22	16 17:57 (5)	20:18
17	08:23	15:38 (3) 07:33	16:56 (9)	06:30	17:32 (7)	06:16
	16:33	20 15:58 (3) 17:31	7 17:03 (9)	18:24	11 17:58 (5)	20:20
18	08:22	15:38 (3) 07:31	16:54 (9)	06:28	17:50 (5)	06:14
	16:34	21 15:59 (3) 17:33	11 17:05 (9)	18:26	10 18:00 (5)	20:22
19	08:21	15:39 (3) 07:29	16:53 (9)	06:25	17:49 (5)	06:12
	16:36	20 15:59 (3) 17:35	14 17:07 (9)	18:28	12 18:01 (5)	20:24
20	08:20	15:40 (3) 07:27	16:52 (9)	06:23	17:49 (5)	06:10
	16:38	20 16:00 (3) 17:37	17 17:09 (9)	18:30	13 18:02 (5)	20:25
21	08:19	15:39 (3) 07:25	16:52 (9)	06:20	17:50 (5)	06:07
	16:40	20 15:59 (3) 17:39	18 17:10 (9)	18:31	11 18:01 (5)	20:27
22	08:18	15:40 (3) 07:23	16:52 (9)	06:18	17:51 (5)	06:05
	16:41	20 16:00 (3) 17:41	18 17:10 (9)	18:33	8 17:59 (5)	20:29
23	08:16	15:41 (3) 07:21	16:51 (9)	06:15	18:03	06:03
	16:43	18 15:59 (3) 17:43	18 17:09 (9)	18:35	20:31	21:21
24	08:15	15:42 (3) 07:19	16:52 (9)	06:13	18:04	06:01
	16:45	17 15:59 (3) 17:45	17 17:09 (9)	18:37	20:33	21:23
25	08:14	15:42 (3) 07:16	16:53 (9)	06:11	18:05	05:59
	16:47	16 15:58 (3) 17:47	15 17:08 (9)	18:39	20:34	21:24
26	08:12	15:44 (3) 07:14	16:53 (9)	06:08	18:06	05:57
	16:49	17 16:17 (10) 17:49	13 17:06 (9)	18:40	20:36	21:26
27	08:11	15:45 (3) 07:12	16:55 (9)	06:06	18:07	05:55
	16:51	19 16:18 (10) 17:51	10 17:05 (9)	18:42	20:38	21:27
28	08:10	15:47 (3) 07:10	16:59 (9)	06:03	18:08	05:52
	16:53	18 16:20 (10) 17:53	2 17:01 (9)	18:44	20:40	21:28
29	08:08	16:10 (10)	07:01	05:50	05:01	04:53
	16:54	13 16:23 (10)	19:46	20:42	21:30	21:49
30	08:07	16:09 (10)	06:59	05:48	05:00	04:54
	16:56	16 16:25 (10)	19:48	20:43	21:31	21:48
31	08:05	16:08 (10)	06:56	05:45	04:59	04:51
	16:58	18 16:26 (10)	19:49	20:44	21:32	21:49
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	382	420	263			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	43	68	50			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: N - IO14

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember					
1	04:55	05:33	06:26	07:18	18:06 (7)	07:14	15:40 (10) 08:08	15:20 (3)			
	21:48	21:14	20:09	18:57	18:23 (7)	16:48	19	15:59 (10) 16:05	10	15:30 (3)	
2	04:55	05:35	06:28	07:19	18:05 (7)	07:16	15:39 (10) 08:09	15:21 (3)			
	21:48	21:12	20:07	18:55	18:22 (7)	16:46	20	15:59 (10) 16:04	8	15:29 (3)	
3	04:56	05:37	06:29	07:21	18:05 (6)	07:18	15:38 (10) 08:11	15:22 (3)			
	21:47	21:11	20:04	18:52	18:22 (7)	16:44	22	16:00 (10) 16:04	6	15:28 (3)	
4	04:57	05:38	06:31	07:23	18:03 (6)	07:20	15:38 (10) 08:12	15:22 (3)			
	21:47	21:09	20:02	18:50	18:21 (7)	16:42	22	16:00 (10) 16:03	5	15:27 (3)	
5	04:58	05:40	06:33	07:25	18:02 (6)	07:22	15:37 (10) 08:14	15:24 (3)			
	21:46	21:07	20:00	18:47	18:19 (7)	16:40	23	16:00 (10) 16:02	3	15:27 (3)	
6	04:59	05:41	06:34	07:26	18:01 (6)	07:24	15:37 (10) 08:15	15:25 (3)			
	21:46	21:05	19:57	18:45	18:17 (7)	16:39	24	16:01 (10) 16:02	1	15:26 (3)	
7	05:00	05:43	06:36	07:28	18:00 (6)	07:26	15:37 (10) 08:16				
	21:45	21:03	19:55	18:43	18:14 (6)	16:37	24	16:01 (10) 16:01			
8	05:01	05:45	06:38	07:30	18:00 (6)	07:28	15:38 (10) 08:17				
	21:44	21:01	19:53	18:40	18:12 (6)	16:35	23	16:01 (10) 16:01			
9	05:02	05:46	06:40	07:32	18:00 (6)	07:29	15:39 (10) 08:19				
	21:44	20:59	19:50	18:38	18:09 (6)	16:33	22	16:01 (10) 16:01			
10	05:03	05:48	06:41	07:34	18:01 (6)	07:31	15:39 (10) 08:20				
	21:43	20:57	19:48	18:36	18:07 (6)	16:32	21	16:00 (10) 16:01			
11	05:04	05:50	06:43	07:35	18:03 (6)	07:33	15:40 (10) 08:21				
	21:42	20:55	19:45	18:33	2	18:05 (6)	16:30	18	15:58 (10) 16:00		
12	05:05	05:52	06:45	07:37		07:35	15:40 (10) 08:22				
	21:41	20:53	19:43	18:31		16:28	16	15:56 (10) 16:00			
13	05:06	05:53	06:46	07:39		07:37	15:41 (10) 08:23				
	21:40	20:51	19:41	18:29		16:27	14	15:55 (10) 16:00			
14	05:07	05:55	06:48	07:41		17:29 (9)	07:39	15:20 (3) 08:24			
	21:39	20:49	19:38	18:26	6	17:35 (9)	16:25	18	15:53 (10) 16:00		
15	05:08	05:57	06:50	07:43		17:26 (9)	07:41	15:18 (3) 08:25			
	21:38	20:47	19:36	18:24	12	17:38 (9)	16:24	19	15:51 (10) 16:00		
16	05:10	05:58	06:52	07:44		17:25 (9)	07:42	15:17 (3) 08:26			
	21:37	20:45	19:33	18:22	14	17:39 (9)	16:22	16	15:49 (10) 16:00		
17	05:11	06:00	06:53	07:46		17:24 (9)	07:44	15:16 (3) 08:27			
	21:36	20:43	19:31	18:20	16	17:40 (9)	16:21	16	15:32 (3) 16:00		
18	05:12	06:02	06:55	07:48		17:23 (9)	07:46	15:16 (3) 08:28			
	21:35	20:41	19:28	18:17	17	17:40 (9)	16:19	17	15:33 (3) 16:01		
19	05:14	06:04	06:57	07:50		17:22 (9)	07:48	15:16 (3) 08:28			
	21:34	20:39	19:26	18:15	18	17:40 (9)	16:18	18	15:34 (3) 16:01		
20	05:15	06:05	06:59	07:52		17:22 (9)	07:50	15:15 (3) 08:29			
	21:32	20:36	19:24	18:13	18	17:40 (9)	16:16	20	15:35 (3) 16:01		
21	05:16	06:07	07:00	18:38 (5)	07:54	17:22 (9)	07:51	15:15 (3) 08:30			
	21:31	20:34	19:21	5	18:43 (5)	18:11	18	17:40 (9)	16:15	20	15:35 (3) 16:02
22	05:18	06:09	07:02	18:35 (5)	07:55	17:23 (9)	07:53	15:16 (3) 08:30			
	21:30	20:32	19:19	10	18:45 (5)	18:09	16	17:39 (9)	16:14	20	15:36 (3) 16:02
23	05:19	06:10	07:04	18:34 (5)	07:57	17:23 (9)	07:55	15:15 (3) 08:31			
	21:28	20:30	19:16	12	18:46 (5)	18:06	14	17:37 (9)	16:13	20	15:35 (3) 16:03
24	05:21	06:12	07:05	18:33 (5)	07:59	17:24 (9)	07:57	15:15 (3) 08:31			
	21:27	20:28	19:14	13	18:46 (5)	18:04	10	17:34 (9)	16:12	21	15:36 (3) 16:03
25	05:22	06:14	07:07	18:33 (5)	07:01	16:26 (9)	07:58	15:16 (3) 08:31			
	21:25	20:25	19:11	10	18:43 (5)	17:02	6	16:32 (9)	16:11	20	15:36 (3) 16:04
26	05:24	06:16	07:09	18:33 (5)	07:03	16:28 (8)	08:00	15:17 (3) 08:32			
	21:24	20:23	19:09	8	18:41 (5)	17:00	2	16:30 (8)	16:10	18	15:35 (3) 16:04
27	05:25	06:17	07:11	18:12 (7)	07:05		08:02	15:17 (3) 08:32			
	21:22	20:21	19:07	14	18:39 (5)	16:58		16:09	17	15:34 (3) 16:05	
28	05:27	06:19	07:12	18:08 (7)	07:07		08:03	15:18 (3) 08:32			
	21:21	20:18	19:04	15	18:36 (5)	16:56		16:08	15	15:33 (3) 16:06	
29	05:28	06:21	07:14	18:07 (7)	07:09	15:45 (10)	08:05	15:18 (3) 08:32			
	21:19	20:16	19:02	15	18:22 (7)	16:54	8	15:53 (10)	16:07	14	15:32 (3) 16:07
30	05:30	06:22	07:16	18:06 (7)	07:10	15:43 (10)	08:06	15:19 (3) 08:32			
	21:17	20:14	18:59	17	18:23 (7)	16:52	13	15:56 (10)	16:06	12	15:31 (3) 16:08
31	05:32	06:24		07:12		15:41 (10)		08:32			
	21:16	20:11		16:50		15:57 (10)		16:09			
Sonnenscheinstunden	509	458	382	330		262		237			
astr. max. mögl. Beschattung			119		349		569			33	
Red. Sonnenscheinwahrsch.			0.35		0.29		0.19			0.14	
Reduktion Betriebsdauer			0.96		0.96		0.96			0.96	
Reduktion Windrichtung			0.72		0.72		0.70			0.69	
Gesamte Reduktion			0.24		0.20		0.13			0.09	
Met. wahrsch. Beschattung			28		70		73			3	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: O - IO15

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	08:03	16:08 (10)	07:07	06:54	05:46	04:58
16:10	17:00	21 16:29 (10)	17:54	19:51	20:45	21:34
2 08:32	08:02	16:08 (10)	07:05	17:26 (6)	06:51	05:44
16:11	17:02	22 16:30 (10)	17:56	3 17:29 (6)	19:53	20:47
3 08:32	08:00	16:08 (10)	07:03	17:25 (6)	06:49	05:42
16:12	17:04	23 16:31 (10)	17:58	7 17:32 (6)	19:55	20:49
4 08:32	07:58	16:08 (10)	07:00	17:24 (6)	06:47	05:40
16:14	17:06	23 16:31 (10)	18:00	9 17:33 (6)	19:57	20:50
5 08:31	07:57	16:08 (10)	06:58	17:23 (6)	06:44	05:38
16:15	17:08	23 16:31 (10)	18:02	12 17:35 (6)	19:58	20:52
6 08:31	07:55	16:08 (10)	06:56	17:24 (6)	06:42	05:36
16:16	17:10	22 16:30 (10)	18:04	14 17:38 (6)	20:00	20:54
7 08:31	07:53	16:09 (10)	06:54	17:23 (6)	06:40	05:35
16:17	17:12	21 16:30 (10)	18:06	16 17:39 (7)	20:02	20:56
8 08:30	07:51	16:09 (10)	06:51	17:24 (6)	06:37	05:33
16:19	17:14	20 16:29 (10)	18:08	17 17:41 (7)	20:04	20:57
9 08:30	07:49	16:10 (10)	06:49	17:26 (6)	06:35	05:31
16:20	17:16	19 16:29 (10)	18:09	17 17:43 (7)	20:06	20:59
10 08:29	07:47	16:12 (10)	06:47	17:25 (7)	06:33	05:29
16:22	17:18	16 16:28 (10)	18:11	17 17:42 (7)	20:07	21:01
11 08:28	07:45	16:13 (10)	06:44	17:25 (7)	06:30	05:27
16:23	17:20	13 16:26 (10)	18:13	17 17:42 (7)	20:09	21:02
12 08:28	07:44	16:16 (10)	06:42	17:25 (7)	06:28	05:25
16:25	17:22	7 16:23 (10)	18:15	16 17:41 (7)	20:11	21:04
13 08:27	07:42		06:39	17:26 (7)	06:26	05:24
16:26	17:24		18:17	14 17:40 (7)	20:13	21:06
14 08:26	07:40		06:37	17:26 (7)	06:23	05:22
16:28	17:26		18:19	13 17:52 (5)	20:15	21:07
15 08:25	07:38	16:57 (8)	06:35	17:28 (7)	06:21	05:20
16:29	17:27	2 16:59 (8)	18:21	12 17:54 (5)	20:16	21:09
16 08:24	07:36	16:12 (10)	06:32	17:49 (5)	06:19	05:19
16:31	17:29	6 17:01 (9)	18:22	8 17:57 (5)	20:18	21:11
17 08:23	07:33	16:54 (9)	06:30	17:48 (5)	06:16	05:17
16:33	17:31	9 17:03 (9)	18:24	10 17:58 (5)	20:20	21:12
18 08:22	07:31	16:52 (9)	06:27	17:48 (5)	06:14	05:16
16:34	17:33	13 17:05 (9)	18:26	12 18:00 (5)	20:22	21:14
19 08:21	07:29	16:51 (9)	06:25	17:48 (5)	06:12	05:14
16:36	17:35	16 17:07 (9)	18:28	12 18:00 (5)	20:24	21:15
20 08:20	07:27	16:51 (9)	06:23	17:49 (5)	06:10	05:13
16:38	17:37	17 17:08 (9)	18:30	10 17:59 (5)	20:25	21:17
21 08:19	07:25	16:51 (9)	06:20	17:51 (5)	06:07	05:11
16:40	17:39	18 17:09 (9)	18:31	6 17:57 (5)	20:27	21:18
22 08:18	07:23	16:51 (9)	06:18		06:05	05:10
16:41	17:41	18 17:09 (9)	18:33		20:29	21:20
23 08:16	07:21	16:51 (9)	06:15		06:03	05:08
16:43	17:43	16 17:07 (9)	18:35		20:31	21:21
24 08:15	07:18	16:52 (9)	06:13		06:01	05:07
16:45	17:45	15 17:07 (9)	18:37		20:33	21:23
25 08:14	07:16	16:53 (9)	06:11		05:59	05:06
16:47	17:47	13 17:06 (9)	18:39		20:34	21:24
26 08:12	16:13 (10)	07:14	16:54 (9)	06:08	05:57	05:05
16:49	4 16:17 (10)	17:49	9 17:03 (9)	18:40	20:36	21:26
27 08:11	16:11 (10)	07:12	06:06		05:55	05:04
16:51	7 16:18 (10)	17:51	18:42		20:38	21:27
28 08:10	16:10 (10)	07:10	06:03		05:52	05:02
16:53	10 16:20 (10)	17:53	18:44		20:40	21:28
29 08:08	16:09 (10)		07:01		05:50	05:01
16:54	14 16:23 (10)		19:46		20:42	21:30
30 08:07	16:09 (10)		06:59		05:48	05:00
16:56	16 16:25 (10)		19:48		20:43	21:31
31 08:05	16:08 (10)		06:56			04:59
16:58	18 16:26 (10)		19:49			21:32
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	69	382	242			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.71	0.72	0.72			
Gesamte Reduktion	0.12	0.16	0.19			
Met.wahrsch.Beschattung	8	62	46			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: O - IO15

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember		
1	04:55	05:33	06:26	07:18	18:05 (7)	07:14	15:41 (10)	08:08
	21:48	21:14	20:09	18:57	18:20 (7)	16:48	15:57 (10)	16:05
2	04:55	05:35	06:28	07:19	18:03 (7)	07:16	15:40 (10)	08:09
	21:48	21:12	20:07	18:55	18:20 (7)	16:46	15:58 (10)	16:04
3	04:56	05:37	06:29	07:21	18:03 (7)	07:18	15:39 (10)	08:11
	21:47	21:11	20:04	18:52	18:20 (7)	16:44	15:59 (10)	16:04
4	04:57	05:38	06:31	07:23	18:03 (7)	07:20	15:38 (10)	08:12
	21:47	21:09	20:02	18:50	18:20 (7)	16:42	16:00 (10)	16:03
5	04:58	05:40	06:33	07:25	18:02 (6)	07:22	15:38 (10)	08:14
	21:46	21:07	20:00	18:47	18:19 (7)	16:40	16:00 (10)	16:02
6	04:59	05:41	06:34	07:26	18:01 (6)	07:24	15:38 (10)	08:15
	21:46	21:05	19:57	18:45	18:17 (7)	16:39	16:00 (10)	16:02
7	05:00	05:43	06:36	07:28	17:59 (6)	07:26	15:38 (10)	08:16
	21:45	21:03	19:55	18:43	18:14 (7)	16:37	16:00 (10)	16:01
8	05:01	05:45	06:38	07:30	17:58 (6)	07:28	15:39 (10)	08:17
	21:44	21:01	19:53	18:40	18:12 (6)	16:35	16:01 (10)	16:01
9	05:02	05:46	06:40	07:32	17:58 (6)	07:29	15:39 (10)	08:19
	21:44	20:59	19:50	18:38	18:09 (6)	16:33	16:01 (10)	16:01
10	05:03	05:48	06:41	07:34	17:59 (6)	07:31	15:39 (10)	08:20
	21:43	20:57	19:48	18:36	18:07 (6)	16:32	16:00 (10)	16:00
11	05:04	05:50	06:43	07:35	18:00 (6)	07:33	15:40 (10)	08:21
	21:42	20:55	19:45	18:33	18:05 (6)	16:30	15:58 (10)	16:00
12	05:05	05:52	06:45	07:37	18:01 (6)	07:35	15:40 (10)	08:22
	21:41	20:53	19:43	18:31	18:02 (6)	16:28	15:56 (10)	16:00
13	05:06	05:53	06:46	07:39		07:37	15:41 (10)	08:23
	21:40	20:51	19:41	18:29		16:27	15:55 (10)	16:00
14	05:07	05:55	06:48	07:41		07:39	15:42 (10)	08:24
	21:39	20:49	19:38	18:26		16:25	15:53 (10)	16:00
15	05:08	05:57	06:50	07:43	17:28 (9)	07:41	15:44 (10)	08:25
	21:38	20:47	19:36	18:24	17:54 (9)	16:24	15:51 (10)	16:00
16	05:10	05:58	06:52	07:44	17:25 (9)	07:42	15:46 (10)	08:26
	21:37	20:45	19:33	18:22	17:36 (9)	16:22	15:49 (10)	16:00
17	05:11	06:00	06:53	07:46	17:24 (9)	07:44		08:27
	21:36	20:43	19:31	18:20	17:38 (9)	16:21		16:00
18	05:12	06:02	06:55	07:48	17:23 (9)	07:46		08:28
	21:35	20:41	19:28	18:17	17:38 (9)	16:19		16:01
19	05:14	06:04	06:57	07:50	17:22 (9)	07:48		08:28
	21:34	20:39	19:26	18:15	17:39 (9)	16:18		16:01
20	05:15	06:05	06:59	07:52	17:22 (9)	07:50		08:29
	21:32	20:36	19:24	18:13	17:39 (9)	16:16		16:01
21	05:16	06:07	07:00	07:54	17:21 (9)	07:51		08:30
	21:31	20:34	19:21	18:11	17:39 (9)	16:15		16:02
22	05:18	06:09	07:02	18:37 (5)	07:55	17:22 (9)	07:53	08:30
	21:30	20:32	19:19	18:40 (5)	18:09	17:39 (9)	16:14	16:02
23	05:19	06:10	07:04	18:34 (5)	07:57	17:22 (9)	07:55	08:31
	21:28	20:30	19:16	18:43 (5)	18:06	17:37 (9)	16:13	16:03
24	05:21	06:12	07:05	18:32 (5)	07:59	17:23 (9)	07:57	08:31
	21:27	20:28	19:14	18:43 (5)	18:04	17:34 (9)	16:12	16:03
25	05:22	06:14	07:07	18:31 (5)	07:01	16:24 (9)	07:58	08:31
	21:25	20:25	19:11	18:43 (5)	17:02	16:32 (9)	16:11	16:04
26	05:24	06:16	07:09	18:31 (5)	07:03	16:25 (9)	08:00	08:32
	21:24	20:23	19:09	18:41 (5)	17:00	16:30 (9)	16:10	16:04
27	05:25	06:17	07:11	18:31 (5)	07:05	16:27 (8)	08:02	08:32
	21:22	20:21	19:07	18:39 (5)	16:58	16:28 (8)	16:09	16:05
28	05:27	06:19	07:12	18:10 (7)	07:07		08:03	08:32
	21:21	20:18	19:04	18:36 (5)	16:56		16:08	16:06
29	05:28	06:21	07:14	18:07 (7)	07:09		08:05	08:32
	21:19	20:16	19:02	18:34 (5)	16:54		16:07	16:07
30	05:30	06:22	07:16	18:06 (7)	07:10	15:45 (10)	08:06	08:32
	21:17	20:14	18:59	18:20 (7)	16:52	15:54 (10)	16:06	16:08
31	05:32	06:24		07:12		15:43 (10)		08:32
	21:16	20:11		16:50	13	15:56 (10)		16:09
Sonnenscheinstunden	509	458	382	330		262		237
astr.max.mögl.Beschattung			93	330		276		
Red.Sonnenscheinwahrsch.			0.35	0.29		0.19		
Reduktion Betriebsdauer			0.96	0.96		0.96		
Reduktion Windrichtung			0.72	0.72		0.71		
Gesamte Reduktion			0.24	0.20		0.13		
Met.wahrsch.Beschattung			22	66		36		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: P - IO16

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:29 (3) 08:03	16:01 (10) 07:07	17:25 (6) 06:54	05:46	04:58	
16:10	4 15:33 (3) 17:00	23 16:24 (10) 17:54	2 17:27 (6) 19:51	20:45	21:34	
2 08:32	15:30 (3) 08:02	16:00 (10) 07:05	17:23 (6) 06:51	05:44	04:57	
16:11	5 15:35 (3) 17:02	24 16:24 (10) 17:56	6 17:29 (6) 19:53	20:47	21:35	
3 08:32	15:30 (3) 08:00	16:01 (10) 07:03	17:23 (6) 06:49	05:42	04:57	
16:12	6 15:36 (3) 17:04	23 16:24 (10) 17:58	9 17:32 (6) 19:55	20:49	21:36	
4 08:32	15:29 (3) 07:58	16:01 (10) 07:00	17:21 (6) 06:47	05:40	04:56	
16:14	8 15:37 (3) 17:06	23 16:24 (10) 18:00	12 17:33 (6) 19:57	20:50	21:37	
5 08:31	15:30 (3) 07:57	16:01 (10) 06:58	17:21 (6) 06:44	05:38	04:55	
16:15	9 15:39 (3) 17:08	23 16:24 (10) 18:02	14 17:35 (6) 19:58	20:52	21:38	
6 08:31	15:29 (3) 07:55	16:02 (10) 06:56	17:21 (6) 06:42	05:36	04:54	
16:16	11 15:40 (3) 17:10	21 16:23 (10) 18:04	17 17:38 (7) 20:00	20:54	21:39	
7 08:31	15:30 (3) 07:53	16:03 (10) 06:54	17:21 (6) 06:40	05:35	04:54	
16:17	12 15:42 (3) 17:12	20 16:23 (10) 18:06	18 17:39 (7) 20:02	20:56	21:40	
8 08:30	15:30 (3) 07:51	16:04 (10) 06:51	17:22 (6) 06:37	05:33	04:53	
16:19	13 15:43 (3) 17:14	18 16:22 (10) 18:08	18 17:40 (7) 20:04	20:57	21:41	
9 08:30	15:30 (3) 07:49	16:05 (10) 06:49	17:23 (7) 06:35	05:31	04:53	
16:20	14 15:44 (3) 17:16	15 16:20 (10) 18:09	18 17:41 (7) 20:06	20:59	21:42	
10 08:29	15:30 (3) 07:47	16:07 (10) 06:47	17:22 (7) 06:33	05:29	04:52	
16:22	16 15:46 (3) 17:18	11 16:18 (10) 18:11	18 17:40 (7) 20:07	21:01	21:43	
11 08:28	15:31 (3) 07:45	16:04 (10) 06:44	17:22 (7) 06:30	05:27	04:52	
16:23	17 15:48 (3) 17:20	18:13	18 17:40 (7) 20:09	21:02	21:43	
12 08:28	15:31 (3) 07:44	16:04 (10) 06:42	17:22 (7) 06:28	05:25	04:51	
16:25	19 15:50 (3) 17:22	18:15	17 17:39 (7) 20:11	21:04	21:44	
13 08:27	15:31 (3) 07:42	16:03 (10) 06:39	17:23 (7) 06:26	05:24	04:51	
16:26	20 15:51 (3) 17:24	18:17	15 17:38 (7) 20:13	21:06	21:45	
14 08:26	15:31 (3) 07:40	16:03 (10) 06:37	17:24 (7) 06:23	05:22	04:51	
16:28	21 15:52 (3) 17:26	4 16:57 (9) 18:19	14 17:53 (5) 20:15	21:07	21:45	
15 08:25	15:32 (3) 07:38	16:50 (9) 06:35	17:25 (7) 06:21	05:20	04:50	
16:29	20 15:52 (3) 17:27	9 16:59 (9) 18:21	15 17:54 (5) 20:16	21:09	21:46	
16 08:24	15:32 (3) 07:36	16:49 (9) 06:32	17:48 (5) 06:19	05:19	04:50	
16:31	21 15:53 (3) 17:29	12 17:01 (9) 18:22	9 17:57 (5) 20:18	21:11	21:47	
17 08:23	15:32 (3) 07:33	16:48 (9) 06:30	17:47 (5) 06:16	05:17	04:50	
16:33	20 15:52 (3) 17:31	15 17:03 (9) 18:24	11 17:58 (5) 20:20	21:12	21:47	
18 08:22	15:32 (3) 07:31	16:47 (9) 06:28	17:47 (5) 06:14	05:16	04:50	
16:34	20 15:52 (3) 17:33	18 17:05 (8) 18:26	13 18:00 (5) 20:22	21:14	21:48	
19 08:21	15:33 (3) 07:29	16:46 (9) 06:25	17:47 (5) 06:12	05:14	04:50	
16:36	20 15:53 (3) 17:35	19 17:05 (9) 18:28	12 17:59 (5) 20:24	21:15	21:48	
20 08:20	15:34 (3) 07:27	16:46 (9) 06:23	17:48 (5) 06:10	05:13	04:50	
16:38	19 15:53 (3) 17:37	19 17:05 (9) 18:30	11 17:59 (5) 20:25	21:17	21:48	
21 08:19	15:34 (3) 07:25	16:47 (9) 06:20	17:49 (5) 06:07	05:11	04:50	
16:40	18 15:52 (3) 17:39	18 17:05 (9) 18:31	8 17:57 (5) 20:27	21:18	21:48	
22 08:18	15:36 (3) 07:23	16:47 (9) 06:18	17:48 (5) 06:05	05:10	04:51	
16:41	16 15:52 (3) 17:41	18 17:05 (9) 18:33	20:29	21:20	21:49	
23 08:17	15:36 (3) 07:21	16:47 (9) 06:15	17:48 (5) 06:03	05:09	04:51	
16:43	21 16:10 (10) 17:43	16 17:03 (9) 18:35	20:31	21:21	21:49	
24 08:15	15:38 (3) 07:19	16:48 (9) 06:13	17:48 (5) 06:01	05:07	04:51	
16:45	21 16:12 (10) 17:45	14 17:02 (9) 18:37	20:33	21:23	21:49	
25 08:14	15:40 (3) 07:16	16:50 (9) 06:11	17:48 (5) 05:59	05:06	04:51	
16:47	21 16:14 (10) 17:47	11 17:01 (9) 18:39	20:34	21:24	21:49	
26 08:12	15:43 (3) 07:14	16:52 (9) 06:08	17:48 (5) 05:57	05:05	04:52	
16:49	19 16:17 (10) 17:49	5 16:57 (9) 18:40	20:36	21:26	21:49	
27 08:11	16:01 (10) 07:12	16:06	17:48 (5) 05:55	05:04	04:52	
16:51	17 16:18 (10) 17:51	18:42	20:38	21:27	21:49	
28 08:10	16:00 (10) 07:10	16:03	17:48 (5) 05:52	05:02	04:53	
16:53	20 16:20 (10) 17:53	18:44	20:40	21:28	21:49	
29 08:08	16:01 (10) 07:07	16:04	17:48 (5) 05:50	05:01	04:53	
16:54	22 16:23 (10) 17:56	19:46	20:42	21:30	21:49	
30 08:07	16:00 (10) 07:05	16:05	17:48 (5) 05:48	05:00	04:54	
16:56	23 16:23 (10) 17:56	19:48	20:43	21:31	21:48	
31 08:05	16:00 (10) 07:03	16:06	17:48 (5) 05:46	04:59	21:48	
16:58	23 16:23 (10) 17:56	19:49	20:43	21:32	21:48	
Sonnenscheinstunden	253	275	367	419	491	506
astr. max.mögl. Beschattung	516	379	275	275		
Red. Sonnenscheinwahrsch.	0.17	0.24	0.28	0.28		
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96		
Reduktion Windrichtung	0.69	0.72	0.72	0.72		
Gesamte Reduktion	0.11	0.16	0.19	0.19		
Met. wahrsch. Beschattung	58	62	52			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: P - IO16

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember						
1	04:55	05:33	06:26	07:18	18:02 (7)	07:14	15:37 (10)	08:08	15:13 (3)			
	21:48	21:14	20:09	18:57	17	18:19 (7)	16:48	11	15:48 (10)	16:05	17	15:30 (3)
2	04:55	05:35	06:28	07:19	18:01 (7)	07:16	15:35 (10)	08:09	15:13 (3)			
	21:48	21:12	20:07	18:55	17	18:18 (7)	16:46	15	15:50 (10)	16:04	16	15:29 (3)
3	04:56	05:37	06:29	07:21	18:00 (7)	07:18	15:33 (10)	08:11	15:14 (3)			
	21:47	21:11	20:04	18:52	18	18:18 (7)	16:44	18	15:51 (10)	16:04	14	15:28 (3)
4	04:57	05:38	06:31	07:23	18:00 (7)	07:20	15:32 (10)	08:12	15:14 (3)			
	21:47	21:09	20:02	18:50	18	18:18 (7)	16:42	20	15:52 (10)	16:03	13	15:27 (3)
5	04:58	05:40	06:33	07:25	18:00 (6)	07:22	15:31 (10)	08:14	15:15 (3)			
	21:46	21:07	20:00	18:47	18	18:18 (7)	16:40	22	15:53 (10)	16:02	12	15:27 (3)
6	04:59	05:41	06:34	07:26	17:59 (6)	07:24	15:31 (10)	08:15	15:16 (3)			
	21:46	21:05	19:57	18:45	18	18:17 (7)	16:39	23	15:54 (10)	16:02	10	15:26 (3)
7	05:00	05:43	06:36	07:28	17:57 (6)	07:26	15:31 (10)	08:16	15:17 (3)			
	21:45	21:03	19:55	18:43	17	18:14 (7)	16:37	23	15:54 (10)	16:01	9	15:26 (3)
8	05:01	05:45	06:38	07:30	17:56 (6)	07:28	15:31 (10)	08:18	15:17 (3)			
	21:44	21:01	19:53	18:40	16	18:12 (7)	16:35	24	15:55 (10)	16:01	8	15:25 (3)
9	05:02	05:46	06:40	07:32	17:56 (6)	07:29	15:31 (10)	08:19	15:18 (3)			
	21:44	20:59	19:50	18:38	13	18:09 (6)	16:33	24	15:55 (10)	16:01	6	15:24 (3)
10	05:03	05:48	06:41	07:34	17:56 (6)	07:31	15:31 (10)	08:20	15:19 (3)			
	21:43	20:57	19:48	18:36	11	18:07 (6)	16:32	24	15:55 (10)	16:01	5	15:24 (3)
11	05:04	05:50	06:43	07:35	17:57 (6)	07:33	15:32 (10)	08:21	15:20 (3)			
	21:42	20:55	19:45	18:33	8	18:05 (6)	16:30	23	15:55 (10)	16:00	4	15:24 (3)
12	05:05	05:52	06:45	07:37	17:58 (6)	07:35	15:32 (10)	08:22	15:21 (3)			
	21:41	20:53	19:43	18:31	4	18:02 (6)	16:28	23	15:55 (10)	16:00	3	15:24 (3)
13	05:06	05:53	06:46	07:39	17:57 (6)	07:37	15:32 (10)	08:23	15:22 (3)			
	21:40	20:51	19:41	18:29		16:27	23	15:55 (10)	16:00	2	15:24 (3)	
14	05:07	05:55	06:48	07:41	17:59 (6)	07:39	15:33 (10)	08:24	15:23 (3)			
	21:39	20:49	19:38	18:26		16:25	20	15:53 (10)	16:00	1	15:24 (3)	
15	05:08	05:57	06:50	07:43	17:59 (6)	07:41	15:34 (10)	08:25	15:24 (3)			
	21:38	20:47	19:36	18:24		16:24	17	15:51 (10)	16:00			
16	05:10	05:58	06:52	07:44	17:59 (6)	07:42	15:34 (10)	08:26	15:25 (3)			
	21:37	20:45	19:33	18:22	8	17:31 (9)	16:22	18	15:49 (10)	16:00		
17	05:11	06:00	06:53	07:46	17:20 (9)	07:44	15:13 (3)	08:27	15:26 (3)			
	21:36	20:43	19:31	18:20	13	17:33 (9)	16:21	22	15:48 (10)	16:00		
18	05:12	06:02	06:55	07:48	17:19 (9)	07:46	15:12 (3)	08:28	15:27 (3)			
	21:35	20:41	19:28	18:17	15	17:34 (9)	16:19	21	15:46 (10)	16:01		
19	05:14	06:04	06:57	07:50	17:18 (9)	07:48	15:11 (3)	08:28	15:28 (3)			
	21:34	20:39	19:26	18:15	17	17:35 (9)	16:18	21	15:45 (10)	16:01		
20	05:15	06:05	06:59	07:52	17:17 (9)	07:50	15:11 (3)	08:29	15:29 (3)			
	21:32	20:36	19:24	18:13	18	17:35 (9)	16:16	16	15:27 (3)	16:01		
21	05:16	06:07	07:00	07:54	17:17 (9)	07:51	15:10 (3)	08:30	15:30 (3)			
	21:31	20:34	19:21	18:11	18	17:35 (9)	16:15	18	15:28 (3)	16:02		
22	05:18	06:09	07:02	07:56	17:17 (9)	07:53	15:10 (3)	08:30	15:31 (3)			
	21:30	20:32	19:19	6	18:41 (5)	18:09	19	17:36 (8)	16:14	19	15:29 (3)	16:02
23	05:19	06:10	07:04	07:57	17:17 (9)	07:55	15:09 (3)	08:31	15:32 (3)			
	21:28	20:30	19:16	10	18:43 (5)	18:06	19	17:36 (8)	16:13	20	15:29 (3)	16:03
24	05:21	06:12	07:05	07:59	17:17 (9)	07:57	15:10 (3)	08:31	15:33 (3)			
	21:27	20:28	19:14	13	18:43 (5)	18:04	17	17:34 (9)	16:12	20	15:30 (3)	16:03
25	05:22	06:14	07:07	07:59	17:18 (9)	07:58	15:10 (3)	08:31	15:34 (3)			
	21:25	20:25	19:11	13	18:43 (5)	17:02	14	16:32 (9)	16:11	20	15:30 (3)	16:04
26	05:24	06:16	07:09	07:59	17:19 (9)	08:00	15:10 (3)	08:32	15:35 (3)			
	21:24	20:23	19:09	11	18:41 (5)	17:00	11	16:30 (9)	16:10	21	15:31 (3)	16:04
27	05:25	06:17	07:11	07:59	17:20 (9)	08:02	15:11 (3)	08:32	15:36 (3)			
	21:22	20:21	19:07	9	18:39 (5)	16:58	8	16:28 (9)	16:09	20	15:31 (3)	16:05
28	05:27	06:19	07:12	07:59	17:21 (9)	08:03	15:11 (3)	08:32	15:37 (3)			
	21:21	20:18	19:04	14	18:36 (5)	16:56	3	16:26 (9)	16:08	21	15:32 (3)	16:06
29	05:28	06:21	07:14	07:59	17:22 (9)	08:05	15:11 (3)	08:32	15:38 (3)			
	21:19	20:16	19:02	15	18:34 (5)	16:54	16:07	20	15:31 (3)	16:07		
30	05:30	06:22	07:16	07:10	18:03 (7)	07:10	08:06	15:12 (3)	08:32			15:30 (3)
	21:17	20:14	18:59	15	18:18 (7)	16:52	16:06	19	15:31 (3)	16:08	1	15:31 (3)
31	05:32	06:24		07:12		15:40 (10)		08:32	15:36 (3)			
	21:16	20:11		16:50	5	15:45 (10)		16:09	2	15:32 (3)		
Sonnenscheinstunden	509	458	382	330		262		237				
astr. max. mögl. Beschattung			106		360		606		123			
Red. Sonnenscheinwahrsch.			0.35		0.29		0.19		0.14			
Reduktion Betriebsdauer			0.96		0.96		0.96		0.96			
Reduktion Windrichtung			0.72		0.72		0.70		0.69			
Gesamte Reduktion			0.24		0.20		0.13		0.09			
Met. wahrsch. Beschattung			25		72		78		11			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: Q - IO17

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 817 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:20 (3) 08:03	15:53 (10) 07:07	17:21 (6) 06:54	05:46	04:58	
16:10	13 15:33 (3) 17:00	25 16:18 (10) 17:54	6 17:27 (6) 19:51	20:45	21:34	
2 08:32	15:20 (3) 08:02	15:53 (10) 07:05	17:20 (6) 06:51	05:44	04:57	
16:11	15 15:35 (3) 17:02	24 16:17 (10) 17:56	9 17:29 (6) 19:53	20:47	21:35	
3 08:32	15:21 (3) 08:00	15:54 (10) 07:03	17:20 (6) 06:49	05:42	04:57	
16:12	15 15:36 (3) 17:04	23 16:17 (10) 17:58	12 17:32 (6) 19:55	20:49	21:36	
4 08:32	15:20 (3) 07:58	15:54 (10) 07:01	17:18 (6) 06:47	05:40	04:56	
16:14	17 15:37 (3) 17:06	22 16:16 (10) 18:00	15 17:33 (6) 19:57	20:50	21:37	
5 08:31	15:21 (3) 07:57	15:55 (10) 06:58	17:19 (6) 06:44	05:38	04:55	
16:15	18 15:39 (3) 17:08	21 16:16 (10) 18:02	16 17:35 (7) 19:58	20:52	21:38	
6 08:31	15:21 (3) 07:55	15:56 (10) 06:56	17:19 (6) 06:42	05:36	04:54	
16:16	19 15:40 (3) 17:10	19 16:15 (10) 18:04	18 17:37 (7) 20:00	20:54	21:39	
7 08:31	15:22 (3) 07:53	15:57 (10) 06:54	17:19 (6) 06:40	05:35	04:54	
16:17	20 15:42 (3) 17:12	17 16:14 (10) 18:06	18 17:37 (7) 20:02	20:56	21:40	
8 08:30	15:22 (3) 07:51	15:59 (10) 06:51	17:20 (6) 06:37	05:33	04:53	
16:19	20 15:42 (3) 17:14	13 16:12 (10) 18:08	18 17:38 (7) 20:04	20:57	21:41	
9 08:30	15:22 (3) 07:49	16:03 (10) 06:49	17:20 (7) 06:35	05:31	04:53	
16:20	21 15:43 (3) 17:16	5 16:08 (10) 18:09	19 17:39 (7) 20:06	20:59	21:42	
10 08:29	15:22 (3) 07:47	06:47	17:19 (7) 06:33	05:29	04:52	
16:22	21 15:43 (3) 17:18	18:11	19 17:38 (7) 20:07	21:01	21:43	
11 08:28	15:23 (3) 07:45	06:44	17:19 (7) 06:30	05:27	04:52	
16:23	21 15:44 (3) 17:20	18:13	19 17:38 (7) 20:09	21:02	21:43	
12 08:28	15:23 (3) 07:44	16:51 (8) 06:42	17:19 (7) 06:28	05:25	04:51	
16:25	22 15:45 (3) 17:22	1 16:52 (8) 18:15	17 17:36 (7) 20:11	21:04	21:44	
13 08:27	15:24 (3) 07:42	16:46 (9) 06:39	17:20 (7) 06:26	05:24	04:51	
16:26	21 15:45 (3) 17:24	8 16:54 (9) 18:17	16 17:36 (7) 20:13	21:06	21:45	
14 08:26	15:24 (3) 07:40	16:45 (9) 06:37	17:22 (7) 06:23	05:22	04:51	
16:28	21 15:45 (3) 17:26	12 16:57 (9) 18:19	16 17:53 (5) 20:15	21:07	21:46	
15 08:25	15:25 (3) 07:38	16:44 (9) 06:35	17:23 (7) 06:21	05:20	04:50	
16:29	20 15:45 (3) 17:27	15 16:59 (9) 18:21	15 17:54 (5) 20:16	21:09	21:46	
16 08:24	15:26 (3) 07:36	16:43 (9) 06:32	17:47 (5) 06:19	05:19	04:50	
16:31	20 15:46 (3) 17:29	18 17:01 (8) 18:22	10 17:57 (5) 20:18	21:11	21:47	
17 08:23	15:25 (3) 07:33	16:42 (9) 06:30	17:46 (5) 06:16	05:17	04:50	
16:33	20 15:45 (3) 17:31	21 17:03 (8) 18:24	12 17:58 (5) 20:20	21:12	21:47	
18 08:22	15:26 (3) 07:31	16:41 (9) 06:28	17:46 (5) 06:14	05:16	04:50	
16:34	19 15:45 (3) 17:33	21 17:02 (8) 18:26	13 17:59 (5) 20:22	21:14	21:48	
19 08:21	15:27 (3) 07:29	16:41 (9) 06:25	17:45 (5) 06:12	05:14	04:50	
16:36	23 16:02 (10) 17:35	20 17:01 (9) 18:28	13 17:58 (5) 20:24	21:15	21:48	
20 08:20	15:29 (3) 07:27	16:42 (9) 06:23	17:46 (5) 06:10	05:13	04:50	
16:38	25 16:05 (10) 17:37	19 17:01 (9) 18:30	12 17:58 (5) 20:25	21:17	21:48	
21 08:19	15:29 (3) 07:25	16:42 (9) 06:20	17:48 (5) 06:07	05:11	04:50	
16:40	27 16:06 (10) 17:39	18 17:00 (9) 18:31	8 17:56 (5) 20:27	21:18	21:48	
22 08:18	15:31 (3) 07:23	16:43 (9) 06:18	06:05	05:10	04:51	
16:41	26 16:08 (10) 17:41	17 17:00 (9) 18:33	20:29	21:20	21:49	
23 08:17	15:33 (3) 07:21	16:43 (9) 06:15	06:03	05:09	04:51	
16:43	25 16:10 (10) 17:43	15 16:58 (9) 18:35	20:31	21:21	21:49	
24 08:15	15:53 (10) 07:19	16:45 (9) 06:13	06:01	05:07	04:51	
16:45	19 16:12 (10) 17:45	12 16:57 (9) 18:37	20:33	21:23	21:49	
25 08:14	15:52 (10) 07:16	16:48 (9) 06:11	05:59	05:06	04:51	
16:47	22 16:14 (10) 17:47	6 16:54 (9) 18:39	20:34	21:24	21:49	
26 08:12	15:52 (10) 07:14	06:08	05:57	05:05	04:52	
16:49	24 16:16 (10) 17:49	18:40	20:36	21:26	21:49	
27 08:11	15:52 (10) 07:12	06:06	05:55	05:04	04:52	
16:51	24 16:16 (10) 17:51	18:42	20:38	21:27	21:49	
28 08:10	15:52 (10) 07:10	17:24 (6) 06:03	05:52	05:02	04:53	
16:53	25 16:17 (10) 17:53	2 17:26 (6) 18:44	20:40	21:28	21:49	
29 08:08	15:52 (10) 07:07	07:01	05:50	05:01	04:53	
16:54	25 16:17 (10) 17:54	19:46	20:42	21:30	21:49	
30 08:07	15:52 (10) 07:05	06:59	05:48	05:00	04:54	
16:56	25 16:17 (10) 17:55	19:48	20:43	21:31	21:48	
31 08:05	15:52 (10) 07:03	06:56	05:49	05:01	04:54	
16:58	25 16:17 (10) 17:56	19:49	20:44	21:32	21:48	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	658	374	301			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	73	61	57			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: Q - IO17

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:55	05:33	06:26	07:18	17:59 (7) 07:14	08:08
	21:48	21:14	20:09	18:57	18:16 (7) 16:48	16:05
2	04:55	05:35	06:28	07:19	17:58 (7) 07:16	15:32 (10) 08:09
	21:48	21:12	20:07	18:55	18:16 (7) 16:46	15:39 (10) 16:04
3	04:56	05:37	06:29	07:21	17:57 (7) 07:18	15:29 (10) 08:11
	21:47	21:11	20:04	18:52	18:16 (7) 16:44	15:42 (10) 16:04
4	04:57	05:38	06:31	07:23	17:57 (7) 07:20	15:27 (10) 08:12
	21:47	21:09	20:02	18:50	18:16 (7) 16:42	15:43 (10) 16:03
5	04:58	05:40	06:33	07:25	17:57 (7) 07:22	15:26 (10) 08:14
	21:46	21:07	20:00	18:47	18:15 (7) 16:40	15:45 (10) 16:02
6	04:59	05:41	06:34	07:26	17:56 (6) 07:24	15:25 (10) 08:15
	21:46	21:05	19:57	18:45	18:15 (7) 16:39	15:46 (10) 16:02
7	05:00	05:43	06:36	07:28	17:54 (6) 07:26	15:24 (10) 08:16
	21:45	21:03	19:55	18:43	18:13 (7) 16:37	15:46 (10) 16:02
8	05:01	05:45	06:38	07:30	17:54 (6) 07:28	15:24 (10) 08:18
	21:44	21:01	19:53	18:40	18:12 (7) 16:35	15:48 (10) 16:01
9	05:02	05:46	06:40	07:32	17:53 (6) 07:29	15:24 (10) 08:19
	21:44	20:59	19:50	18:38	18:09 (6) 16:33	15:48 (10) 16:01
10	05:03	05:48	06:41	07:34	17:54 (6) 07:31	15:24 (10) 08:20
	21:43	20:57	19:48	18:36	18:07 (6) 16:32	15:49 (10) 16:01
11	05:04	05:50	06:43	07:35	17:54 (6) 07:33	15:24 (10) 08:21
	21:42	20:55	19:45	18:33	18:05 (6) 16:30	15:49 (10) 16:00
12	05:05	05:52	06:45	07:37	17:55 (6) 07:35	15:24 (10) 08:22
	21:41	20:53	19:43	18:31	18:02 (6) 16:28	15:49 (10) 16:00
13	05:06	05:53	06:46	07:39	17:56 (6) 07:37	15:24 (10) 08:23
	21:40	20:51	19:41	18:29	18:00 (6) 16:27	15:49 (10) 16:00
14	05:07	05:55	06:48	07:41	18:00 (6) 16:27	15:24 (10) 08:24
	21:39	20:49	19:38	18:26	16:25	15:49 (10) 16:00
15	05:08	05:57	06:50	07:43	17:55 (6) 07:39	15:25 (10) 08:25
	21:38	20:47	19:36	18:24	16:24	15:49 (10) 16:00
16	05:10	05:58	06:52	07:44	17:54 (6) 07:42	15:25 (10) 08:26
	21:37	20:45	19:33	18:22	16:22	15:48 (10) 16:00
17	05:11	06:00	06:53	07:46	17:18 (9) 07:44	15:26 (10) 08:27
	21:36	20:43	19:31	18:20	17:26 (9) 16:21	15:48 (10) 16:00
18	05:12	06:02	06:55	07:48	17:16 (9) 07:46	15:27 (10) 08:28
	21:35	20:41	19:28	18:17	17:28 (9) 16:19	15:46 (10) 16:01
19	05:14	06:04	06:57	07:50	17:14 (9) 07:48	15:08 (3) 08:28
	21:34	20:39	19:26	18:15	17:30 (9) 16:18	15:45 (10) 16:01
20	05:15	06:05	06:59	07:52	17:13 (9) 07:50	15:06 (3) 08:29
	21:32	20:36	19:24	18:13	17:30 (9) 16:17	15:43 (10) 16:01
21	05:16	06:07	07:00	07:54	17:12 (9) 07:51	15:05 (3) 08:30
	21:31	20:34	19:21	18:11	17:31 (9) 16:15	15:42 (10) 16:02
22	05:18	06:09	07:02	18:33 (5) 07:56	17:12 (9) 07:53	15:05 (3) 08:30
	21:30	20:32	19:19	18:40 (5) 18:09	17:31 (9) 16:14	15:41 (10) 16:02
23	05:19	06:10	07:04	18:31 (5) 07:57	17:12 (9) 07:55	15:04 (3) 08:31
	21:28	20:30	19:16	18:42 (5) 18:06	17:32 (8) 16:13	15:38 (10) 16:03
24	05:21	06:12	07:05	18:29 (5) 07:59	17:12 (9) 07:57	15:03 (3) 08:31
	21:27	20:28	19:14	18:42 (5) 18:04	17:32 (8) 16:12	15:22 (3) 16:03
25	05:22	06:14	07:07	18:28 (5) 07:01	16:12 (9) 07:58	15:03 (3) 08:31
	21:25	20:25	19:11	18:42 (5) 17:02	16:32 (8) 16:11	15:23 (3) 16:04
26	05:24	06:16	07:09	18:28 (5) 07:03	16:12 (9) 08:00	15:04 (3) 08:32
	21:24	20:23	19:09	18:41 (5) 17:00	16:30 (8) 16:10	15:24 (3) 16:04
27	05:25	06:17	07:11	18:28 (5) 07:05	16:13 (9) 08:02	15:04 (3) 08:32
	21:22	20:21	19:07	18:39 (5) 16:58	16:28 (9) 16:09	15:24 (3) 16:05
28	05:27	06:19	07:12	18:05 (7) 07:07	16:14 (9) 08:03	15:04 (3) 08:32
	21:21	20:18	19:04	18:36 (5) 16:56	16:26 (9) 16:08	15:25 (3) 16:06
29	05:28	06:21	07:14	18:02 (7) 07:09	16:16 (9) 08:05	15:04 (3) 08:32
	21:19	20:16	19:02	18:34 (5) 16:54	16:24 (9) 16:07	15:25 (3) 16:07
30	05:30	06:22	07:16	18:00 (7) 07:11	08:06	15:04 (3) 08:32
	21:17	20:14	18:59	18:15 (7) 16:52	16:06	15:26 (3) 16:08
31	05:32	06:24	07:16	07:12	08:06	08:32
	21:16	20:11	18:58	16:50	16:09	15:32 (3)
Sonnenscheinstunden	509	458	382	330	262	237
astr. max.mögl. Beschattung			115	402	627	401
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19	0.14
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.72	0.70	0.69
Gesamte Reduktion			0.24	0.20	0.13	0.09
Met. wahrsch. Beschattung			27	81	80	36

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: R - IO18

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	15:18 (3) 08:03	15:52 (10) 07:07	17:20 (6) 06:54	05:46	04:58
	16:10	15:33 (3) 17:00	24 16:16 (10) 17:54	7 17:27 (6) 19:51	20:45	21:34
2	08:32	15:18 (3) 08:02	15:52 (10) 07:05	17:19 (6) 06:51	05:44	04:57
	16:11	15:35 (3) 17:02	24 16:16 (10) 17:56	10 17:29 (6) 19:53	20:47	21:35
3	08:32	15:19 (3) 08:00	15:52 (10) 07:03	17:19 (6) 06:49	05:42	04:57
	16:12	15:36 (3) 17:04	23 16:15 (10) 17:58	13 17:32 (6) 19:55	20:49	21:36
4	08:32	15:19 (3) 07:58	15:53 (10) 07:01	17:18 (6) 06:47	05:40	04:56
	16:14	15:37 (3) 17:06	22 16:15 (10) 18:00	15 17:33 (6) 19:57	20:50	21:37
5	08:31	15:19 (3) 07:57	15:54 (10) 06:58	17:18 (6) 06:44	05:38	04:55
	16:15	20 15:39 (3) 17:08	20 16:14 (10) 18:02	17 17:35 (7) 19:58	20:52	21:38
6	08:31	15:19 (3) 07:55	15:55 (10) 06:56	17:18 (6) 06:42	05:36	04:54
	16:16	21 15:40 (3) 17:10	18 16:13 (10) 18:04	19 17:37 (7) 20:00	20:54	21:39
7	08:31	15:20 (3) 07:53	15:57 (10) 06:54	17:18 (6) 06:40	05:35	04:54
	16:17	21 15:41 (3) 17:12	14 16:11 (10) 18:06	19 17:37 (7) 20:02	20:56	21:40
8	08:30	15:20 (3) 07:51	16:00 (10) 06:51	17:19 (7) 06:37	05:33	04:53
	16:19	21 15:41 (3) 17:14	9 16:09 (10) 18:08	19 17:38 (7) 20:04	20:57	21:41
9	08:30	15:20 (3) 07:49	06:49	17:19 (7) 06:35	05:31	04:53
	16:20	21 15:41 (3) 17:16	18:09	19 17:38 (7) 20:06	20:59	21:42
10	08:29	15:20 (3) 07:47	06:47	17:18 (7) 06:33	05:29	04:52
	16:22	22 15:42 (3) 17:18	18:11	19 17:37 (7) 20:07	21:01	21:43
11	08:28	15:22 (3) 07:45	06:44	17:19 (7) 06:30	05:27	04:52
	16:23	21 15:43 (3) 17:20	18:13	18 17:37 (7) 20:09	21:02	21:43
12	08:28	15:22 (3) 07:44	16:46 (9) 06:42	17:18 (7) 06:28	05:25	04:51
	16:25	21 15:43 (3) 17:22	6 16:52 (9) 18:15	17 17:35 (7) 20:11	21:04	21:44
13	08:27	15:22 (3) 07:42	16:44 (9) 06:39	17:20 (7) 06:26	05:24	04:51
	16:26	21 15:43 (3) 17:24	10 16:54 (9) 18:17	14 17:34 (7) 20:13	21:06	21:45
14	08:26	15:23 (3) 07:40	16:43 (9) 06:37	17:21 (7) 06:23	05:22	04:51
	16:28	21 15:44 (3) 17:26	14 16:57 (9) 18:19	16 17:53 (5) 20:15	21:07	21:46
15	08:25	15:24 (3) 07:38	16:42 (9) 06:35	17:24 (7) 06:21	05:20	04:50
	16:29	20 15:44 (3) 17:27	17 16:59 (9) 18:21	12 17:54 (5) 20:16	21:09	21:46
16	08:24	15:24 (3) 07:36	16:41 (9) 06:32	17:46 (5) 06:19	05:19	04:50
	16:31	20 15:44 (3) 17:29	20 17:01 (8) 18:22	11 17:57 (5) 20:18	21:11	21:47
17	08:23	15:24 (3) 07:33	16:41 (9) 06:30	17:45 (5) 06:16	05:17	04:50
	16:33	19 15:43 (3) 17:31	21 17:02 (8) 18:24	13 17:58 (5) 20:20	21:12	21:47
18	08:22	15:25 (3) 07:31	16:40 (9) 06:28	17:45 (5) 06:14	05:16	04:50
	16:34	23 16:00 (10) 17:33	21 17:01 (8) 18:26	14 17:59 (5) 20:22	21:14	21:48
19	08:21	15:27 (3) 07:29	16:40 (9) 06:25	17:45 (5) 06:12	05:14	04:50
	16:36	24 16:02 (10) 17:35	20 17:00 (8) 18:28	13 17:58 (5) 20:24	21:15	21:48
20	08:20	15:28 (3) 07:27	16:41 (9) 06:23	17:46 (5) 06:10	05:13	04:50
	16:38	27 16:05 (10) 17:37	19 17:00 (8) 18:30	11 17:57 (5) 20:25	21:17	21:48
21	08:19	15:29 (3) 07:25	16:41 (9) 06:20	17:48 (5) 06:07	05:11	04:50
	16:40	27 16:06 (10) 17:39	18 16:59 (9) 18:31	7 17:55 (5) 20:27	21:18	21:48
22	08:18	15:31 (3) 07:23	16:42 (9) 06:18	06:05	05:10	04:51
	16:41	26 16:08 (10) 17:41	16 16:58 (9) 18:33	20:29	21:20	21:49
23	08:17	15:33 (3) 07:21	16:43 (9) 06:15	06:03	05:09	04:51
	16:43	24 16:10 (10) 17:43	13 16:56 (9) 18:35	20:31	21:21	21:49
24	08:15	15:51 (10) 07:19	16:45 (9) 06:13	06:01	05:07	04:51
	16:45	21 16:12 (10) 17:45	9 16:54 (9) 18:37	20:33	21:23	21:49
25	08:14	15:50 (10) 07:16	06:11	05:59	05:06	04:51
	16:47	23 16:13 (10) 17:47	18:39	20:34	21:24	21:49
26	08:12	15:51 (10) 07:14	06:08	05:57	05:05	04:52
	16:49	23 16:14 (10) 17:49	18:40	20:36	21:26	21:49
27	08:11	15:50 (10) 07:12	06:06	05:55	05:04	04:52
	16:51	24 16:14 (10) 17:51	18:42	20:38	21:27	21:49
28	08:10	15:51 (10) 07:10	17:23 (6) 06:03	05:52	05:02	04:53
	16:53	25 16:16 (10) 17:53	3 17:26 (6) 18:44	20:40	21:28	21:49
29	08:08	15:51 (10)	07:01	05:50	05:01	04:53
	16:54	25 16:16 (10)	19:46	20:42	21:30	21:49
30	08:07	15:50 (10)	06:59	05:48	05:00	04:54
	16:56	25 16:15 (10)	19:48	20:43	21:31	21:48
31	08:05	15:50 (10)	06:56	05:49	04:59	04:59
	16:58	25 16:15 (10)	19:49	20:44	21:32	21:48
Sonnenscheinstunden	253	275	367	419	491	506
astr. max.mögl. Beschattung	678	361	303			
Red. Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met. wahrsch. Beschattung	75	58	57			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: R - IO18

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:55	05:33	06:26	07:18	17:59 (7) 07:14	08:08
	21:48	21:14	20:09	18:57	16 18:15 (7) 16:48	15:25 (3)
2	04:55	05:35	06:28	07:19	17:57 (7) 07:16	08:09
	21:48	21:12	20:07	18:55	17 18:14 (7) 16:46	16:04 21 15:25 (3)
3	04:56	05:37	06:29	07:21	17:56 (7) 07:18	15:29 (10) 08:11
	21:47	21:11	20:04	18:52	19 18:15 (7) 16:44	10 15:39 (10) 16:04 22 15:26 (3)
4	04:57	05:38	06:31	07:23	17:56 (7) 07:20	15:26 (10) 08:12
	21:47	21:09	20:02	18:50	19 18:15 (7) 16:42	15 15:41 (10) 16:03 21 15:25 (3)
5	04:58	05:40	06:33	07:25	17:56 (7) 07:22	15:25 (10) 08:14
	21:46	21:07	20:00	18:47	19 18:15 (7) 16:40	17 15:42 (10) 16:02 21 15:26 (3)
6	04:59	05:41	06:34	07:26	17:56 (6) 07:24	15:24 (10) 08:15
	21:46	21:05	19:57	18:45	18 18:14 (7) 16:39	20 15:44 (10) 16:02 21 15:26 (3)
7	05:00	05:43	06:36	07:28	17:54 (6) 07:26	15:23 (10) 08:16
	21:45	21:03	19:55	18:43	18 18:12 (7) 16:37	21 15:44 (10) 16:02 19 15:26 (3)
8	05:01	05:45	06:38	07:30	17:53 (6) 07:28	15:23 (10) 08:18
	21:44	21:01	19:53	18:40	18 18:11 (7) 16:35	23 15:46 (10) 16:01 18 15:25 (3)
9	05:02	05:46	06:40	07:32	17:53 (6) 07:29	15:23 (10) 08:19
	21:44	20:59	19:50	18:38	16 18:09 (7) 16:33	24 15:47 (10) 16:01 17 15:24 (3)
10	05:03	05:48	06:41	07:34	17:53 (6) 07:31	15:22 (10) 08:20
	21:43	20:57	19:48	18:36	14 18:07 (6) 16:32	25 15:47 (10) 16:01 17 15:24 (3)
11	05:04	05:50	06:43	07:35	17:53 (6) 07:33	15:22 (10) 08:21
	21:42	20:55	19:45	18:33	12 18:05 (6) 16:30	25 15:47 (10) 16:00 15 15:24 (3)
12	05:05	05:52	06:45	07:37	17:53 (6) 07:35	15:22 (10) 08:22
	21:41	20:53	19:43	18:31	9 18:02 (6) 16:28	25 15:47 (10) 16:00 15 15:24 (3)
13	05:06	05:53	06:46	07:39	17:55 (6) 07:37	15:22 (10) 08:23
	21:40	20:51	19:41	18:29	5 18:00 (6) 16:27	25 15:47 (10) 16:00 14 15:24 (3)
14	05:07	05:55	06:48	07:41	17:56 (6) 07:39	15:23 (10) 08:24
	21:39	20:49	19:38	18:26	1 17:57 (6) 16:25	24 15:47 (10) 16:00 13 15:24 (3)
15	05:08	05:57	06:50	07:43	17:57 (6) 07:41	15:23 (10) 08:25
	21:38	20:47	19:36	18:24	16 17:58 (6) 16:24	24 15:47 (10) 16:00 13 15:24 (3)
16	05:10	05:58	06:52	07:44	17:58 (6) 07:42	15:23 (10) 08:26
	21:37	20:45	19:33	18:22	18 17:59 (6) 16:22	24 15:47 (10) 16:00 12 15:24 (3)
17	05:11	06:00	06:53	07:46	17:19 (9) 07:44	15:24 (10) 08:27
	21:36	20:43	19:31	18:20	4 17:23 (9) 16:21	23 15:47 (10) 16:00 11 15:23 (3)
18	05:12	06:02	06:55	07:48	17:15 (9) 07:46	15:25 (10) 08:28
	21:35	20:41	19:28	18:17	11 17:26 (9) 16:19	21 15:46 (10) 16:01 10 15:23 (3)
19	05:14	06:04	06:57	07:50	17:13 (9) 07:48	15:08 (3) 08:28
	21:34	20:39	19:26	18:15	15 17:28 (9) 16:18	24 15:45 (10) 16:01 11 15:24 (3)
20	05:15	06:05	06:59	07:52	17:12 (9) 07:50	15:06 (3) 08:29
	21:32	20:36	19:24	18:13	17 17:29 (9) 16:17	26 15:43 (10) 16:01 11 15:24 (3)
21	05:16	06:07	07:00	07:54	17:11 (9) 07:51	15:05 (3) 08:30
	21:31	20:34	19:21	18:11	18 17:29 (9) 16:15	27 15:42 (10) 16:02 11 15:25 (3)
22	05:18	06:09	07:02	18:33 (5) 07:56	17:11 (9) 07:53	15:04 (3) 08:30
	21:30	20:32	19:19	6 18:39 (5) 18:09	19 17:30 (9) 16:14	27 15:41 (10) 16:02 11 15:26 (3)
23	05:19	06:10	07:04	18:31 (5) 07:57	17:11 (9) 07:55	15:03 (3) 08:31
	21:28	20:30	19:16	10 18:41 (5) 18:06	20 17:31 (8) 16:13	24 15:38 (10) 16:03 11 15:26 (3)
24	05:21	06:12	07:05	18:29 (5) 07:59	17:10 (9) 07:57	15:02 (3) 08:31
	21:27	20:28	19:14	12 18:41 (5) 18:04	21 17:31 (8) 16:12	23 15:37 (10) 16:03 11 15:26 (3)
25	05:22	06:14	07:07	18:28 (5) 07:01	16:11 (9) 07:58	15:02 (3) 08:31
	21:25	20:25	19:11	13 18:41 (5) 17:02	20 16:31 (8) 16:11	19 15:21 (3) 16:04 11 15:27 (3)
26	05:24	06:16	07:09	18:28 (5) 07:03	16:11 (9) 08:00	15:02 (3) 08:32
	21:24	20:23	19:09	13 18:41 (5) 17:00	19 16:30 (8) 16:10	20 15:22 (3) 16:04 11 15:28 (3)
27	05:25	06:17	07:11	18:28 (5) 07:05	16:12 (9) 08:02	15:03 (3) 08:32
	21:22	20:21	19:07	11 18:39 (5) 16:58	16 16:28 (9) 16:09	20 15:23 (3) 16:05 11 15:28 (3)
28	05:27	06:19	07:12	18:27 (5) 07:07	16:13 (9) 08:03	15:03 (3) 08:32
	21:21	20:18	19:04	9 18:36 (5) 16:56	13 16:26 (9) 16:08	21 15:24 (3) 16:06 12 15:29 (3)
29	05:28	06:21	07:14	18:02 (7) 07:09	16:14 (9) 08:05	15:03 (3) 08:32
	21:19	20:16	19:02	16 18:34 (5) 16:54	10 16:24 (9) 16:07	21 15:24 (3) 16:07 13 15:30 (3)
30	05:30	06:22	07:16	18:00 (7) 07:11	16:17 (9) 08:06	15:03 (3) 08:32
	21:17	20:14	18:59	15 18:31 (5) 16:52	4 16:21 (9) 16:06	21 15:24 (3) 16:08 13 15:31 (3)
31	05:32	06:24	07:18	07:12		08:32
	21:16	20:11	16:50			16:09 14 15:32 (3)
Sonnenscheinstunden	509	458	382	330	262	237
astr. max.mögl. Beschattung			105	408	619	452
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19	0.14
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.72	0.70	0.69
Gesamte Reduktion			0.24	0.20	0.13	0.09
Met. wahrsch. Beschattung			25	82	79	41

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: S - IO19

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:16 (3) 08:03	15:50 (10) 07:07	17:19 (6) 06:54	05:46	04:58	
16:10	17 15:33 (3) 17:00	24 16:14 (10) 17:54	8 17:27 (6) 19:51	20:45	21:34	
2 08:32	15:17 (3) 08:02	15:51 (10) 07:05	17:18 (6) 06:51	05:44	04:57	
16:11	18 15:35 (3) 17:02	23 16:14 (10) 17:56	11 17:29 (6) 19:53	20:47	21:35	
3 08:32	15:17 (3) 08:00	15:51 (10) 07:03	17:18 (6) 06:49	05:42	04:57	
16:12	19 15:36 (3) 17:04	22 16:13 (10) 17:58	14 17:32 (6) 19:55	20:49	21:36	
4 08:32	15:17 (3) 07:58	15:52 (10) 07:01	17:17 (6) 06:47	05:40	04:56	
16:14	20 15:37 (3) 17:06	21 16:13 (10) 18:00	16 17:33 (7) 19:57	20:50	21:37	
5 08:31	15:18 (3) 07:57	15:53 (10) 06:58	17:17 (6) 06:44	05:38	04:55	
16:15	21 15:39 (3) 17:08	19 16:12 (10) 18:02	18 17:35 (7) 19:58	20:52	21:38	
6 08:31	15:18 (3) 07:55	15:55 (10) 06:56	17:18 (6) 06:42	05:36	04:54	
16:16	21 15:39 (3) 17:10	15 16:10 (10) 18:04	18 17:36 (7) 20:00	20:54	21:39	
7 08:31	15:19 (3) 07:53	15:57 (10) 06:54	17:18 (6) 06:40	05:35	04:54	
16:17	21 15:40 (3) 17:12	11 16:08 (10) 18:06	18 17:36 (7) 20:02	20:56	21:40	
8 08:30	15:19 (3) 07:51	16:01 (10) 06:51	17:18 (7) 06:37	05:33	04:53	
16:19	21 15:40 (3) 17:14	3 16:04 (10) 18:08	19 17:37 (7) 20:04	20:57	21:41	
9 08:30	15:19 (3) 07:49	06:49	17:18 (7) 06:35	05:31	04:53	
16:20	21 15:40 (3) 17:16	18:09	19 17:37 (7) 20:06	20:59	21:42	
10 08:29	15:19 (3) 07:47	06:47	17:17 (7) 06:33	05:29	04:52	
16:22	21 15:40 (3) 17:18	18:11	19 17:36 (7) 20:07	21:01	21:43	
11 08:28	15:20 (3) 07:45	16:48 (9) 06:44	17:18 (7) 06:30	05:27	04:52	
16:23	22 15:42 (3) 17:20	1 16:49 (9) 18:13	18 17:36 (7) 20:09	21:02	21:43	
12 08:28	15:21 (3) 07:44	16:44 (9) 06:42	17:18 (7) 06:28	05:25	04:51	
16:25	21 15:42 (3) 17:22	8 16:52 (9) 18:15	16 17:34 (7) 20:11	21:04	21:44	
13 08:27	15:21 (3) 07:42	16:42 (9) 06:39	17:19 (7) 06:26	05:24	04:51	
16:26	21 15:42 (3) 17:24	12 16:54 (9) 18:17	15 17:51 (5) 20:13	21:06	21:45	
14 08:26	15:22 (3) 07:40	16:41 (9) 06:37	17:21 (7) 06:23	05:22	04:51	
16:28	20 15:42 (3) 17:26	16 16:57 (9) 18:19	16 17:53 (5) 20:15	21:07	21:46	
15 08:25	15:23 (3) 07:38	16:40 (9) 06:35	17:46 (5) 06:21	05:20	04:50	
16:29	19 15:42 (3) 17:27	19 16:59 (8) 18:21	8 17:54 (5) 20:16	21:09	21:46	
16 08:24	15:23 (3) 07:36	16:40 (9) 06:32	17:45 (5) 06:19	05:19	04:50	
16:31	20 15:43 (3) 17:29	21 17:01 (8) 18:22	12 17:57 (5) 20:18	21:11	21:47	
17 08:23	15:23 (3) 07:33	16:40 (9) 06:30	17:44 (5) 06:16	05:17	04:50	
16:33	24 15:58 (10) 17:31	21 17:01 (8) 18:24	14 17:58 (5) 20:20	21:12	21:47	
18 08:22	15:25 (3) 07:31	16:39 (9) 06:28	17:45 (5) 06:14	05:16	04:50	
16:34	25 16:00 (10) 17:33	21 17:00 (8) 18:26	13 17:58 (5) 20:22	21:14	21:48	
19 08:21	15:26 (3) 07:29	16:39 (9) 06:25	17:44 (5) 06:12	05:14	04:50	
16:36	27 16:02 (10) 17:35	20 16:59 (8) 18:28	13 17:57 (5) 20:24	21:15	21:48	
20 08:20	15:27 (3) 07:27	16:40 (9) 06:23	17:46 (5) 06:10	05:13	04:50	
16:38	28 16:05 (10) 17:37	18 16:58 (9) 18:30	10 17:56 (5) 20:25	21:17	21:48	
21 08:19	15:28 (3) 07:25	16:41 (9) 06:20	17:48 (5) 06:07	05:11	04:50	
16:40	28 16:06 (10) 17:39	17 16:58 (9) 18:31	6 17:54 (5) 20:27	21:18	21:48	
22 08:18	15:31 (3) 07:23	16:42 (9) 06:18	06:05	05:10	04:51	
16:41	25 16:08 (10) 17:41	15 16:57 (9) 18:33	20:29	21:20	21:49	
23 08:17	15:49 (10) 07:21	16:42 (9) 06:15	06:03	05:09	04:51	
16:43	21 16:10 (10) 17:43	13 16:55 (9) 18:35	20:31	21:21	21:49	
24 08:15	15:49 (10) 07:19	16:45 (9) 06:13	06:01	05:07	04:51	
16:45	23 16:12 (10) 17:45	7 16:52 (9) 18:37	20:33	21:23	21:49	
25 08:14	15:48 (10) 07:16	06:11	05:59	05:06	04:51	
16:47	24 16:12 (10) 17:47	18:39	20:34	21:24	21:49	
26 08:12	15:49 (10) 07:14	06:08	05:57	05:05	04:52	
16:49	24 16:13 (10) 17:49	18:40	20:36	21:26	21:49	
27 08:11	15:48 (10) 07:12	06:06	05:55	05:04	04:52	
16:51	25 16:13 (10) 17:51	18:42	20:38	21:27	21:49	
28 08:10	15:49 (10) 07:10	17:21 (6) 06:03	05:52	05:02	04:53	
16:53	25 16:14 (10) 17:53	5 17:26 (6) 18:44	20:40	21:28	21:49	
29 08:08	15:49 (10)	07:01	05:50	05:01	04:53	
16:54	25 16:14 (10)	19:46	20:42	21:30	21:49	
30 08:07	15:49 (10)	06:59	05:48	05:00	04:54	
16:56	25 16:14 (10)	19:48	20:43	21:31	21:48	
31 08:05	15:49 (10)	06:56	05:49	05:01	04:54	
16:58	25 16:14 (10)	19:49	20:44	21:32	21:48	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	697	352	301			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	78	57	57			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: S - IO19

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember	
1	04:55	05:33	06:26	07:18	17:58 (7) 07:14	08:08	
	21:48	21:14	20:09	18:57	16 18:14 (7) 16:48	16:05 22 15:24 (3)	
2	04:55	05:35	06:28	07:19	17:56 (7) 07:16	08:09 15:02 (3)	
	21:48	21:12	20:07	18:55	18 18:14 (7) 16:46	16:04 22 15:24 (3)	
3	04:56	05:37	06:29	07:21	17:55 (7) 07:18	15:30 (10) 08:11	
	21:47	21:11	20:04	18:52	19 18:14 (7) 16:44	5 15:35 (10) 16:04 21 15:24 (3)	
4	04:57	05:38	06:31	07:23	17:55 (7) 07:20	15:26 (10) 08:12	
	21:47	21:09	20:02	18:50	19 18:14 (7) 16:42	12 15:38 (10) 16:03 21 15:24 (3)	
5	04:58	05:40	06:33	07:25	17:55 (7) 07:22	15:24 (10) 08:14	
	21:46	21:07	20:00	18:47	19 18:14 (7) 16:40	16 15:40 (10) 16:02 21 15:25 (3)	
6	04:59	05:41	06:34	07:26	17:55 (7) 07:24	15:23 (10) 08:15	
	21:46	21:05	19:57	18:45	19 18:14 (7) 16:39	19 15:42 (10) 16:02 21 15:25 (3)	
7	05:00	05:43	06:36	07:28	17:53 (6) 07:26	15:22 (10) 08:16	
	21:45	21:03	19:55	18:43	19 18:12 (7) 16:37	21 15:43 (10) 16:02 21 15:26 (3)	
8	05:01	05:45	06:38	07:30	17:53 (6) 07:28	15:22 (10) 08:18	
	21:44	21:01	19:53	18:40	18 18:11 (7) 16:35	22 15:44 (10) 16:01 20 15:25 (3)	
9	05:02	05:46	06:40	07:32	17:52 (6) 07:29	15:22 (10) 08:19	
	21:44	20:59	19:50	18:38	17 18:09 (7) 16:33	23 15:45 (10) 16:01 19 15:24 (3)	
10	05:03	05:48	06:41	07:34	17:52 (6) 07:31	15:21 (10) 08:20	
	21:43	20:57	19:48	18:36	15 18:07 (6) 16:32	24 15:45 (10) 16:01 18 15:24 (3)	
11	05:04	05:50	06:43	07:35	17:52 (6) 07:33	15:21 (10) 08:21	
	21:42	20:55	19:45	18:33	13 18:05 (6) 16:30	25 15:46 (10) 16:00 17 15:24 (3)	
12	05:05	05:52	06:45	07:37	17:53 (6) 07:35	15:21 (10) 08:22	
	21:41	20:53	19:43	18:31	9 18:02 (6) 16:28	25 15:46 (10) 16:00 16 15:24 (3)	
13	05:06	05:53	06:46	07:39	17:53 (6) 07:37	15:21 (10) 08:23	
	21:40	20:51	19:41	18:29	7 18:00 (6) 16:27	25 15:46 (10) 16:00 16 15:24 (3)	
14	05:07	05:55	06:48	07:41	17:54 (6) 07:39	15:21 (10) 08:24	
	21:39	20:49	19:38	18:26	3 17:57 (6) 16:25	25 15:46 (10) 16:00 15 15:24 (3)	
15	05:08	05:57	06:50	07:43	17:54 (6) 07:41	15:21 (10) 08:25	
	21:38	20:47	19:36	18:24	16:24	25 15:46 (10) 16:00 15 15:24 (3)	
16	05:10	05:58	06:52	07:44	17:54 (6) 07:42	15:22 (10) 08:26	
	21:37	20:45	19:33	18:22	16:22	24 15:46 (10) 16:00 14 15:24 (3)	
17	05:11	06:00	06:53	07:46	17:54 (6) 07:44	15:22 (10) 08:27	
	21:36	20:43	19:31	18:20	16:21	24 15:46 (10) 16:00 13 15:23 (3)	
18	05:12	06:02	06:55	07:48	17:15 (9) 07:46	15:23 (10) 08:28	
	21:35	20:41	19:28	18:17	9 17:24 (9) 16:19	23 15:46 (10) 16:01 12 15:23 (3)	
19	05:14	06:04	06:57	07:50	17:13 (9) 07:48	15:24 (10) 08:28	
	21:34	20:39	19:26	18:15	13 17:26 (9) 16:18	21 15:45 (10) 16:01 12 15:24 (3)	
20	05:15	06:05	06:59	07:52	17:12 (9) 07:50	15:06 (3) 08:29	
	21:32	20:36	19:24	18:13	15 17:27 (9) 16:17	25 15:43 (10) 16:01 12 15:24 (3)	
21	05:16	06:07	07:00	07:54	17:11 (9) 07:51	15:04 (3) 08:30	
	21:31	20:34	19:21	18:11	17 17:28 (9) 16:15	28 15:42 (10) 16:02 13 15:25 (3)	
22	05:18	06:09	07:02	18:34 (5) 07:56	17:10 (9) 07:53	15:05 (3) 08:30	
	21:30	20:32	19:19	4 18:38 (5) 18:09	19 17:29 (9) 16:14	28 15:41 (10) 16:02 13 15:26 (3)	
23	05:19	06:10	07:04	18:31 (5) 07:57	17:10 (9) 07:55	15:02 (3) 08:31	
	21:28	20:30	19:16	9 18:40 (5) 18:06	20 17:30 (8) 16:13	27 15:38 (10) 16:03 13 15:26 (3)	
24	05:21	06:12	07:05	18:28 (5) 07:59	17:09 (9) 07:57	15:02 (3) 08:31	
	21:27	20:28	19:14	12 18:40 (5) 18:04	21 17:30 (8) 16:12	25 15:37 (10) 16:03 12 15:26 (3)	
25	05:22	06:14	07:07	18:28 (5) 07:01	16:09 (9) 07:58	15:01 (3) 08:31	
	21:25	20:25	19:11	13 18:41 (5) 17:02	21 16:30 (8) 16:11	24 15:36 (10) 16:04 12 15:27 (3)	
26	05:24	06:16	07:09	18:27 (5) 07:03	16:10 (9) 08:00	15:01 (3) 08:32	
	21:24	20:23	19:09	14 18:41 (5) 17:00	20 16:30 (8) 16:10	20 15:21 (3) 16:04 13 15:28 (3)	
27	05:25	06:17	07:11	18:27 (5) 07:05	16:10 (9) 08:02	15:02 (3) 08:32	
	21:22	20:21	19:07	12 18:39 (5) 16:58	18 16:28 (8) 16:09	20 15:22 (3) 16:05 13 15:28 (3)	
28	05:27	06:19	07:12	18:26 (5) 07:07	16:11 (9) 08:03	15:02 (3) 08:32	
	21:21	20:18	19:04	10 18:36 (5) 16:56	15 16:26 (9) 16:08	20 15:22 (3) 16:06 14 15:29 (3)	
29	05:28	06:21	07:14	18:02 (7) 07:09	16:12 (9) 08:05	15:01 (3) 08:32	
	21:19	20:16	19:02	15 18:34 (5) 16:54	12 16:24 (9) 16:07	21 15:22 (3) 16:07 14 15:30 (3)	
30	05:30	06:22	07:16	18:00 (7) 07:11	16:14 (9) 08:06	15:02 (3) 08:32	
	21:17	20:14	18:59	14 18:31 (5) 16:52	7 16:21 (9) 16:06	21 15:23 (3) 16:08 15 15:31 (3)	
31	05:32	06:24	07:18	07:12		08:32	
	21:16	20:11	16:50			16:09	15 15:32 (3)
Sonnenscheinstunden	509	458	382	330	262	237	
astr. max.mögl. Beschattung			103	418	618	495	
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19	0.14	
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96	
Reduktion Windrichtung			0.72	0.72	0.70	0.69	
Gesamte Reduktion			0.24	0.20	0.13	0.09	
Met. wahrsch. Beschattung			25	84	79	45	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: T - IO20

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:07 (3) 08:03	15:44 (10) 07:07	17:11 (6) 06:54	05:46	04:58	
16:10	22 15:29 (3) 17:00	18 16:02 (10) 17:54	16 17:27 (6) 19:51	20:45	21:34	
2 08:32	15:08 (3) 08:02	15:46 (10) 07:05	17:11 (6) 06:51	05:44	04:57	
16:11	22 15:30 (3) 17:02	14 16:00 (10) 17:56	18 17:29 (7) 19:53	20:47	21:35	
3 08:32	15:09 (3) 08:00	15:48 (10) 07:03	17:12 (6) 06:49	05:42	04:57	
16:12	21 15:30 (3) 17:04	10 15:58 (10) 17:58	18 17:30 (7) 19:55	20:49	21:36	
4 08:32	15:09 (3) 07:58	15:09 (3) 07:58	17:01	17:11 (7) 06:47	05:40	04:56
16:14	21 15:30 (3) 17:06	18:00	19 17:30 (7) 19:57	20:50	21:37	
5 08:31	15:10 (3) 07:57	06:58	17:11 (7) 06:44	05:38	04:55	
16:15	21 15:31 (3) 17:08	18:02	19 17:30 (7) 19:58	20:52	21:38	
6 08:31	15:10 (3) 07:55	06:56	17:11 (7) 06:42	05:36	04:54	
16:16	21 15:31 (3) 17:10	18:04	19 17:30 (7) 20:00	20:54	21:39	
7 08:31	15:11 (3) 07:53	06:54	17:10 (7) 06:40	05:35	04:54	
16:17	21 15:32 (3) 17:12	18:06	19 17:29 (7) 20:02	20:56	21:40	
8 08:30	15:11 (3) 07:51	16:36 (9) 06:51	17:11 (7) 06:37	05:33	04:53	
16:19	21 15:32 (3) 17:14	8 16:44 (9) 18:08	18 17:29 (7) 20:04	20:57	21:41	
9 08:30	15:12 (3) 07:49	16:34 (9) 06:49	17:12 (7) 06:35	05:31	04:53	
16:20	22 15:44 (10) 17:16	12 16:46 (9) 18:09	16 17:28 (7) 20:06	20:59	21:42	
10 08:29	15:12 (3) 07:47	16:33 (9) 06:47	17:12 (7) 06:33	05:29	04:52	
16:22	25 15:46 (10) 17:18	15 16:48 (9) 18:11	14 17:26 (7) 20:07	21:01	21:43	
11 08:28	15:14 (3) 07:45	16:32 (9) 06:44	17:14 (7) 06:30	05:27	04:52	
16:23	26 15:48 (10) 17:20	18 16:50 (8) 18:13	12 17:47 (5) 20:09	21:02	21:43	
12 08:28	15:14 (3) 07:44	16:31 (9) 06:42	17:42 (5) 06:28	05:25	04:51	
16:25	29 15:50 (10) 17:22	21 16:52 (8) 18:15	6 17:48 (5) 20:11	21:04	21:44	
13 08:27	15:15 (3) 07:42	16:31 (9) 06:39	17:41 (5) 06:26	05:24	04:51	
16:26	29 15:51 (10) 17:24	23 16:54 (8) 18:17	10 17:51 (5) 20:13	21:06	21:45	
14 08:26	15:16 (3) 07:40	16:31 (9) 06:37	17:41 (5) 06:23	05:22	04:51	
16:28	30 15:53 (10) 17:26	23 16:54 (8) 18:19	12 17:53 (5) 20:15	21:07	21:46	
15 08:25	15:17 (3) 07:38	16:31 (9) 06:35	17:40 (5) 06:21	05:20	04:50	
16:29	32 15:55 (10) 17:27	23 16:54 (8) 18:21	14 17:54 (5) 20:16	21:09	21:46	
16 08:24	15:18 (3) 07:36	16:32 (9) 06:32	17:40 (5) 06:19	05:19	04:50	
16:31	31 15:57 (10) 17:29	21 16:53 (8) 18:22	14 17:54 (5) 20:18	21:11	21:47	
17 08:23	15:20 (3) 07:33	16:32 (9) 06:30	17:40 (5) 06:16	05:17	04:50	
16:33	30 15:58 (10) 17:31	20 16:52 (8) 18:24	13 17:53 (5) 20:20	21:12	21:47	
18 08:22	15:23 (3) 07:31	16:32 (9) 06:28	17:41 (5) 06:14	05:16	04:50	
16:34	28 16:00 (10) 17:33	18 16:50 (8) 18:26	10 17:51 (5) 20:22	21:14	21:48	
19 08:21	15:38 (10) 07:29	16:34 (9) 06:25	17:43 (5) 06:12	05:14	04:50	
16:36	23 16:01 (10) 17:35	14 16:48 (9) 18:28	5 17:48 (5) 20:24	21:15	21:48	
20 08:20	15:38 (10) 07:27	16:36 (9) 06:23	06:10	05:13	04:50	
16:38	24 16:02 (10) 17:37	10 16:46 (9) 18:30	20:25	21:17	21:48	
21 08:19	15:37 (10) 07:25	16:40 (9) 06:20	06:07	05:11	04:50	
16:40	25 16:02 (10) 17:39	2 16:42 (9) 06:20	20:27	21:19	21:49	
22 08:18	15:38 (10) 07:23	06:18	06:05	05:10	04:51	
16:41	25 16:03 (10) 17:41	18:33	20:29	21:20	21:49	
23 08:17	15:38 (10) 07:21	06:15	06:03	05:09	04:51	
16:43	25 16:03 (10) 17:43	18:35	20:31	21:21	21:49	
24 08:15	15:38 (10) 07:19	06:13	06:01	05:07	04:51	
16:45	26 16:04 (10) 17:45	18:37	20:33	21:23	21:49	
25 08:14	15:38 (10) 07:16	17:16 (6) 06:11	05:59	05:06	04:51	
16:47	25 16:03 (10) 17:47	4 17:20 (6) 18:39	20:34	21:24	21:49	
26 08:12	15:39 (10) 07:14	17:14 (6) 06:08	05:57	05:05	04:52	
16:49	25 16:04 (10) 17:49	7 17:21 (6) 18:40	20:36	21:26	21:49	
27 08:11	15:39 (10) 07:12	17:13 (6) 06:06	05:55	05:04	04:52	
16:51	25 16:04 (10) 17:51	10 17:23 (6) 18:42	20:38	21:27	21:49	
28 08:10	15:40 (10) 07:10	17:12 (6) 06:03	05:52	05:02	04:53	
16:53	24 16:04 (10) 17:53	14 17:26 (6) 18:44	20:40	21:28	21:49	
29 08:08	15:41 (10)	07:01	05:50	05:01	04:53	
16:54	22 16:03 (10)	19:46	20:42	21:30	21:49	
30 08:07	15:41 (10)	06:59	05:48	05:00	04:54	
16:56	22 16:03 (10)	19:48	20:43	21:31	21:48	
31 08:05	15:42 (10)	06:56	05:49	05:01	04:54	
16:58	20 16:02 (10)	19:49	20:44	21:32	21:48	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	763	305	272			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	84	50	52			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: T - IO20

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember	
1	04:55	05:33	06:26	07:18	8 18:21 (5) 07:14	16:03 (9) 08:08	
	21:48	21:14	20:09	18:57	18:29 (5) 16:48	16:17 (9) 16:05	
2	04:55	05:35	06:28	07:19	17:54 (7) 07:16	16:04 (9) 08:09	
	21:48	21:12	20:07	18:55	18:26 (5) 16:46	16:15 (9) 16:04	
3	04:56	05:37	06:29	07:21	17:51 (7) 07:18	16:06 (9) 08:11	
	21:47	21:11	20:04	18:52	18:03 (7) 16:44	16:13 (9) 16:04	
4	04:57	05:38	06:31	07:23	17:49 (7) 07:20	16:12	14:55 (3)
	21:47	21:09	20:02	18:50	18:05 (7) 16:42	15:15 (10) 08:20	
5	04:58	05:40	06:33	07:25	17:48 (7) 07:22	16:11	14:56 (3)
	21:46	21:07	20:00	18:47	18:06 (7) 16:40	16:12	15:17 (3)
6	04:59	05:41	06:34	07:26	17:48 (7) 07:24	16:11	14:56 (3)
	21:46	21:05	19:57	18:45	18:06 (7) 16:39	16:12	15:17 (3)
7	05:00	05:43	06:36	07:28	17:46 (7) 07:26	15:22 (10) 08:16	14:57 (3)
	21:45	21:03	19:55	18:43	18:05 (7) 16:37	15:25 (10) 16:02	15:18 (3)
8	05:01	05:45	06:38	07:30	17:46 (7) 07:28	15:18 (10) 08:18	14:57 (3)
	21:44	21:01	19:53	18:40	18:05 (7) 16:35	15:29 (10) 16:01	15:18 (3)
9	05:02	05:46	06:40	07:32	17:46 (7) 07:29	15:16 (10) 08:19	14:57 (3)
	21:44	20:59	19:50	18:38	18:05 (7) 16:33	15:31 (10) 16:01	15:18 (3)
10	05:03	05:48	06:41	07:34	17:46 (7) 07:31	15:15 (10) 08:20	14:57 (3)
	21:43	20:57	19:48	18:36	18:04 (7) 16:32	15:33 (10) 16:01	15:19 (3)
11	05:04	05:50	06:43	07:35	17:46 (6) 07:33	15:14 (10) 08:21	14:59 (3)
	21:42	20:55	19:45	18:33	18:04 (7) 16:30	15:34 (10) 16:00	15:20 (3)
12	05:05	05:52	06:45	07:37	17:45 (6) 07:35	15:13 (10) 08:22	14:59 (3)
	21:41	20:53	19:43	18:31	18:02 (7) 16:28	15:35 (10) 16:00	15:20 (3)
13	05:06	05:53	06:46	07:39	17:45 (6) 07:37	15:13 (10) 08:23	14:59 (3)
	21:40	20:51	19:41	18:29	18:00 (6) 16:27	15:35 (10) 16:00	15:21 (3)
14	05:07	05:55	06:48	07:41	17:45 (6) 07:39	15:12 (10) 08:24	15:00 (3)
	21:39	20:49	19:38	18:26	17:57 (6) 16:25	15:36 (10) 16:00	15:21 (3)
15	05:08	05:57	06:50	07:43	17:45 (6) 07:41	15:12 (10) 08:25	15:00 (3)
	21:38	20:47	19:36	18:24	17:55 (6) 16:24	15:37 (10) 16:00	15:21 (3)
16	05:10	05:58	06:52	07:44	17:46 (6) 07:42	15:12 (10) 08:26	15:01 (3)
	21:37	20:45	19:33	18:22	17:52 (6) 16:22	15:37 (10) 16:00	15:22 (3)
17	05:11	06:00	06:53	07:46	17:48 (6) 07:44	15:12 (10) 08:27	15:01 (3)
	21:36	20:43	19:31	18:20	17:50 (6) 16:21	15:37 (10) 16:00	15:22 (3)
18	05:12	06:02	06:55	07:48	17:48	15:12 (10) 08:28	15:01 (3)
	21:35	20:41	19:28	18:17	16:19	15:38 (10) 16:01	15:22 (3)
19	05:14	06:04	06:57	07:50	17:48	15:13 (10) 08:28	15:02 (3)
	21:34	20:39	19:26	18:15	16:18	15:38 (10) 16:01	15:23 (3)
20	05:15	06:05	06:59	07:52	17:50	15:13 (10) 08:29	15:02 (3)
	21:32	20:36	19:24	18:13	16:17	15:38 (10) 16:01	15:23 (3)
21	05:16	06:07	07:00	07:54	17:08 (9) 07:51	15:13 (10) 08:30	15:03 (3)
	21:31	20:34	19:21	18:11	17:15 (9) 16:15	15:38 (10) 16:02	15:24 (3)
22	05:18	06:09	07:02	07:56	17:05 (9) 07:53	15:14 (10) 08:30	15:04 (3)
	21:30	20:32	19:19	18:09	17:17 (9) 16:14	15:38 (10) 16:02	15:25 (3)
23	05:19	06:10	07:04	07:57	17:04 (9) 07:55	15:14 (10) 08:31	15:04 (3)
	21:28	20:30	19:16	18:06	17:18 (9) 16:13	15:37 (10) 16:03	15:25 (3)
24	05:21	06:12	07:05	07:59	17:02 (9) 07:57	15:00 (3) 08:31	15:04 (3)
	21:27	20:28	19:14	18:04	17:21 (8) 16:12	15:37 (10) 16:03	15:25 (3)
25	05:22	06:14	07:07	07:01	16:02 (9) 07:58	14:58 (3) 08:31	15:05 (3)
	21:25	20:25	19:11	18:34 (5) 17:02	16:22 (8) 16:11	15:36 (10) 16:04	15:26 (3)
26	05:24	06:16	07:09	18:23 (5) 07:03	16:01 (9) 08:00	14:57 (3) 08:32	15:05 (3)
	21:24	20:23	19:09	18:35 (5) 17:00	16:23 (8) 16:10	15:35 (10) 16:04	15:26 (3)
27	05:25	06:17	07:11	18:22 (5) 07:05	16:01 (9) 08:02	14:57 (3) 08:32	15:06 (3)
	21:22	20:21	19:07	18:36 (5) 16:58	16:23 (8) 16:09	15:34 (10) 16:05	15:27 (3)
28	05:27	06:19	07:12	18:21 (5) 07:07	16:01 (9) 08:03	14:56 (3) 08:32	15:06 (3)
	21:21	20:18	19:04	18:35 (5) 16:56	16:24 (8) 16:08	15:33 (10) 16:06	15:27 (3)
29	05:28	06:21	07:14	18:21 (5) 07:09	16:01 (9) 08:05	14:55 (3) 08:32	15:07 (3)
	21:19	20:16	19:02	18:34 (5) 16:54	16:23 (8) 16:07	15:32 (10) 16:07	15:28 (3)
30	05:30	06:22	07:16	18:21 (5) 07:11	16:01 (9) 08:06	14:56 (3) 08:32	15:07 (3)
	21:17	20:14	18:59	18:31 (5) 16:52	16:21 (8) 16:06	15:31 (10) 16:08	15:28 (3)
31	05:32	06:24	07:18	07:12	16:02 (9) 08:07	14:56 (3) 08:32	15:08 (3)
	21:16	20:11	18:57	16:50	16:19 (9) 08:08	16:09	15:29 (3)
Sonnenscheinstunden	509	458	382	330	262	237	
astr. max. mögl. Beschattung			72	436	597	663	
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19	0.14	
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96	
Reduktion Windrichtung			0.72	0.72	0.69	0.68	
Gesamte Reduktion			0.24	0.20	0.13	0.09	
Met. wahrsch. Beschattung			17	88	76	60	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: U - IO21

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:19 (3) 08:03	15:52 (10) 07:07	17:18 (6) 06:54	05:46	04:58	
16:10	14 15:33 (3) 17:00	24 16:16 (10) 17:54	9 17:27 (6) 19:51	20:45	21:34	
2 08:32	15:19 (3) 08:02	15:53 (10) 07:05	17:17 (6) 06:51	05:44	04:57	
16:11	16 15:35 (3) 17:02	22 16:15 (10) 17:56	12 17:29 (6) 19:53	20:47	21:35	
3 08:32	15:20 (3) 08:00	15:53 (10) 07:03	17:17 (6) 06:49	05:42	04:57	
16:12	16 15:36 (3) 17:04	22 16:15 (10) 17:58	15 17:32 (6) 19:55	20:49	21:36	
4 08:32	15:19 (3) 07:58	15:54 (10) 07:01	17:16 (6) 06:47	05:40	04:56	
16:14	18 15:37 (3) 17:06	20 16:14 (10) 18:00	17 17:33 (7) 19:57	20:50	21:37	
5 08:31	15:20 (3) 07:57	15:55 (10) 06:58	17:17 (6) 06:44	05:38	04:55	
16:15	19 15:39 (3) 17:08	18 16:13 (10) 18:02	18 17:35 (7) 19:58	20:52	21:38	
6 08:31	15:20 (3) 07:55	15:57 (10) 06:56	17:18 (6) 06:42	05:36	04:54	
16:16	20 15:40 (3) 17:10	14 16:11 (10) 18:04	18 17:36 (7) 20:00	20:54	21:39	
7 08:31	15:21 (3) 07:53	15:59 (10) 06:54	17:17 (7) 06:40	05:35	04:54	
16:17	20 15:41 (3) 17:12	10 16:09 (10) 18:06	18 17:35 (7) 20:02	20:56	21:40	
8 08:30	15:21 (3) 07:51	06:51	17:17 (7) 06:37	05:33	04:53	
16:19	21 15:42 (3) 17:14	18:08	19 17:36 (7) 20:04	20:57	21:41	
9 08:30	15:21 (3) 07:49	06:49	17:17 (7) 06:35	05:31	04:53	
16:20	21 15:42 (3) 17:16	18:09	19 17:36 (7) 20:06	20:59	21:42	
10 08:29	15:21 (3) 07:47	06:47	17:17 (7) 06:33	05:29	04:52	
16:22	21 15:42 (3) 17:18	18:11	18 17:35 (7) 20:07	21:01	21:43	
11 08:28	15:22 (3) 07:45	16:47 (9) 06:44	17:18 (7) 06:30	05:27	04:52	
16:23	21 15:43 (3) 17:20	3 16:50 (9) 18:13	16 17:34 (7) 20:09	21:02	21:43	
12 08:28	15:23 (3) 07:44	16:44 (9) 06:42	17:18 (7) 06:28	05:25	04:51	
16:25	21 15:44 (3) 17:22	8 16:52 (9) 18:15	14 17:32 (7) 20:11	21:04	21:44	
13 08:27	15:23 (3) 07:42	16:42 (9) 06:39	17:20 (7) 06:26	05:24	04:51	
16:26	21 15:44 (3) 17:24	12 16:54 (9) 18:17	15 17:51 (5) 20:13	21:06	21:45	
14 08:26	15:24 (3) 07:40	16:41 (9) 06:37	17:25 (7) 06:23	05:22	04:51	
16:28	20 15:44 (3) 17:26	16 16:57 (9) 18:19	8 17:53 (5) 20:15	21:07	21:46	
15 08:25	15:25 (3) 07:38	16:41 (9) 06:35	17:44 (5) 06:21	05:20	04:50	
16:29	19 15:44 (3) 17:27	18 16:59 (8) 18:21	10 17:54 (5) 20:16	21:09	21:46	
16 08:24	15:25 (3) 07:36	16:40 (9) 06:32	17:44 (5) 06:19	05:19	04:50	
16:31	19 15:44 (3) 17:29	21 17:01 (8) 18:22	13 17:57 (5) 20:18	21:11	21:47	
17 08:23	15:25 (3) 07:33	16:40 (9) 06:30	17:43 (5) 06:16	05:17	04:50	
16:33	20 15:58 (10) 17:31	21 17:01 (8) 18:24	14 17:57 (5) 20:20	21:12	21:47	
18 08:22	15:26 (3) 07:31	16:39 (9) 06:28	17:44 (5) 06:14	05:16	04:50	
16:34	23 16:00 (10) 17:33	20 16:59 (8) 18:26	13 17:57 (5) 20:22	21:14	21:48	
19 08:21	15:28 (3) 07:29	16:40 (9) 06:25	17:44 (5) 06:12	05:14	04:50	
16:36	24 16:02 (10) 17:35	19 16:59 (8) 18:28	11 17:55 (5) 20:24	21:15	21:48	
20 08:20	15:29 (3) 07:27	16:40 (9) 06:23	17:46 (5) 06:10	05:13	04:50	
16:38	26 16:05 (10) 17:37	18 16:58 (9) 18:30	7 17:53 (5) 20:25	21:17	21:48	
21 08:19	15:30 (3) 07:25	16:41 (9) 06:20	06:07	05:11	04:50	
16:40	26 16:06 (10) 17:39	16 16:57 (9) 18:31	20:27	21:18	21:48	
22 08:18	15:32 (3) 07:23	16:43 (9) 06:18	06:05	05:10	04:51	
16:41	25 16:08 (10) 17:41	13 16:56 (9) 18:33	20:29	21:20	21:49	
23 08:17	15:51 (10) 07:21	16:44 (9) 06:15	06:03	05:09	04:51	
16:43	19 16:10 (10) 17:43	10 16:54 (9) 18:35	20:31	21:21	21:49	
24 08:15	15:51 (10) 07:19	06:13	06:01	05:07	04:51	
16:45	21 16:12 (10) 17:45	18:37	20:33	21:23	21:49	
25 08:14	15:50 (10) 07:16	06:11	05:59	05:06	04:51	
16:47	23 16:13 (10) 17:47	18:39	20:34	21:24	21:49	
26 08:12	15:51 (10) 07:14	06:08	05:57	05:05	04:52	
16:49	23 16:14 (10) 17:49	18:40	20:36	21:26	21:49	
27 08:11	15:50 (10) 07:12	17:22 (6) 06:06	05:55	05:04	04:52	
16:51	24 16:14 (10) 17:51	1 17:23 (6) 18:42	20:38	21:27	21:49	
28 08:10	15:51 (10) 07:10	17:20 (6) 06:03	05:52	05:02	04:53	
16:53	24 16:15 (10) 17:53	6 17:26 (6) 18:44	20:40	21:28	21:49	
29 08:08	15:51 (10) 07:01	07:01	05:50	05:01	04:53	
16:54	24 16:15 (10) 19:46	19:46	20:42	21:30	21:49	
30 08:07	15:51 (10) 06:59	06:59	05:48	05:00	04:54	
16:56	24 16:15 (10) 19:48	19:48	20:43	21:31	21:48	
31 08:05	15:51 (10) 06:56	06:56	05:49	04:59	04:54	
16:58	24 16:15 (10) 19:49	19:49	20:43	21:32	21:48	
Sonnenscheinstunden	253	275	367	419	491	506
astr. max.mögl. Beschattung	657	332	284			
Red. Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met. wahrsch. Beschattung	73	54	54			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: U - IO21

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember	
1	04:55	05:33	06:26	07:18	17:59 (7) 07:14	08:08	
	21:48	21:14	20:09	18:57	18:29 (5) 16:48	16:05 20	
2	04:55	05:35	06:28	07:19	17:56 (7) 07:16	08:09	
	21:48	21:12	20:07	18:55	18:12 (7) 16:46	16:04 21	
3	04:56	05:37	06:29	07:21	17:55 (7) 07:18	15:32 (10) 08:11	
	21:47	21:11	20:04	18:52	18:12 (7) 16:44	15:36 (10) 16:04 21	
4	04:57	05:38	06:31	07:23	17:55 (7) 07:20	15:28 (10) 08:12	
	21:47	21:09	20:02	18:50	18:13 (7) 16:42	15:40 (10) 16:03 21	
5	04:58	05:40	06:33	07:25	17:54 (7) 07:22	15:26 (10) 08:14	
	21:46	21:07	20:00	18:47	18:13 (7) 16:40	15:41 (10) 16:02 21	
6	04:59	05:41	06:34	07:26	17:54 (7) 07:24	15:25 (10) 08:15	
	21:46	21:05	19:57	18:45	18:13 (7) 16:39	15:43 (10) 16:02 20	
7	05:00	05:43	06:36	07:28	17:53 (7) 07:26	15:24 (10) 08:16	
	21:45	21:03	19:55	18:43	18:11 (7) 16:37	15:44 (10) 16:01 19	
8	05:01	05:45	06:38	07:30	17:52 (6) 07:28	15:24 (10) 08:18	
	21:44	21:01	19:53	18:40	18:10 (7) 16:35	15:46 (10) 16:01 17	
9	05:02	05:46	06:40	07:32	17:52 (6) 07:29	15:23 (10) 08:19	
	21:44	20:59	19:50	18:38	18:09 (7) 16:33	15:46 (10) 16:01 16	
10	05:03	05:48	06:41	07:34	17:51 (6) 07:31	15:23 (10) 08:20	
	21:43	20:57	19:48	18:36	18:07 (7) 16:32	15:47 (10) 16:01 16	
11	05:04	05:50	06:43	07:35	17:51 (6) 07:33	15:23 (10) 08:21	
	21:42	20:55	19:45	18:33	18:05 (6) 16:30	15:47 (10) 16:00 14	
12	05:05	05:52	06:45	07:37	17:52 (6) 07:35	15:23 (10) 08:22	
	21:41	20:53	19:43	18:31	18:02 (6) 16:28	15:47 (10) 16:00 14	
13	05:06	05:53	06:46	07:39	17:52 (6) 07:37	15:23 (10) 08:23	
	21:40	20:51	19:41	18:29	18:00 (6) 16:27	15:47 (10) 16:00 13	
14	05:07	05:55	06:48	07:41	17:53 (6) 07:39	15:23 (10) 08:24	
	21:39	20:49	19:38	18:26	17:57 (6) 16:25	15:47 (10) 16:00 13	
15	05:08	05:57	06:50	07:43	17:52 (6) 07:41	15:23 (10) 08:25	
	21:38	20:47	19:36	18:24	17:54 (6) 16:24	15:47 (10) 16:00 12	
16	05:10	05:58	06:52	07:44	17:53 (6) 07:42	15:24 (10) 08:26	
	21:37	20:45	19:33	18:22	17:52 (6) 16:22	15:47 (10) 16:00 11	
17	05:11	06:00	06:53	07:46	17:53 (6) 07:44	15:24 (10) 08:27	
	21:36	20:43	19:31	18:20	17:51 (6) 16:21	15:47 (10) 16:00 10	
18	05:12	06:02	06:55	07:48	17:17 (9) 07:46	15:25 (10) 08:28	
	21:35	20:41	19:28	18:17	17:23 (9) 16:19	15:46 (10) 16:01 10	
19	05:14	06:04	06:57	07:50	17:14 (9) 07:48	15:26 (10) 08:28	
	21:34	20:39	19:26	18:15	17:26 (9) 16:18	15:45 (10) 16:01 10	
20	05:15	06:05	06:59	07:52	17:12 (9) 07:50	15:07 (3) 08:29	
	21:32	20:36	19:24	18:13	17:27 (9) 16:17	15:43 (10) 16:01 10	
21	05:16	06:07	07:00	07:54	17:11 (9) 07:51	15:06 (3) 08:30	
	21:31	20:34	19:21	18:11	17:28 (9) 16:15	15:42 (10) 16:02 10	
22	05:18	06:09	07:02	07:56	17:11 (9) 07:53	15:05 (3) 08:30	
	21:30	20:32	19:19	18:09	17:29 (8) 16:14	15:41 (10) 16:02 10	
23	05:19	06:10	07:04	07:57	17:10 (9) 07:55	15:04 (3) 08:31	
	21:28	20:30	19:16	18:32 (5) 18:06	17:30 (8) 16:13	15:38 (10) 16:03 10	
24	05:21	06:12	07:05	18:28 (5) 07:59	17:10 (9) 07:57	15:03 (3) 08:31	
	21:27	20:28	19:14	18:38 (5) 18:04	17:30 (8) 16:12	15:37 (10) 16:03 10	
25	05:22	06:14	07:07	18:27 (5) 07:01	16:10 (9) 07:58	15:03 (3) 08:31	
	21:25	20:25	19:11	18:39 (5) 17:02	16:30 (8) 16:11	15:36 (10) 16:04 10	
26	05:24	06:16	07:09	18:26 (5) 07:03	16:10 (9) 08:00	15:03 (3) 08:32	
	21:24	20:23	19:09	18:40 (5) 17:00	16:30 (8) 16:10	15:22 (3) 16:04 11	
27	05:25	06:17	07:11	18:26 (5) 07:05	16:10 (9) 08:02	15:04 (3) 08:32	
	21:22	20:21	19:07	18:39 (5) 16:58	16:28 (8) 16:09	15:23 (3) 16:05 10	
28	05:27	06:19	07:12	18:25 (5) 07:07	16:11 (9) 08:03	15:04 (3) 08:32	
	21:21	20:18	19:04	18:36 (5) 16:56	16:26 (9) 16:08	15:24 (3) 16:06 11	
29	05:28	06:21	07:14	18:25 (5) 07:09	16:12 (9) 08:05	15:03 (3) 08:32	
	21:19	20:16	19:02	18:34 (5) 16:54	16:24 (9) 16:07	15:24 (3) 16:07 12	
30	05:30	06:22	07:16	18:01 (7) 07:11	16:14 (9) 08:06	15:04 (3) 08:32	
	21:17	20:14	18:59	18:31 (5) 16:52	16:21 (9) 16:06	15:25 (3) 16:08 12	
31	05:32	06:24	07:18	07:12		08:32	15:19 (3)
	21:16	20:11	18:56	16:50		16:09	15:32 (3)
Sonnenscheinstunden	509	458	382	330	262	237	
astr. max.mögl. Beschattung			87	407	588		428
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19		0.14
Reduktion Betriebsdauer			0.96	0.96	0.96		0.96
Reduktion Windrichtung			0.72	0.72	0.70		0.69
Gesamte Reduktion			0.24	0.20	0.13		0.09
Met. wahrsch. Beschattung			21	82	75		39

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenden	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	-------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: V - IO22

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32	15:10 (3) 08:03	15:47 (10) 07:07	17:09 (6) 06:54	05:46	04:58	
16:10	20 15:30 (3) 17:00	14 16:01 (10) 17:54	17 17:26 (7) 19:51	20:45	21:34	
2 08:32	15:11 (3) 08:02	15:50 (10) 07:05	17:09 (7) 06:51	05:44	04:57	
16:11	20 15:31 (3) 17:02	9 15:59 (10) 17:56	18 17:27 (7) 19:53	20:47	21:35	
3 08:32	15:12 (3) 08:00	07:03	17:09 (7) 06:49	05:42	04:57	
16:12	20 15:32 (3) 17:04	17:58	18 17:27 (7) 19:55	20:49	21:36	
4 08:32	15:11 (3) 07:58	07:01	17:08 (7) 06:47	05:40	04:56	
16:14	21 15:32 (3) 17:06	18:00	18 17:26 (7) 19:57	20:50	21:37	
5 08:31	15:12 (3) 07:57	06:58	17:08 (7) 06:44	05:38	04:55	
16:15	21 15:33 (3) 17:08	18:02	18 17:26 (7) 19:58	20:52	21:38	
6 08:31	15:13 (3) 07:55	16:37 (9) 06:56	17:09 (7) 06:42	05:36	04:54	
16:16	20 15:33 (3) 17:10	2 16:39 (9) 18:04	17 17:26 (7) 20:00	20:54	21:39	
7 08:31	15:14 (3) 07:53	16:34 (9) 06:54	17:09 (7) 06:40	05:35	04:54	
16:17	19 15:33 (3) 17:12	7 16:41 (9) 18:06	15 17:24 (7) 20:02	20:56	21:40	
8 08:30	15:14 (3) 07:51	16:33 (9) 06:51	17:11 (7) 06:37	05:33	04:53	
16:19	19 15:33 (3) 17:14	11 16:44 (9) 18:08	12 17:23 (7) 20:04	20:57	21:41	
9 08:30	15:14 (3) 07:49	16:32 (9) 06:49	17:14 (7) 06:35	05:31	04:53	
16:20	20 15:44 (10) 17:16	14 16:46 (9) 18:09	7 17:44 (5) 20:06	20:59	21:42	
10 08:29	15:15 (3) 07:47	16:31 (9) 06:47	17:40 (5) 06:33	05:29	04:52	
16:22	22 15:46 (10) 17:18	17 16:48 (9) 18:11	5 17:45 (5) 20:07	21:01	21:43	
11 08:28	15:16 (3) 07:45	16:31 (9) 06:44	17:39 (5) 06:30	05:27	04:52	
16:23	24 15:48 (10) 17:20	19 16:50 (8) 18:13	8 17:47 (5) 20:09	21:02	21:43	
12 08:28	15:17 (3) 07:44	16:30 (9) 06:42	17:38 (5) 06:28	05:25	04:51	
16:25	26 15:50 (10) 17:22	22 16:52 (8) 18:15	10 17:48 (5) 20:11	21:04	21:44	
13 08:27	15:18 (3) 07:42	16:30 (9) 06:39	17:38 (5) 06:26	05:24	04:51	
16:26	26 15:51 (10) 17:24	22 16:52 (8) 18:17	13 17:51 (5) 20:13	21:06	21:45	
14 08:26	15:19 (3) 07:40	16:31 (9) 06:37	17:38 (5) 06:23	05:22	04:51	
16:28	28 15:53 (10) 17:26	21 16:52 (8) 18:19	13 17:51 (5) 20:15	21:07	21:46	
15 08:25	15:20 (3) 07:38	16:31 (9) 06:35	17:38 (5) 06:21	05:20	04:50	
16:29	28 15:55 (10) 17:27	21 16:52 (8) 18:21	12 17:50 (5) 20:16	21:09	21:46	
16 08:24	15:22 (3) 07:36	16:32 (9) 06:32	17:39 (5) 06:19	05:19	04:50	
16:31	28 15:57 (10) 17:29	19 16:51 (8) 18:22	10 17:49 (5) 20:18	21:11	21:47	
17 08:23	15:23 (3) 07:33	16:33 (9) 06:30	17:41 (5) 06:16	05:17	04:50	
16:33	27 15:58 (10) 17:31	16 16:49 (8) 18:24	4 17:45 (5) 20:20	21:12	21:47	
18 08:22	15:39 (10) 07:31	16:34 (9) 06:28	06:14	05:16	04:50	
16:34	21 16:00 (10) 17:33	11 16:45 (9) 18:26	20:22	21:14	21:48	
19 08:21	15:39 (10) 07:29	16:36 (9) 06:25	06:12	05:14	04:50	
16:36	23 16:02 (10) 17:35	7 16:43 (9) 18:28	20:24	21:15	21:48	
20 08:20	15:40 (10) 07:27	06:23	06:10	05:13	04:50	
16:38	23 16:03 (10) 17:37	18:30	20:25	21:17	21:48	
21 08:19	15:39 (10) 07:25	06:20	06:07	05:11	04:50	
16:40	24 16:03 (10) 17:39	18:31	20:27	21:19	21:49	
22 08:18	15:40 (10) 07:23	06:18	06:05	05:10	04:51	
16:41	24 16:04 (10) 17:41	18:33	20:29	21:20	21:49	
23 08:17	15:39 (10) 07:21	06:15	06:03	05:09	04:51	
16:43	24 16:03 (10) 17:43	18:35	20:31	21:21	21:49	
24 08:15	15:40 (10) 07:19	17:13 (6) 06:13	06:01	05:07	04:51	
16:45	24 16:04 (10) 17:45	4 17:17 (6) 18:37	20:33	21:23	21:49	
25 08:14	15:40 (10) 07:16	17:12 (6) 06:11	05:59	05:06	04:51	
16:47	24 16:04 (10) 17:47	8 17:20 (6) 18:39	20:34	21:24	21:49	
26 08:12	15:41 (10) 07:14	17:10 (6) 06:08	05:57	05:05	04:52	
16:49	23 16:04 (10) 17:49	11 17:21 (6) 18:40	20:36	21:26	21:49	
27 08:11	15:41 (10) 07:12	17:10 (6) 06:06	05:55	05:04	04:52	
16:51	23 16:04 (10) 17:51	13 17:23 (6) 18:42	20:38	21:27	21:49	
28 08:10	15:43 (10) 07:10	17:10 (6) 06:03	05:52	05:02	04:53	
16:53	21 16:04 (10) 17:53	16 17:26 (7) 18:44	20:40	21:28	21:49	
29 08:08	15:43 (10)	07:01	05:50	05:01	04:53	
16:54	21 16:04 (10)	19:46	20:42	21:30	21:49	
30 08:07	15:44 (10)	06:59	05:48	05:00	04:54	
16:56	19 16:03 (10)	19:48	20:43	21:31	21:48	
31 08:05	15:45 (10)	06:56	05:49	04:59	04:59	
16:58	17 16:02 (10)	19:49	20:44	21:32	21:48	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	700	284	215			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	77	46	41			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: V - IO22

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:55	05:33	06:26	07:18	18:17 (5) 07:14	16:01 (9) 08:08
	21:48	21:14	20:09	18:57	12 18:29 (5) 16:48	16:17 (9) 16:05 24 15:30 (10)
2	04:55	05:35	06:28	07:19	18:17 (5) 07:16	16:01 (9) 08:09
	21:48	21:12	20:07	18:55	9 18:26 (5) 16:46	16:15 (9) 16:04 22 15:29 (10)
3	04:56	05:37	06:29	07:21	18:17 (5) 07:18	16:02 (9) 08:11
	21:47	21:11	20:04	18:52	7 18:24 (5) 16:44	16:13 (9) 16:04 20 15:28 (10)
4	04:57	05:38	06:31	07:23	18:19 (5) 07:20	16:04 (9) 08:12
	21:47	21:09	20:02	18:50	3 18:22 (5) 16:42	7 16:11 (9) 16:03
5	04:58	05:40	06:33	07:25	17:49 (7) 07:22	16:08 (9) 08:14
	21:46	21:07	20:00	18:47	10 17:59 (7) 16:40	1 16:09 (9) 16:02 20 15:19 (3)
6	04:59	05:41	06:34	07:26	17:47 (7) 07:24	16:08 (9) 08:15
	21:46	21:05	19:57	18:45	14 18:01 (7) 16:39	16:02 (9) 16:02 20 15:19 (3)
7	05:00	05:43	06:36	07:28	17:45 (7) 07:26	16:08 (9) 08:16
	21:45	21:03	19:55	18:43	16 18:01 (7) 16:37	16:01 (9) 16:01 20 15:20 (3)
8	05:01	05:45	06:38	07:30	17:44 (7) 07:28	16:08 (9) 08:18
	21:44	21:01	19:53	18:40	17 18:01 (7) 16:35	16:01 (9) 16:01 20 15:20 (3)
9	05:02	05:46	06:40	07:32	17:43 (7) 07:29	15:20 (10) 08:19
	21:44	20:59	19:50	18:38	18 18:01 (7) 16:33	10 15:30 (10) 16:01 20 15:20 (3)
10	05:03	05:48	06:41	07:34	17:43 (7) 07:31	15:18 (10) 08:20
	21:43	20:57	19:48	18:36	18 18:01 (7) 16:32	14 15:32 (10) 16:01 20 15:20 (3)
11	05:04	05:50	06:43	07:35	17:43 (7) 07:33	15:17 (10) 08:21
	21:42	20:55	19:45	18:33	18 18:01 (7) 16:30	17 15:34 (10) 16:00 21 15:22 (3)
12	05:05	05:52	06:45	07:37	17:43 (7) 07:35	15:16 (10) 08:22
	21:41	20:53	19:43	18:31	18 18:01 (7) 16:28	19 15:35 (10) 16:00 21 15:22 (3)
13	05:06	05:53	06:46	07:39	17:43 (6) 07:37	15:15 (10) 08:23
	21:40	20:51	19:41	18:29	17 18:00 (7) 16:27	21 15:36 (10) 16:00 20 15:22 (3)
14	05:07	05:55	06:48	07:41	17:42 (6) 07:39	15:15 (10) 08:24
	21:39	20:49	19:38	18:26	15 17:57 (6) 16:25	21 15:36 (10) 16:00 21 15:23 (3)
15	05:08	05:57	06:50	07:43	17:42 (6) 07:41	15:14 (10) 08:25
	21:38	20:47	19:36	18:24	13 17:55 (6) 16:24	23 15:37 (10) 16:00 20 15:23 (3)
16	05:10	05:58	06:52	07:44	17:42 (6) 07:42	15:14 (10) 08:26
	21:37	20:45	19:33	18:22	10 17:52 (6) 16:22	23 15:37 (10) 16:00 21 15:24 (3)
17	05:11	06:00	06:53	07:46	17:43 (6) 07:44	15:14 (10) 08:27
	21:36	20:43	19:31	18:20	7 17:50 (6) 16:21	24 15:38 (10) 16:00 20 15:23 (3)
18	05:12	06:02	06:55	07:48	17:45 (6) 07:46	15:14 (10) 08:28
	21:35	20:41	19:28	18:17	3 17:48 (6) 16:19	24 15:38 (10) 16:01 19 15:23 (3)
19	05:14	06:04	06:57	07:50	17:48 (6) 07:48	15:14 (10) 08:28
	21:34	20:39	19:26	18:15	16:18	24 15:38 (10) 16:01 19 15:24 (3)
20	05:15	06:05	06:59	07:52	17:50 (6) 07:50	15:15 (10) 08:29
	21:32	20:36	19:24	18:13	16:16	24 15:39 (10) 16:01 19 15:24 (3)
21	05:16	06:07	07:00	07:54	17:51 (6) 07:51	15:15 (10) 08:30
	21:31	20:34	19:21	18:11	16:15	24 15:39 (10) 16:02 19 15:25 (3)
22	05:18	06:09	07:02	07:56	17:53 (6) 07:53	15:16 (10) 08:30
	21:30	20:32	19:19	18:09	16:14	23 15:39 (10) 16:02 20 15:26 (3)
23	05:19	06:10	07:04	07:57	17:06 (9) 07:55	15:15 (10) 08:31
	21:28	20:30	19:16	18:06	8 17:14 (9) 16:13	23 15:38 (10) 16:03 19 15:26 (3)
24	05:21	06:12	07:05	07:59	17:04 (9) 07:57	15:16 (10) 08:31
	21:27	20:28	19:14	18:04	12 17:16 (9) 16:12	21 15:37 (10) 16:03 19 15:26 (3)
25	05:22	06:14	07:07	07:01	16:02 (9) 07:58	15:01 (3) 08:31
	21:25	20:25	19:11	17:02	17 16:19 (8) 16:11	26 15:36 (10) 16:04 19 15:27 (3)
26	05:24	06:16	07:09	07:03	16:01 (9) 08:00	15:00 (3) 08:32
	21:24	20:23	19:09	17:00	19 16:20 (8) 16:10	28 15:35 (10) 16:04 20 15:28 (3)
27	05:25	06:17	07:11	07:05	16:01 (9) 08:02	14:59 (3) 08:32
	21:22	20:21	19:07	8 18:30 (5) 16:58	20 16:21 (8) 16:09	28 15:34 (10) 16:05 20 15:28 (3)
28	05:27	06:19	07:12	07:07	18:19 (5) 07:07	16:00 (9) 08:03
	21:21	20:18	19:04	11 18:30 (5) 16:56	22 16:22 (8) 16:08	28 15:33 (10) 16:06 20 15:29 (3)
29	05:28	06:21	07:14	18:18 (5) 07:09	16:00 (9) 08:05	14:58 (3) 08:32
	21:19	20:16	19:02	13 18:31 (5) 16:54	22 16:22 (8) 16:07	27 15:32 (10) 16:07 20 15:29 (3)
30	05:30	06:22	07:16	18:17 (5) 07:11	16:00 (9) 08:06	14:58 (3) 08:32
	21:17	20:14	18:59	14 18:31 (5) 16:52	21 16:21 (8) 16:06	26 15:31 (10) 16:08 20 15:30 (3)
31	05:32	06:24	07:18	07:12	16:00 (9) 08:06	14:58 (3) 08:32
	21:16	20:11	18:57	16:50	19 16:19 (8) 16:06	16:09 (9) 16:09 21 15:31 (3)
Sonnenscheinstunden	509	458	382	330	262	237
astr. max. mögl. Beschattung			46	385	547	625
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19	0.14
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.72	0.69	0.68
Gesamte Reduktion			0.24	0.20	0.13	0.09
Met. wahrsch. Beschattung			11	77	69	56

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: W - IO23

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32		08:03	15:49 (10) 07:07	17:06 (7) 06:54	05:46	04:58
1 16:10		17:00	6 15:55 (10) 17:54	18 17:24 (7) 19:51	20:45	21:34
2 08:32		08:02	07:05	17:06 (7) 06:51	05:44	04:57
2 16:11		17:02	17:56	18 17:24 (7) 19:53	20:47	21:35
3 08:32		08:00	07:03	17:06 (7) 06:49	05:42	04:57
3 16:12		17:04	17:58	18 17:24 (7) 19:55	20:49	21:36
4 08:32		07:58	07:01	17:06 (7) 06:47	05:40	04:56
4 16:14		17:06	18:00	17 17:23 (7) 19:57	20:50	21:37
5 08:31		07:57	16:33 (9) 06:58	17 17:07 (7) 06:44	05:38	04:55
5 16:15		17:08	4 16:37 (9) 18:02	15 17:22 (7) 19:58	20:52	21:38
6 08:31		07:55	16:31 (9) 06:56	17 17:08 (7) 06:42	05:36	04:54
6 16:16		17:10	8 16:39 (9) 18:04	13 17:21 (7) 20:00	20:54	21:39
7 08:31		07:53	16:30 (9) 06:54	17 17:09 (7) 06:40	05:35	04:54
7 16:17	2 15:42 (10) 17:12	11 16:41 (9) 18:06	9 17:18 (7) 20:02	20:56	21:40	
8 08:30		07:51	16:29 (9) 06:51	17 17:00 (5) 06:37	05:33	04:53
8 16:19	4 15:43 (10) 17:14	15 16:44 (9) 18:08	1 17:41 (5) 20:04	20:57	21:41	
9 08:30		07:49	16:28 (9) 06:49	17 17:38 (5) 06:35	05:31	04:53
9 16:20	6 15:44 (10) 17:16	18 16:46 (8) 18:09	6 17:44 (5) 20:06	20:59	21:42	
10 08:29		07:47	16:28 (9) 06:47	17 17:36 (5) 06:33	05:29	04:52
10 16:22	9 15:46 (10) 17:18	20 16:48 (8) 18:11	9 17:45 (5) 20:07	21:01	21:43	
11 08:28		07:45	16:28 (9) 06:44	17 17:36 (5) 06:30	05:27	04:52
11 16:23	10 15:48 (10) 17:20	22 16:50 (8) 18:13	11 17:47 (5) 20:09	21:02	21:43	
12 08:28		07:44	16:28 (9) 06:42	17 17:35 (5) 06:28	05:25	04:51
12 16:25	13 15:50 (10) 17:22	22 16:50 (8) 18:15	13 17:48 (5) 20:11	21:04	21:44	
13 08:27		07:42	16:28 (9) 06:39	17 17:36 (5) 06:26	05:24	04:51
13 16:26	14 15:51 (10) 17:24	22 16:50 (8) 18:17	13 17:49 (5) 20:13	21:06	21:45	
14 08:26		07:40	16:29 (9) 06:37	17 17:37 (5) 06:23	05:22	04:51
14 16:28	16 15:53 (10) 17:26	20 16:49 (8) 18:19	11 17:48 (5) 20:15	21:07	21:46	
15 08:25		07:38	16:30 (9) 06:35	17 17:37 (5) 06:21	05:20	04:50
15 16:29	18 15:55 (10) 17:27	18 16:48 (8) 18:21	9 17:46 (5) 20:16	21:09	21:46	
16 08:24		07:36	16:31 (9) 06:32	17 17:36 (5) 06:19	05:19	04:50
16 16:31	20 15:57 (10) 17:29	15 16:46 (8) 18:22	20 20:18	21:11	21:47	
17 08:23		07:33	16:33 (9) 06:30	17 17:36 (5) 06:16	05:17	04:50
17 16:33	22 15:58 (10) 17:31	9 16:42 (9) 18:24	20 20:20	21:12	21:47	
18 08:22		07:31	16:33 (9) 06:28	17 17:35 (5) 06:14	05:16	04:50
18 16:34	22 15:59 (10) 17:33	18 18:26	20 20:22	21:14	21:48	
19 08:21		07:29	16:32 (9) 06:25	17 17:34 (5) 06:12	05:14	04:50
19 16:36	23 16:00 (10) 17:35	18 18:28	20 20:24	21:15	21:48	
20 08:20		07:27	16:32 (9) 06:23	17 17:33 (5) 06:10	05:13	04:50
20 16:38	24 16:01 (10) 17:37	18 18:30	20 20:25	21:17	21:48	
21 08:19		07:25	16:32 (9) 06:20	17 17:32 (5) 06:07	05:11	04:50
21 16:40	24 16:01 (10) 17:39	18 18:31	20 20:27	21:19	21:49	
22 08:18		07:23	16:31 (9) 06:18	17 17:31 (5) 06:05	05:10	04:51
22 16:41	23 16:01 (10) 17:41	1 17:13 (6) 18:33	20 20:29	21:20	21:49	
23 08:17		07:21	16:30 (9) 06:15	17 17:30 (5) 06:03	05:09	04:51
23 16:43	23 16:01 (10) 17:43	5 17:15 (6) 18:35	20 20:31	21:21	21:49	
24 08:15		07:19	16:29 (9) 06:13	17 17:29 (5) 06:01	05:07	04:51
24 16:45	23 16:02 (10) 17:45	8 17:17 (6) 18:37	20 20:33	21:23	21:49	
25 08:14		07:16	16:28 (9) 06:11	17 17:28 (5) 05:59	05:06	04:51
25 16:47	22 16:01 (10) 17:47	12 17:20 (6) 18:39	20 20:34	21:24	21:49	
26 08:12		07:14	16:27 (9) 06:08	17 17:27 (5) 05:57	05:05	04:52
26 16:49	21 16:01 (10) 17:49	14 17:21 (6) 18:40	20 20:36	21:26	21:49	
27 08:11		07:12	16:26 (9) 06:06	17 17:26 (5) 05:55	05:04	04:52
27 16:51	21 16:01 (10) 17:51	16 17:23 (7) 18:42	20 20:38	21:27	21:49	
28 08:10		07:10	16:25 (9) 06:03	17 17:25 (5) 05:52	05:02	04:53
28 16:53	19 16:01 (10) 17:53	17 17:24 (7) 18:44	20 20:40	21:28	21:49	
29 08:08		07:07	16:24 (9) 06:01	17 17:24 (5) 05:50	05:01	04:53
29 16:54	17 16:00 (10) 18:00	19 19:46	20 20:42	21:30	21:49	
30 08:07		07:05	16:23 (9) 05:59	17 17:23 (5) 05:48	05:00	04:54
30 16:56	15 15:59 (10) 17:51	19 19:48	20 20:43	21:31	21:48	
31 08:05		07:03	16:22 (9) 05:56	17 17:22 (5) 05:46	04:59	
31 16:58	12 15:57 (10) 17:49	19 19:49	20 20:44	21:32		
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	423	283	181			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.69	0.72	0.72			
Gesamte Reduktion	0.11	0.16	0.19			
Met.wahrsch.Beschattung	47	46	35			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: W - IO23

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember	
1	04:55 21:48	05:33 21:14	06:26 20:09	07:18 18:57	18:15 (5) 07:14	15:58 (9) 08:08	15:20 (10)
2	04:55 21:48	05:35 21:12	06:28 20:07	07:19 18:55	18:14 (5) 07:16	16:17 (8) 16:05	15:30 (10)
3	04:56 21:47	05:37 21:11	06:29 20:04	07:21 18:52	18:14 (5) 07:18	16:15 (9) 16:04	15:29 (10)
4	04:57 21:47	05:38 21:09	06:31 20:02	07:23 18:50	18:15 (5) 07:20	16:13 (9) 16:04	15:28 (10)
5	04:58 21:46	05:40 21:07	06:33 20:00	07:25 18:47	18:16 (5) 07:22	16:11 (9) 16:03	15:27 (10)
6	04:59 21:46	05:41 21:05	06:34 19:57	07:26 18:45	18:19 (5) 16:40	16:09 (9) 16:02	15:27 (10)
7	05:00 21:45	05:43 21:03	06:36 19:55	07:28 18:43	17:48 (7) 07:24	16:03 (9) 16:15	16:01
8	05:01 21:44	05:45 21:01	06:38 19:53	07:30 18:40	17:44 (7) 07:26	16:07 (9) 16:02	16:01
9	05:02 21:44	05:46 20:59	06:40 19:50	07:32 18:38	17:42 (7) 07:28	16:09 (9) 16:05	16:01
10	05:03 21:43	05:48 20:57	06:41 19:48	07:34 18:36	17:40 (7) 07:31	16:10 (9) 16:06	16:01
11	05:04 21:42	05:50 20:55	06:43 19:45	07:35 18:33	17:40 (7) 07:33	16:11 (9) 16:07	16:01
12	05:05 21:41	05:52 20:53	06:45 19:43	07:37 18:31	17:40 (7) 07:35	16:12 (9) 16:08	16:01
13	05:06 21:40	05:53 20:51	06:46 19:41	07:39 18:29	17:40 (7) 07:37	16:13 (9) 16:09	16:01
14	05:07 21:39	05:55 20:49	06:48 19:38	07:41 18:26	17:40 (7) 07:39	16:14 (9) 16:10	16:01
15	05:08 21:38	05:57 20:47	06:50 19:36	07:43 18:24	17:40 (7) 07:41	16:15 (9) 16:11	16:01
16	05:10 21:37	05:58 20:45	06:52 19:33	07:44 18:22	17:40 (6) 07:42	16:16 (9) 16:12	16:01
17	05:11 21:36	06:00 20:43	06:53 19:31	07:46 18:20	17:40 (6) 07:44	16:17 (9) 16:13	16:01
18	05:12 21:35	06:02 20:41	06:55 19:28	07:48 18:17	17:40 (6) 07:46	16:18 (9) 16:14	16:01
19	05:14 21:34	06:04 20:39	06:57 19:26	07:50 18:15	17:42 (6) 07:48	16:19 (9) 16:15	16:01
20	05:15 21:32	06:05 20:36	06:59 19:24	07:52 18:13	17:46 (6) 07:48	16:20 (9) 16:16	16:01
21	05:16 21:31	06:07 20:34	07:00 19:21	07:54 18:11	17:46 (6) 07:50	16:21 (9) 16:17	16:01
22	05:18 21:30	06:09 20:32	07:02 19:19	07:56 18:09	17:46 (6) 07:52	16:22 (9) 16:18	16:01
23	05:19 21:28	06:10 20:30	07:04 19:16	07:57 18:06	17:46 (6) 07:54	16:23 (9) 16:19	16:01
24	05:21 21:27	06:12 20:28	07:05 19:14	07:59 18:04	17:05 (9) 07:57	16:24 (9) 16:20	16:01
25	05:22 21:25	06:14 20:25	07:07 19:11	08:01 18:02	17:09 (9) 07:58	16:25 (9) 16:21	16:01
26	05:24 21:24	06:16 20:23	07:09 19:09	08:03 18:00	16:02 (9) 07:58	16:26 (9) 16:22	16:01
27	05:25 21:22	06:17 20:21	07:11 19:07	08:05 17:58	16:12 (9) 08:00	16:27 (9) 16:23	16:01
28	05:27 21:21	06:19 20:18	07:12 19:04	08:07 18:19 (5)	16:00 (9) 08:00	16:28 (9) 16:24	16:01
29	05:28 21:19	06:21 20:16	07:14 19:02	08:09 18:26 (5)	16:16 (8) 08:06	16:29 (9) 16:25	16:01
30	05:30 21:17	06:22 20:14	07:16 18:59	08:11 18:27 (5)	16:56 (8) 08:08	16:30 (9) 16:26	16:01
31	05:32 21:16	06:24 20:11	07:18 18:57	08:13 18:28 (5)	16:52 (8) 08:06	16:31 (9) 16:27	16:01
Sonnenscheinstunden	509	458	382	330	262	237	31
astr. max. mögl. Beschattung			29	369	475		0.14
Red. Sonnenscheinwahrsch.			0.35	0.29	0.19		0.96
Reduktion Betriebsdauer			0.96	0.96	0.96		0.69
Reduktion Windrichtung			0.72	0.72	0.69		0.09
Gesamte Reduktion			0.24	0.20	0.13		0.09
Met. wahrsch. Beschattung			7	74	60		3

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: X - IO24

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 721 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni								
1	08:32	08:03	07:07	06:54	19:02 (1)	05:46	19:37 (4)	04:58	19:47 (3)					
	16:10	17:00	17:54	19:51	20	19:22 (1)	20:45	29	20:06 (3)	21:33	41	21:00 (6)		
2	08:32	08:02	07:05	06:52	19:01 (1)	05:44	19:39 (4)	04:57	19:49 (3)					
	16:11	17:02	17:56	19:53	23	19:24 (1)	20:47	29	20:08 (3)	21:35	38	21:01 (6)		
3	08:32	08:00	07:03	06:49	18:59 (1)	05:42	19:39 (4)	04:57	19:50 (3)					
	16:13	17:04	17:58	19:55	25	19:24 (1)	20:49	30	20:09 (3)	21:36	34	21:02 (6)		
4	08:32	07:58	07:01	06:47	18:59 (1)	05:40	19:38 (3)	04:56	19:52 (3)					
	16:14	17:06	18:00	19:57	25	19:24 (1)	20:50	32	20:10 (3)	21:37	30	21:03 (6)		
5	08:31	07:57	06:58	06:44	18:58 (1)	05:38	19:38 (3)	04:55	20:31 (8)					
	16:15	17:08	18:02	19:58	27	19:25 (1)	20:52	32	20:10 (3)	21:38	21	21:04 (6)		
6	08:31	07:55	06:56	06:42	18:57 (1)	05:36	19:37 (3)	04:54	20:33 (8)					
	16:16	17:10	18:04	20:00	27	19:24 (1)	20:54	33	20:10 (3)	21:39	18	21:05 (5)		
7	08:31	07:53	06:54	06:40	18:57 (1)	05:35	19:37 (3)	04:54	20:48 (6)					
	16:18	17:12	18:06	20:02	28	19:25 (1)	20:56	34	20:11 (3)	21:40	17	21:05 (5)		
8	08:30	07:51	06:51	17:19 (2)	06:37	18:57 (1)	05:33	19:36 (3)	04:53	20:49 (6)				
	16:19	17:14	18:08	14	17:33 (2)	20:04	28	19:25 (1)	20:57	35	20:11 (3)	21:41	17	21:06 (5)
9	08:30	07:49	06:49	17:16 (2)	06:35	18:56 (1)	05:31	19:36 (3)	04:53	20:49 (6)				
	16:20	17:16	18:09	20	17:36 (2)	20:06	27	19:23 (1)	20:59	35	20:11 (3)	21:42	19	21:08 (5)
10	08:29	07:47	06:47	17:13 (2)	06:33	18:56 (1)	05:29	19:35 (3)	04:52	20:49 (6)				
	16:22	17:18	18:11	24	17:37 (2)	20:07	27	19:23 (1)	21:01	36	20:11 (3)	21:43	19	21:08 (5)
11	08:28	07:45	06:44	17:12 (2)	06:30	18:57 (1)	05:27	19:35 (3)	04:52	20:49 (6)				
	16:23	17:20	18:13	27	17:39 (2)	20:09	26	19:23 (1)	21:02	37	20:12 (3)	21:43	20	21:09 (5)
12	08:28	07:44	06:42	17:10 (2)	06:28	18:57 (1)	05:26	19:35 (3)	04:51	20:50 (6)				
	16:25	17:22	18:15	29	17:39 (2)	20:11	24	19:21 (1)	21:04	37	20:12 (3)	21:44	20	21:10 (5)
13	08:27	07:42	06:39	17:09 (2)	06:26	18:58 (1)	05:24	19:36 (3)	04:51	20:49 (6)				
	16:26	17:24	18:17	31	17:40 (2)	20:13	22	19:20 (1)	21:06	44	20:35 (8)	21:45	21	21:10 (5)
14	08:26	07:40	06:37	17:09 (2)	06:23	18:59 (1)	05:22	19:35 (3)	04:51	20:49 (6)				
	16:28	17:26	18:19	32	17:41 (2)	20:15	20	19:19 (1)	21:07	48	20:36 (8)	21:45	21	21:10 (5)
15	08:25	07:38	06:35	17:07 (2)	06:21	19:01 (1)	05:21	19:36 (3)	04:51	20:50 (6)				
	16:29	17:28	18:21	34	17:41 (2)	20:16	16	19:17 (1)	21:09	50	20:38 (8)	21:46	21	21:11 (5)
16	08:24	07:35	06:32	17:07 (2)	06:19	19:03 (1)	05:19	19:35 (3)	04:50	20:50 (6)				
	16:31	17:29	18:22	34	17:41 (2)	20:18	11	19:14 (1)	21:11	52	20:39 (8)	21:47	21	21:11 (5)
17	08:23	07:33	06:30	17:06 (2)	06:16	19:05 (1)	05:17	19:36 (3)	04:50	20:50 (6)				
	16:33	17:31	18:24	35	17:41 (2)	20:20	21:12	52	20:40 (8)	21:47	22	21:12 (5)		
18	08:22	07:31	06:28	17:06 (2)	06:14	19:06 (1)	05:16	19:36 (3)	04:50	20:50 (6)				
	16:35	17:33	18:26	35	17:41 (2)	20:22	21:14	53	20:40 (8)	21:47	22	21:12 (5)		
19	08:21	07:29	06:25	17:05 (2)	06:12	19:47 (4)	05:14	19:37 (3)	04:50	20:51 (6)				
	16:36	17:35	18:28	35	17:40 (2)	20:24	9	19:56 (4)	21:15	52	20:40 (8)	21:48	22	21:13 (5)
20	08:20	07:27	06:23	17:05 (2)	06:10	19:44 (4)	05:13	19:37 (3)	04:50	20:51 (6)				
	16:38	17:37	18:30	35	17:40 (2)	20:25	14	19:58 (4)	21:17	53	20:41 (8)	21:48	22	21:13 (5)
21	08:19	07:25	06:20	17:06 (2)	06:08	19:42 (4)	05:11	19:37 (3)	04:51	20:52 (6)				
	16:40	17:39	18:31	34	17:40 (2)	20:27	17	19:59 (4)	21:18	52	20:40 (8)	21:48	22	21:14 (5)
22	08:18	07:23	06:18	17:06 (2)	06:05	19:41 (4)	05:10	19:38 (3)	04:51	20:52 (6)				
	16:42	17:41	18:33	32	17:38 (2)	20:29	20	20:01 (4)	21:20	51	20:41 (8)	21:49	22	21:14 (5)
23	08:16	07:21	06:16	17:06 (2)	06:03	19:39 (4)	05:09	19:39 (3)	04:51	20:52 (6)				
	16:43	17:43	18:35	32	17:38 (2)	20:31	22	20:01 (4)	21:21	49	20:41 (8)	21:49	22	21:14 (5)
24	08:15	07:18	06:13	17:07 (2)	06:01	19:38 (4)	05:07	19:39 (3)	04:51	20:52 (6)				
	16:45	17:45	18:37	29	17:36 (2)	20:33	23	20:01 (4)	21:23	49	20:41 (8)	21:49	21	21:13 (5)
25	08:14	07:16	06:11	17:08 (2)	05:59	19:38 (4)	05:06	19:40 (3)	04:52	20:52 (6)				
	16:47	17:47	18:39	27	17:35 (2)	20:34	24	20:02 (4)	21:24	48	20:41 (8)	21:49	22	21:14 (5)
26	08:12	07:14	06:08	17:08 (2)	05:57	19:37 (4)	05:05	19:41 (3)	04:52	20:52 (6)				
	16:49	17:49	18:40	25	17:33 (2)	20:36	25	20:02 (4)	21:26	45	20:41 (8)	21:49	22	21:14 (5)
27	08:11	07:12	06:06	17:10 (2)	05:55	19:37 (4)	05:04	19:42 (3)	04:52	20:53 (6)				
	16:50	17:51	18:42	21	17:31 (2)	20:38	25	20:02 (4)	21:27	45	20:54 (6)	21:49	21	21:14 (5)
28	08:10	07:10	06:03	17:13 (2)	05:52	19:37 (4)	05:02	19:43 (3)	04:53	20:53 (6)				
	16:53	17:53	18:44	16	17:29 (2)	20:40	25	20:02 (4)	21:28	46	20:56 (6)	21:49	21	21:14 (5)
29	08:08	07:01	06:00	18:17 (2)	05:50	19:37 (4)	05:01	19:44 (3)	04:53	20:53 (6)				
	16:54	17:54	18:45	6	18:23 (2)	20:41	26	20:03 (3)	21:30	45	20:57 (6)	21:49	21	21:14 (5)
30	08:06	06:59	06:00	19:08 (1)	05:48	19:37 (4)	05:00	19:45 (3)	04:54	20:53 (6)				
	16:56	17:56	18:47	10	19:18 (1)	20:43	28	20:05 (3)	21:31	43	20:58 (6)	21:48	20	21:13 (5)
31	08:05	06:56	06:00	19:04 (1)	05:47	19:37 (4)	05:00	19:46 (3)	04:54	20:53 (6)				
	16:58	17:58	18:49	16	19:20 (1)	20:44	42	21:32	20:59 (6)	506				
Sonnenscheinstunden	253	275	367	418	491	506	680							
astr.max.mögl.Beschattung			633	634	1318	680								
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39								
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96								
Reduktion Windrichtung			0.72	0.69	0.65	0.62								
Gesamte Reduktion			0.19	0.25	0.27	0.23								
Met.wahrsch.Beschattung			121	156	354	157								

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: X - IO24

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember				
1	04:55	20:53 (6) 05:33	19:45 (3) 06:26	18:56 (1) 07:18	17:49 (2) 07:14	08:08				
	21:48	20	21:13 (5) 21:14	37	20:22 (3) 20:09	26	19:22 (1) 18:57	30	18:19 (2) 16:48	16:05
2	04:55	20:54 (6) 05:35	19:46 (3) 06:28	18:55 (1) 07:19	17:49 (2) 07:16	08:09				
	21:48	19	21:13 (5) 21:12	36	20:22 (3) 20:07	27	19:22 (1) 18:55	28	18:17 (2) 16:46	16:04
3	04:56	20:53 (6) 05:37	19:45 (3) 06:29	18:54 (1) 07:21	17:51 (2) 07:18	08:11				
	21:47	19	21:12 (5) 21:11	37	20:22 (3) 20:04	27	19:21 (1) 18:52	25	18:16 (2) 16:44	16:04
4	04:57	20:54 (6) 05:38	19:46 (3) 06:31	18:54 (1) 07:23	17:52 (2) 07:20	08:12				
	21:47	18	21:12 (5) 21:09	36	20:22 (3) 20:02	28	19:22 (1) 18:50	22	18:14 (2) 16:42	16:03
5	04:58	20:54 (6) 05:40	19:46 (3) 06:33	18:53 (1) 07:25	17:55 (2) 07:22	08:14				
	21:46	18	21:12 (5) 21:07	35	20:21 (3) 20:00	28	19:21 (1) 18:47	16	18:11 (2) 16:40	16:03
6	04:59	20:55 (6) 05:42	19:46 (3) 06:35	18:53 (1) 07:26	17:58 (2) 07:24	08:15				
	21:46	16	21:11 (5) 21:05	35	20:21 (3) 19:57	28	19:21 (1) 18:45	9	18:07 (2) 16:39	16:02
7	05:00	20:56 (6) 05:43	19:46 (3) 06:36	18:53 (1) 07:28	17:58 (2) 07:26	08:16				
	21:45	20	21:11 (5) 21:03	34	20:20 (3) 19:55	27	19:20 (1) 18:43		16:37	16:02
8	05:01	20:57 (6) 05:45	19:47 (3) 06:38	18:53 (1) 07:30	17:59 (2) 07:27	08:17				
	21:44	27	21:10 (6) 21:01	32	20:19 (3) 19:53	26	19:19 (1) 18:40		16:35	16:01
9	05:02	19:59 (3) 05:47	19:48 (3) 06:40	18:53 (1) 07:32	17:59 (2) 07:29	08:19				
	21:44	32	21:10 (6) 20:59	31	20:19 (3) 19:50	25	19:18 (1) 18:38		16:33	16:01
10	05:03	19:57 (3) 05:48	19:47 (4) 06:41	18:54 (1) 07:34	17:59 (2) 07:31	08:20				
	21:43	37	21:09 (6) 20:57	30	20:17 (3) 19:48	23	19:17 (1) 18:36		16:32	16:01
11	05:04	19:56 (3) 05:50	19:47 (4) 06:43	18:55 (1) 07:35	17:59 (2) 07:33	08:21				
	21:42	39	21:08 (6) 20:55	30	20:17 (3) 19:45	20	19:15 (1) 18:33		16:30	16:00
12	05:05	19:55 (3) 05:52	19:46 (4) 06:45	18:56 (1) 07:37	17:59 (2) 07:35	08:22				
	21:41	42	21:08 (6) 20:53	29	20:15 (3) 19:43	17	19:13 (1) 18:31		16:28	16:00
13	05:06	19:54 (3) 05:53	19:45 (4) 06:47	18:59 (1) 07:39	17:59 (2) 07:37	08:23				
	21:40	43	21:07 (6) 20:51	28	20:13 (3) 19:41	11	19:10 (1) 18:29		16:27	16:00
14	05:07	19:53 (3) 05:55	19:45 (4) 06:48	18:10 (2) 07:41	17:59 (2) 07:39	08:24				
	21:39	45	21:06 (6) 20:49	26	20:11 (3) 19:38	1	18:11 (2) 18:26		16:25	16:00
15	05:09	19:52 (3) 05:57	19:44 (4) 06:50	18:03 (2) 07:43	17:59 (2) 07:41	08:25				
	21:38	46	21:05 (6) 20:47	25	20:09 (4) 19:36	14	18:17 (2) 18:24		16:24	16:00
16	05:10	19:51 (3) 05:58	19:45 (4) 06:52	18:00 (2) 07:44	17:59 (2) 07:42	08:26				
	21:37	45	21:03 (6) 20:45	24	20:09 (4) 19:33	20	18:20 (2) 18:22		16:22	16:00
17	05:11	19:50 (3) 06:00	19:44 (4) 06:53	17:57 (2) 07:46	17:57 (2) 07:46	08:27				
	21:36	44	20:50 (8) 20:43	24	20:08 (4) 19:31	24	18:21 (2) 18:20		16:21	16:00
18	05:12	19:50 (3) 06:02	19:44 (4) 06:55	17:56 (2) 07:48	17:56 (2) 07:48	08:27				
	21:35	47	20:51 (8) 20:41	24	20:08 (4) 19:28	26	18:22 (2) 18:17		16:19	16:01
19	05:14	19:49 (3) 06:04	19:45 (4) 06:57	17:54 (2) 07:50	17:54 (2) 07:50	08:28				
	21:34	48	20:51 (8) 20:39	23	20:08 (4) 19:26	29	18:23 (2) 18:15		16:18	16:01
20	05:15	19:49 (3) 06:05	19:45 (4) 06:59	17:52 (2) 07:52	17:52 (2) 07:52	08:29				
	21:32	50	20:51 (8) 20:36	21	20:06 (4) 19:24	31	18:23 (2) 18:13		16:17	16:01
21	05:17	19:49 (3) 06:07	19:46 (4) 07:00	17:51 (2) 07:54	17:51 (2) 07:54	08:29				
	21:31	50	20:51 (8) 20:34	20	20:06 (4) 19:21	33	18:24 (2) 18:11		16:15	16:02
22	05:18	19:48 (3) 06:09	19:47 (4) 07:02	17:51 (2) 07:55	17:51 (2) 07:55	08:30				
	21:30	51	20:51 (8) 20:32	17	20:04 (4) 19:19	33	18:24 (2) 18:09		16:14	16:02
23	05:19	19:47 (3) 06:10	19:48 (4) 07:04	17:50 (2) 07:57	17:50 (2) 07:57	08:31				
	21:28	52	20:51 (8) 20:30	13	20:01 (4) 19:16	34	18:24 (2) 18:06		16:13	16:03
24	05:21	19:48 (3) 06:12	19:51 (4) 07:05	17:49 (2) 07:59	17:49 (2) 07:59	08:31				
	21:27	51	20:51 (8) 20:28	8	19:59 (4) 19:14	35	18:24 (2) 18:04		16:12	16:03
25	05:22	19:47 (3) 06:14	19:49 (4) 07:07	17:49 (2) 07:01	17:49 (2) 07:01	08:31				
	21:25	53	20:51 (8) 20:25	19:11	18:24 (2) 17:02	16:11	16:04		16:11	16:04
26	05:24	19:46 (3) 06:16	19:49 (4) 07:09	17:49 (2) 07:03	17:49 (2) 07:03	08:32				
	21:24	53	20:50 (8) 20:23	19:09	18:23 (2) 17:00	16:10	16:05		16:10	16:05
27	05:25	19:46 (3) 06:17	19:05 (1) 07:11	17:49 (2) 07:05	17:49 (2) 07:05	08:32				
	21:22	52	20:50 (8) 20:21	12	19:17 (1) 19:07	34	18:23 (2) 16:58		16:09	16:05
28	05:27	19:46 (3) 06:19	19:01 (1) 07:12	17:48 (2) 07:07	17:48 (2) 07:07	08:32				
	21:21	51	20:49 (8) 20:18	17	19:18 (1) 19:04	34	18:22 (2) 16:56		16:08	16:06
29	05:29	19:46 (3) 06:21	19:00 (1) 07:14	17:48 (2) 07:09	17:48 (2) 07:09	08:32				
	21:19	49	20:48 (8) 20:16	20	19:20 (1) 19:02	33	18:21 (2) 16:54		16:07	16:07
30	05:30	19:45 (3) 06:23	18:59 (1) 07:16	17:49 (2) 07:10	17:49 (2) 07:10	08:32				
	21:17	47	20:46 (8) 20:14	22	19:21 (1) 18:59	31	18:20 (2) 16:52		16:06	16:08
31	05:32	19:46 (3) 06:24	18:57 (1)	17:49 (2) 07:12	17:49 (2) 07:12	08:32				
	21:16	42	20:45 (8) 20:11	24	19:21 (1)	16:50	16:09		16:09	16:09
Sonnenscheinstunden	508	458	382	330	262	237				
astr.max.mögl.Beschattung	1226	750	794	130						
Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29						
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96						
Reduktion Windrichtung	0.64	0.66	0.71	0.72						
Gesamte Reduktion	0.23	0.27	0.24	0.20						
Met.wahrsch.Beschattung	287	203	190	26						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: Y - IO25

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:07	06:54	19:03 (1) 05:46	19:37 (3) 04:58			20:44 (6)
	16:10	17:00	17:54	19:51	20	19:23 (1) 20:45	29	20:06 (3) 21:33	16 21:00 (6)
2	08:32	08:02	07:05	06:52	19:02 (1) 05:44	19:37 (3) 04:57			20:44 (6)
	16:11	17:02	17:56	19:53	22	19:24 (1) 20:47	31	20:08 (3) 21:35	16 21:00 (5)
3	08:32	08:00	07:03	06:49	19:00 (1) 05:42	19:36 (3) 04:57			20:45 (6)
	16:12	17:04	17:58	19:55	24	19:24 (1) 20:49	32	20:08 (3) 21:36	17 21:02 (5)
4	08:32	07:58	07:00	06:47	18:59 (1) 05:40	19:35 (3) 04:56			20:44 (6)
	16:14	17:06	18:00	19:57	26	19:25 (1) 20:50	33	20:08 (3) 21:37	19 21:03 (5)
5	08:31	07:57	06:58	06:44	18:59 (1) 05:38	19:35 (3) 04:55			20:45 (6)
	16:15	17:08	18:02	19:58	26	19:25 (1) 20:52	33	20:08 (3) 21:38	19 21:04 (5)
6	08:31	07:55	06:56	06:42	18:58 (1) 05:36	19:34 (3) 04:54			20:45 (6)
	16:16	17:10	18:04	20:00	26	19:24 (1) 20:54	34	20:08 (3) 21:39	20 21:05 (5)
7	08:31	07:53	06:54	06:40	18:58 (1) 05:35	19:35 (3) 04:54			20:45 (6)
	16:18	17:12	18:06	20:02	26	19:24 (1) 20:56	34	20:09 (3) 21:40	20 21:05 (5)
8	08:30	07:51	06:51	17:27 (2) 06:37	18:58 (1) 05:33	19:34 (3) 04:53			20:46 (6)
	16:19	17:14	18:08	6 17:33 (2) 20:04	26	19:24 (1) 20:57	35	20:09 (3) 21:41	20 21:06 (5)
9	08:30	07:49	06:49	17:22 (2) 06:35	18:58 (1) 05:31	19:34 (3) 04:53			20:46 (6)
	16:20	17:16	18:09	15 17:37 (2) 20:06	25	19:23 (1) 20:59	34	20:08 (3) 21:42	22 21:08 (5)
10	08:29	07:47	06:47	17:19 (2) 06:33	18:58 (1) 05:29	19:34 (3) 04:52			20:46 (6)
	16:22	17:18	18:11	20 17:39 (2) 20:07	24	19:22 (1) 21:01	39	20:30 (8) 21:43	22 21:08 (5)
11	08:28	07:45	06:44	17:17 (2) 06:30	18:59 (1) 05:27	19:35 (3) 04:52			20:46 (6)
	16:23	17:20	18:13	24 17:41 (2) 20:09	23	19:22 (1) 21:02	42	20:32 (8) 21:43	23 21:09 (5)
12	08:28	07:43	06:42	17:15 (2) 06:28	18:59 (1) 05:26	19:34 (3) 04:51			20:47 (6)
	16:25	17:22	18:15	27 17:42 (2) 20:11	21	19:20 (1) 21:04	46	20:33 (8) 21:44	23 21:10 (5)
13	08:27	07:42	06:39	17:14 (2) 06:26	19:00 (1) 05:24	19:35 (3) 04:51			20:47 (6)
	16:26	17:24	18:17	29 17:43 (2) 20:13	18	19:18 (1) 21:06	47	20:35 (8) 21:45	23 21:10 (5)
14	08:26	07:40	06:37	17:14 (2) 06:23	19:02 (1) 05:22	19:35 (3) 04:51			20:47 (6)
	16:28	17:26	18:19	30 17:44 (2) 20:15	14	19:16 (1) 21:07	48	20:36 (8) 21:45	23 21:10 (5)
15	08:25	07:38	06:35	17:12 (2) 06:21	19:06 (1) 05:21	19:36 (3) 04:51			20:47 (6)
	16:29	17:28	18:21	31 17:45 (2) 20:16	7	19:13 (1) 21:09	48	20:37 (8) 21:46	24 21:11 (5)
16	08:24	07:35	06:32	17:12 (2) 06:19	19:05 (1) 05:19	19:36 (3) 04:50			20:48 (6)
	16:31	17:29	18:22	32 17:44 (2) 20:18		21:11	48	20:37 (8) 21:47	23 21:11 (5)
17	08:23	07:33	06:30	17:11 (2) 06:16		05:17	48	19:37 (3) 04:50	20:48 (6)
	16:33	17:31	18:24	32 17:43 (2) 20:20		21:12	48	20:38 (8) 21:47	24 21:12 (5)
18	08:22	07:31	06:28	17:11 (2) 06:14	19:45 (4) 05:16	19:37 (3) 04:50			20:48 (6)
	16:34	17:33	18:26	33 17:44 (2) 20:22	9	19:54 (4) 21:14	46	20:37 (8) 21:47	24 21:12 (5)
19	08:21	07:29	06:25	17:10 (2) 06:12	19:42 (4) 05:14	19:38 (3) 04:50			20:49 (6)
	16:36	17:35	18:28	33 17:43 (2) 20:24	14	19:56 (4) 21:15	44	20:37 (8) 21:48	24 21:13 (5)
20	08:20	07:27	06:23	17:10 (2) 06:10	19:41 (4) 05:13	19:39 (3) 04:50			20:49 (6)
	16:38	17:37	18:30	33 17:43 (2) 20:25	17	19:58 (4) 21:17	44	20:38 (8) 21:48	24 21:13 (5)
21	08:19	07:25	06:20	17:11 (2) 06:08	19:40 (4) 05:11	19:40 (3) 04:51			20:50 (6)
	16:40	17:39	18:31	32 17:43 (2) 20:27	19	19:59 (4) 21:18	40	20:37 (8) 21:48	24 21:14 (5)
22	08:18	07:23	06:18	17:11 (2) 06:05	19:39 (4) 05:10	19:41 (3) 04:51			20:50 (6)
	16:42	17:41	18:33	30 17:41 (2) 20:29	21	20:00 (4) 21:20	39	20:37 (8) 21:49	24 21:14 (5)
23	08:16	07:21	06:16	17:11 (2) 06:03	19:37 (4) 05:09	19:43 (3) 04:51			20:50 (6)
	16:43	17:43	18:35	30 17:41 (2) 20:31	23	20:00 (4) 21:21	35	20:37 (8) 21:49	24 21:14 (5)
24	08:15	07:18	06:13	17:11 (2) 06:01	19:37 (4) 05:07	19:44 (3) 04:51			20:49 (6)
	16:45	17:45	18:37	28 17:39 (2) 20:33	23	20:00 (4) 21:23	34	20:50 (6) 21:49	24 21:13 (5)
25	08:14	07:16	06:11	17:13 (2) 05:59	19:37 (4) 05:06	19:46 (3) 04:52			20:50 (6)
	16:47	17:47	18:39	25 17:38 (2) 20:34	23	20:00 (4) 21:24	32	20:52 (6) 21:49	24 21:14 (5)
26	08:12	07:14	06:08	17:13 (2) 05:57	19:36 (4) 05:05	19:49 (3) 04:52			20:50 (6)
	16:49	17:49	18:40	22 17:35 (2) 20:36	24	20:00 (3) 21:26	28	20:53 (6) 21:49	24 21:14 (5)
27	08:11	07:12	06:06	17:16 (2) 05:55	19:36 (4) 05:04	20:23 (8) 04:52			20:51 (6)
	16:40	17:39	18:31	17 17:43 (2) 20:38	26	20:02 (3) 21:27	20	20:54 (6) 21:49	23 21:14 (5)
28	08:10	07:10	06:03	17:19 (2) 05:52	19:36 (4) 05:02	20:24 (8) 04:53			20:50 (6)
	16:53	17:53	18:44	11 17:30 (2) 20:40	28	20:04 (3) 21:28	22	20:56 (6) 21:49	24 21:14 (5)
29	08:08	07:01	06:00	19:12 (1) 05:50	19:37 (4) 05:01	20:25 (8) 04:53			20:51 (6)
	16:54	19:46	4	19:16 (1) 20:41	28	20:05 (3) 21:30	21	20:57 (6) 21:49	23 21:14 (5)
30	08:06	06:59	19:07 (1) 05:48		19:37 (4) 05:00	20:27 (8) 04:54			20:50 (6)
	16:56	19:48	13	19:20 (1) 20:43	29	20:06 (3) 21:31	18	20:58 (6) 21:48	23 21:13 (5)
31	08:05	06:56	19:04 (1)		04:59	20:44 (6)			
	16:58	19:49	18	19:22 (1)	21:32	20:59 (6)	15		
Sonnenscheinstunden	253	275	367	418	491	506			
astr.max.mögl.Beschattung			575	612	1099	663			
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39			
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96			
Reduktion Windrichtung			0.72	0.69	0.65	0.62			
Gesamte Reduktion			0.19	0.25	0.27	0.23			
Met.wahrsch.Beschattung			110	150	295	153			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: Y - IO25

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	20:51 (6)	05:33		19:45 (3)	06:26		18:58 (1)	07:18		17:55 (2)	07:14	08:08
	21:48	22 21:13 (5)	21:14	44	20:43 (8)	20:09	23	19:21 (1)	18:57	27	18:22 (2)	16:48	16:05
2	04:55	20:51 (6)	05:35		19:45 (3)	06:28		18:57 (1)	07:19		17:55 (2)	07:16	08:09
	21:48	22 21:13 (5)	21:12	42	20:42 (8)	20:07	24	19:21 (1)	18:55	25	18:20 (2)	16:46	16:04
3	04:56	20:50 (6)	05:37		19:44 (3)	06:29		18:56 (1)	07:21		17:56 (2)	07:18	08:11
	21:47	22 21:12 (5)	21:11	36	20:39 (8)	20:04	25	19:21 (1)	18:52	22	18:18 (2)	16:44	16:04
4	04:57	20:51 (6)	05:38		19:44 (3)	06:31		18:55 (1)	07:23		17:58 (2)	07:20	08:12
	21:47	21 21:12 (5)	21:09	35	20:19 (3)	20:02	26	19:21 (1)	18:50	18	18:16 (2)	16:42	16:03
5	04:58	20:51 (6)	05:40		19:44 (3)	06:33		18:54 (1)	07:25		18:01 (2)	07:22	08:14
	21:46	21 21:12 (5)	21:07	34	20:18 (3)	20:00	27	19:21 (1)	18:47	11	18:12 (2)	16:40	16:03
6	04:59	20:51 (6)	05:42		19:44 (3)	06:35		18:54 (1)	07:26			07:24	08:15
	21:46	20 21:11 (5)	21:05	34	20:18 (3)	19:57	27	19:21 (1)	18:45			16:39	16:02
7	05:00	20:52 (6)	05:43		19:44 (3)	06:36		18:54 (1)	07:28			07:26	08:16
	21:45	19 21:11 (5)	21:03	33	20:17 (3)	19:55	26	19:20 (1)	18:43			16:37	16:02
8	05:01	20:52 (6)	05:45		19:44 (3)	06:38		18:54 (1)	07:30			07:27	08:17
	21:44	18 21:10 (5)	21:01	34	20:18 (3)	19:53	25	19:19 (1)	18:40			16:35	16:01
9	05:02	20:52 (6)	05:47		19:45 (3)	06:40		18:54 (1)	07:32			07:29	08:19
	21:44	18 21:10 (5)	20:59	33	20:18 (3)	19:50	24	19:18 (1)	18:38			16:33	16:01
10	05:03	20:52 (6)	05:48		19:45 (3)	06:41		18:55 (1)	07:34			07:31	08:20
	21:43	17 21:09 (5)	20:57	31	20:16 (3)	19:48	23	19:18 (1)	18:36			16:32	16:01
11	05:04	20:52 (6)	05:50		19:45 (3)	06:43		18:55 (1)	07:35			07:33	08:21
	21:42	16 21:08 (5)	20:55	31	20:16 (3)	19:45	21	19:16 (1)	18:33			16:30	16:00
12	05:05	20:53 (6)	05:52		19:45 (3)	06:45		18:56 (1)	07:37			07:35	08:22
	21:41	15 21:08 (6)	20:53	30	20:15 (3)	19:43	18	19:14 (1)	18:31			16:28	16:00
13	05:06	20:53 (6)	05:53		19:45 (4)	06:47		18:58 (1)	07:39			07:37	08:23
	21:40	17 21:07 (6)	20:51	29	20:14 (3)	19:41	14	19:12 (1)	18:29			16:27	16:00
14	05:07	20:54 (8)	05:55		19:45 (4)	06:48		19:01 (1)	07:41			07:39	08:24
	21:39	20 21:06 (6)	20:49	28	20:13 (3)	19:38	6	19:07 (1)	18:26			16:25	16:00
15	05:09	20:53 (8)	05:57		19:44 (4)	06:50		18:09 (2)	07:43			07:41	08:25
	21:38	21 21:05 (6)	20:47	27	20:11 (3)	19:36	10	18:19 (2)	18:24			16:24	16:00
16	05:10	20:52 (8)	05:58		19:44 (4)	06:52		18:06 (2)	07:44			07:42	08:26
	21:37	21 21:03 (6)	20:45	26	20:10 (3)	19:33	16	18:22 (2)	18:22			16:22	16:00
17	05:11	20:51 (8)	06:00		19:43 (4)	06:53		18:02 (2)	07:46			07:44	08:27
	21:36	21 21:02 (6)	20:43	24	20:07 (4)	19:31	21	18:23 (2)	18:20			16:21	16:00
18	05:12	19:57 (3)	06:02		19:43 (4)	06:55		18:01 (2)	07:48			07:46	08:27
	21:35	31 21:02 (6)	20:41	24	20:07 (4)	19:28	24	18:25 (2)	18:17			16:19	16:01
19	05:14	19:55 (3)	06:04		19:44 (4)	06:57		17:59 (2)	07:50			07:48	08:28
	21:34	33 21:01 (6)	20:39	23	20:07 (4)	19:26	27	18:26 (2)	18:15			16:18	16:01
20	05:15	19:53 (3)	06:05		19:43 (4)	06:59		17:57 (2)	07:52			07:50	08:29
	21:32	33 20:46 (8)	20:36	22	20:05 (4)	19:24	29	18:26 (2)	18:13			16:17	16:01
21	05:17	19:52 (3)	06:07		19:44 (4)	07:00		17:56 (2)	07:54			07:51	08:29
	21:31	37 20:47 (8)	20:34	21	20:05 (4)	19:21	31	18:27 (2)	18:11			16:15	16:02
22	05:18	19:51 (3)	06:09		19:45 (4)	07:02		17:56 (2)	07:55			07:53	08:30
	21:30	39 20:47 (8)	20:32	19	20:04 (4)	19:19	31	18:27 (2)	18:09			16:14	16:02
23	05:19	19:50 (3)	06:10		19:45 (4)	07:04		17:55 (2)	07:57			07:55	08:31
	21:28	41 20:47 (8)	20:30	16	20:01 (4)	19:16	32	18:27 (2)	18:06			16:13	16:03
24	05:21	19:49 (3)	06:12		19:46 (4)	07:05		17:54 (2)	07:59			07:56	08:31
	21:27	44 20:48 (8)	20:28	13	19:59 (4)	19:14	32	18:26 (2)	18:04			16:12	16:03
25	05:22	19:48 (3)	06:14		19:48 (4)	07:07		17:54 (2)	07:01			07:58	08:31
	21:25	46 20:48 (8)	20:25	9	19:57 (4)	19:11	32	18:26 (2)	17:02			16:11	16:04
26	05:24	19:47 (3)	06:16			07:09		17:53 (2)	07:03			08:00	08:32
	21:24	46 20:47 (8)	20:23			19:09	33	18:26 (2)	17:00			16:10	16:05
27	05:25	19:47 (3)	06:17			07:11		17:54 (2)	07:05			08:01	08:32
	21:22	48 20:48 (8)	20:21			19:07	32	18:26 (2)	16:58			16:09	16:05
28	05:27	19:46 (3)	06:19		19:06 (1)	07:12		17:53 (2)	07:07			08:03	08:32
	21:21	48 20:47 (8)	20:18	8	19:14 (1)	19:04	31	18:24 (2)	16:56			16:08	16:06
29	05:29	19:46 (3)	06:21		19:03 (1)	07:14		17:53 (2)	07:09			08:05	08:32
	21:19	49 20:47 (8)	20:16	14	19:17 (1)	19:02	31	18:24 (2)	16:54			16:07	16:07
30	05:30	19:45 (3)	06:23		19:01 (1)	07:16		17:54 (2)	07:10			08:06	08:32
	21:17	48 20:46 (8)	20:14	18	19:19 (1)	18:59	29	18:23 (2)	16:52			16:06	16:08
31	05:32	19:45 (3)	06:24		18:59 (1)				07:12				08:32
	21:16	46 20:45 (8)	20:11	21	19:20 (1)				16:50				16:09
Sonnenscheinstunden	508		458		382			330			262		237
astr.max.mögl.Beschattung	920		759		750			103					
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35			0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96			0.96					
Reduktion Windrichtung	0.64		0.66		0.71			0.72					
Gesamte Reduktion	0.23		0.27		0.24			0.20					
Met.wahrsch.Beschattung	214		205		179			21					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: Z - IO26

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni						
1	08:32	08:03	07:07	17:06 (2)	06:54	18:46 (1)	05:46	19:16 (3)	04:58	20:35 (6)		
	16:10	17:00	17:54	16	17:22 (2)	19:51	25	19:11 (1)	20:45	33	19:49 (3)	21:33 25 21:00 (5)
2	08:32	08:02	07:05	17:04 (2)	06:52	18:46 (1)	05:44	19:17 (3)	04:57	20:35 (6)		
	16:11	17:02	17:56	20	17:24 (2)	19:53	25	19:11 (1)	20:47	33	19:50 (3)	21:35 25 21:00 (5)
3	08:32	08:00	07:03	17:02 (2)	06:49	18:46 (1)	05:42	19:18 (3)	04:57	20:37 (6)		
	16:12	17:04	17:58	24	17:26 (2)	19:55	24	19:10 (1)	20:49	31	19:49 (3)	21:36 25 21:02 (5)
4	08:32	07:58	07:00	17:00 (2)	06:47	18:47 (1)	05:40	19:18 (3)	04:56	20:37 (6)		
	16:14	17:06	18:00	26	17:26 (2)	19:57	22	19:09 (1)	20:50	38	20:21 (8)	21:37 25 21:02 (5)
5	08:31	07:57	06:58	16:59 (2)	06:44	18:48 (1)	05:38	19:18 (3)	04:55	20:38 (6)		
	16:15	17:08	18:02	28	17:27 (2)	19:58	20	19:08 (1)	20:52	40	20:22 (8)	21:38 25 21:03 (5)
6	08:31	07:55	06:56	16:59 (2)	06:42	18:49 (1)	05:36	19:19 (3)	04:54	20:39 (6)		
	16:16	17:10	18:04	29	17:28 (2)	20:00	16	19:05 (1)	20:54	42	20:24 (8)	21:39 24 21:03 (5)
7	08:31	07:53	06:54	16:57 (2)	06:40	18:51 (1)	05:35	19:21 (3)	04:54	20:39 (6)		
	16:18	17:12	18:06	31	17:28 (2)	20:02	12	19:03 (1)	20:56	41	20:25 (8)	21:40 23 21:02 (5)
8	08:30	07:51	06:51	16:57 (2)	06:37		05:33	19:21 (3)	04:53	20:40 (10)		
	16:19	17:14	18:08	32	17:29 (2)	20:04		20:26 (8)	21:41	23	21:03 (5)	
9	08:30	07:49	06:49	16:57 (2)	06:35		05:31	19:23 (3)	04:53	20:40 (10)		
	16:20	17:16	18:09	32	17:29 (2)	20:06		20:59	20:26 (8)	21:42	24	21:04 (9)
10	08:29	07:47	06:47	16:56 (2)	06:33		05:29	19:24 (3)	04:52	20:39 (10)		
	16:22	17:18	18:11	32	17:28 (2)	20:07		21:01	20:25 (8)	21:43	25	21:04 (9)
11	08:28	07:45	06:44	16:56 (2)	06:30		05:27	19:27 (3)	04:52	20:39 (10)		
	16:23	17:20	18:13	32	17:28 (2)	20:09	6	19:42 (4)	21:02	31	20:26 (8)	21:43 26 21:05 (9)
12	08:28	07:44	06:42	16:56 (2)	06:28		05:26	19:32 (4)	05:26	20:07 (8)	04:51	20:39 (10)
	16:25	17:22	18:15	31	17:27 (2)	20:11	11	19:43 (4)	21:04	19	20:26 (8)	21:44 26 21:05 (9)
13	08:27	07:42	06:39	16:56 (2)	06:26		05:24	19:30 (4)	05:24	20:08 (8)	04:51	20:38 (10)
	16:26	17:24	18:17	31	17:27 (2)	20:13	15	19:45 (4)	21:06	18	20:26 (8)	21:45 27 21:05 (9)
14	08:26	07:40	06:37	16:57 (2)	06:23		05:22	19:29 (4)	05:22	20:07 (8)	04:51	20:39 (10)
	16:28	17:26	18:19	30	17:27 (2)	20:15	18	19:47 (4)	21:07	18	20:25 (8)	21:45 26 21:05 (9)
15	08:25	07:38	06:35	16:57 (2)	06:21		05:21	19:28 (4)	05:21	20:08 (8)	04:51	20:39 (10)
	16:29	17:28	18:21	28	17:25 (2)	20:16	21	19:49 (4)	21:09	17	20:25 (8)	21:46 27 21:06 (9)
16	08:24	07:35	06:32	16:58 (2)	06:19		05:19	20:08 (8)	04:50	20:39 (10)		
	16:31	17:29	18:22	26	17:24 (2)	20:18	22	19:49 (4)	21:11	16	20:24 (8)	21:47 27 21:06 (9)
17	08:23	07:33	06:30	16:59 (2)	06:16		05:17	19:26 (3)	05:17	20:09 (8)	04:50	20:39 (10)
	16:33	17:31	18:24	23	17:22 (2)	20:20	23	19:49 (4)	21:12	18	20:41 (6)	21:47 28 21:07 (9)
18	08:22	07:31	06:28	17:01 (2)	06:14		05:16	19:24 (3)	05:16	20:10 (8)	04:50	20:39 (10)
	16:34	17:33	18:26	19	17:20 (2)	20:22	25	19:49 (4)	21:14	19	20:42 (6)	21:47 28 21:07 (9)
19	08:21	07:29	06:25	17:03 (2)	06:12		05:14	19:23 (3)	05:14	20:11 (8)	04:50	20:39 (10)
	16:36	17:35	18:28	14	17:17 (2)	20:24	26	19:49 (4)	21:15	19	20:43 (6)	21:48 28 21:07 (9)
20	08:20	07:27	06:23	17:08 (2)	06:10		05:13	19:21 (3)	05:13	20:13 (8)	04:50	20:39 (10)
	16:38	17:37	18:30	4	17:12 (2)	20:25	28	19:49 (3)	21:17	17	20:45 (6)	21:48 28 21:07 (9)
21	08:19	07:25	06:20		06:08		05:11	19:20 (3)	05:11	20:34 (6)	04:51	20:40 (10)
	16:40	17:39	18:31		20:27	30	19:50 (3)	21:18	12	20:46 (6)	21:48 28 21:08 (9)	
22	08:18	07:23	06:18	18:01 (1)	06:05		05:10	19:19 (3)	05:10	20:33 (6)	04:51	20:40 (10)
	16:42	17:41	18:33	2	18:03 (1)	20:29	32	19:51 (3)	21:20	14	20:47 (6)	21:49 28 21:08 (9)
23	08:16	07:21	06:16	17:55 (1)	06:03		05:09	19:18 (3)	05:09	20:33 (6)	04:51	20:40 (10)
	16:43	17:43	18:35	13	18:08 (1)	20:31	32	19:50 (3)	21:21	16	20:49 (6)	21:49 28 21:08 (9)
24	08:15	07:18	06:13	17:52 (1)	06:01		05:07	19:17 (3)	05:07	20:33 (6)	04:51	20:40 (10)
	16:45	17:45	18:37	17	18:09 (1)	20:33	34	19:51 (3)	21:23	17	20:50 (6)	21:49 28 21:08 (9)
25	08:14	07:16	06:11	17:51 (1)	05:59		05:06	19:17 (3)	05:06	20:34 (6)	04:52	20:41 (10)
	16:47	17:47	18:39	20	18:11 (1)	20:34	34	19:51 (3)	21:24	17	20:52 (5)	21:49 28 21:09 (9)
26	08:12	07:14	06:08	17:49 (1)	05:57		05:05	19:16 (3)	05:05	20:34 (6)	04:52	20:41 (10)
	16:49	17:49	18:40	22	18:11 (1)	20:36	35	19:51 (3)	21:26	19	20:53 (5)	21:49 27 21:08 (9)
27	08:11	07:12	06:06	17:48 (1)	05:55		05:04	19:16 (3)	05:04	20:34 (6)	04:52	20:42 (10)
	16:50	17:51	18:42	24	18:12 (1)	20:38	35	19:51 (3)	21:27	20	20:54 (5)	21:49 27 21:09 (9)
28	08:10	07:10	06:03	17:48 (1)	05:52		05:02	19:16 (3)	05:02	20:34 (6)	04:53	20:42 (10)
	16:53	17:53	18:44	25	18:13 (1)	20:40	35	19:51 (3)	21:28	22	20:56 (5)	21:49 27 21:09 (9)
29	08:08		07:01	18:46 (1)	05:50		05:01	19:16 (3)	05:01	20:34 (6)	04:53	20:42 (10)
	16:54		19:46	26	19:12 (1)	20:41	34	19:50 (3)	21:30	23	20:57 (5)	21:49 27 21:09 (9)
30	08:06		06:59	18:46 (1)	05:48		05:00	19:16 (3)	05:00	20:35 (6)	04:54	20:42 (10)
	16:56		19:48	27	19:13 (1)	20:43	34	19:50 (3)	21:31	23	20:58 (5)	21:48 27 21:09 (9)
31	08:05		06:56	18:45 (1)			04:59			20:35 (6)		
	16:58		19:49	27	19:12 (1)		21:32			24	20:59 (5)	
Sonnenscheinstunden	253	275	367	418	491	506	790					
astr.max.mögl.Beschattung		9	711	674	771	790						
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39						
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96						
Reduktion Windrichtung		0.72	0.72	0.68	0.65	0.62						
Gesamte Reduktion		0.17	0.19	0.25	0.27	0.23						
Met.wahrsch.Beschattung		1	137	166	208	182						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: Z - IO26

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:55	20:43 (10)	05:33		19:39 (3)	06:26	19:35 (4)	07:18	17:36 (2)	07:14	08:08			
	21:48	26	21:09 (9)	21:14	26	20:36 (8)	20:09	6	19:41 (4)	18:57	31	18:07 (2)	16:48	16:05
2	04:55	20:44 (10)	05:35		19:36 (3)	06:28			07:19	17:34 (2)	07:16	08:09		
	21:48	25	21:09 (9)	21:12	32	20:36 (8)	20:07		18:55	32	18:06 (2)	16:46	16:04	
3	04:56	20:44 (10)	05:37		19:34 (3)	06:29			07:21	17:34 (2)	07:18	08:11		
	21:47	25	21:09 (9)	21:11	37	20:36 (8)	20:04		18:52	32	18:06 (2)	16:44	16:04	
4	04:57	20:45 (10)	05:38		19:32 (3)	06:31			07:23	17:34 (2)	07:20	08:12		
	21:47	24	21:09 (9)	21:09	40	20:36 (8)	20:02		18:50	32	18:06 (2)	16:42	16:03	
5	04:58	20:45 (10)	05:40		19:30 (3)	06:33	18:47 (1)	07:25		32	17:34 (2)	07:22	08:14	
	21:46	24	21:09 (5)	21:07	41	20:35 (8)	20:00	12	18:59 (1)	18:47	32	18:06 (2)	16:40	16:03
6	04:59	20:45 (10)	05:42		19:30 (3)	06:35	18:45 (1)	07:26		32	17:34 (2)	07:24	08:15	
	21:46	24	21:09 (5)	21:05	42	20:35 (8)	19:57	16	19:01 (1)	18:45	31	18:05 (2)	16:39	16:02
7	05:00	20:45 (10)	05:43		19:28 (3)	06:36	18:43 (1)	07:28		32	17:34 (2)	07:26	08:16	
	21:45	24	21:09 (5)	21:03	41	20:32 (8)	19:55	20	19:03 (1)	18:43	30	18:04 (2)	16:37	16:02
8	05:01	20:44 (10)	05:45		19:28 (3)	06:38	18:41 (1)	07:30		32	17:34 (2)	07:27	08:17	
	21:44	26	21:10 (5)	21:01	39	20:31 (8)	19:53	22	19:03 (1)	18:40	29	18:03 (2)	16:35	16:01
9	05:02	20:44 (10)	05:47		19:27 (3)	06:40	18:40 (1)	07:32		32	17:35 (2)	07:29	08:19	
	21:44	26	21:10 (5)	20:59	38	20:30 (8)	19:50	24	19:04 (1)	18:38	27	18:02 (2)	16:33	16:01
10	05:03	20:44 (10)	05:48		19:26 (3)	06:41	18:39 (1)	07:34		32	17:36 (2)	07:31	08:20	
	21:43	25	21:09 (5)	20:57	32	19:58 (3)	19:48	25	19:04 (1)	18:36	25	18:01 (2)	16:32	16:01
11	05:04	20:44 (10)	05:50		19:26 (3)	06:43	18:38 (1)	07:35		32	17:37 (2)	07:33	08:21	
	21:42	24	21:08 (5)	20:55	32	19:58 (3)	19:45	26	19:04 (1)	18:33	22	17:59 (2)	16:30	16:00
12	05:05	20:43 (10)	05:52		19:25 (3)	06:45	18:38 (1)	07:37		32	17:39 (2)	07:35	08:22	
	21:41	25	21:08 (5)	20:53	33	19:58 (3)	19:43	26	19:04 (1)	18:31	18	17:57 (2)	16:28	16:00
13	05:06	20:43 (10)	05:53		19:24 (3)	06:47	18:37 (1)	07:39		32	17:41 (2)	07:37	08:23	
	21:40	24	21:07 (5)	20:51	35	19:59 (3)	19:41	27	19:04 (1)	18:29	14	17:55 (2)	16:27	16:00
14	05:07	20:43 (10)	05:55		19:25 (3)	06:48	18:37 (1)	07:41		32	17:39 (2)	07:39	08:24	
	21:39	23	21:06 (5)	20:49	34	19:59 (3)	19:38	26	19:03 (1)	18:26		16:25	16:00	
15	05:09	20:43 (10)	05:57		19:24 (3)	06:50	18:37 (1)	07:43		32	17:41 (2)	07:41	08:25	
	21:38	22	21:05 (5)	20:47	34	19:58 (3)	19:36	25	19:02 (1)	18:24		16:24	16:00	
16	05:10	20:42 (10)	05:58		19:24 (3)	06:52	18:37 (1)	07:44		32	17:42 (2)	07:42	08:26	
	21:37	21	21:03 (5)	20:45	34	19:58 (3)	19:33	25	19:02 (1)	18:22		16:22	16:00	
17	05:11	20:42 (10)	06:00		19:23 (3)	06:53	18:37 (1)	07:46		32	17:44 (2)	07:44	08:27	
	21:36	20	21:02 (5)	20:43	34	19:57 (3)	19:31	23	19:00 (1)	18:20		16:21	16:00	
18	05:12	20:43 (10)	06:02		19:23 (3)	06:55	18:38 (1)	07:48		32	17:46 (2)	07:46	08:27	
	21:35	19	21:02 (5)	20:41	34	19:57 (3)	19:28	21	18:59 (1)	18:17		16:19	16:01	
19	05:14	20:43 (10)	06:04		19:24 (3)	06:57	18:39 (1)	07:50		32	17:48 (2)	07:48	08:28	
	21:34	16	20:59 (6)	20:39	33	19:57 (3)	19:26	18	18:57 (1)	18:15		16:18	16:01	
20	05:15	20:43 (10)	06:05		19:24 (3)	06:59	18:40 (1)	07:52		32	17:50 (2)	07:50	08:29	
	21:32	16	20:59 (6)	20:36	32	19:56 (3)	19:24	14	18:54 (1)	18:13		16:17	16:01	
21	05:17	20:44 (10)	06:07		19:24 (3)	07:00	18:44 (1)	07:54		32	17:51 (2)	07:51	08:29	
	21:31	15	20:59 (6)	20:34	31	19:55 (3)	19:21	7	18:51 (1)	18:11		16:15	16:02	
22	05:18	20:44 (10)	06:09		19:25 (3)	07:02	18:37 (1)	07:55		32	17:53 (2)	07:53	08:30	
	21:30	13	20:57 (6)	20:32	30	19:55 (3)	19:19		18:09			16:14	16:02	
23	05:19	20:45 (10)	06:10		19:25 (3)	07:04	18:37 (1)	07:57		32	17:55 (2)	07:55	08:31	
	21:28	16	20:56 (6)	20:30	28	19:53 (3)	19:16		18:06			16:13	16:03	
24	05:21	20:46 (10)	06:12		19:26 (3)	07:05	17:47 (2)	07:59		32	17:57 (2)	07:56	08:31	
	21:27	18	20:55 (6)	20:28	27	19:53 (4)	19:14	12	17:59 (2)	18:04		16:12	16:03	
25	05:22	20:46 (10)	06:14		19:27 (3)	07:07	17:44 (2)	07:01		32	17:59 (2)	07:58	08:31	
	21:25	19	20:53 (6)	20:25	25	19:52 (4)	19:11	18	18:02 (2)	17:02		16:11	16:04	
26	05:24	20:47 (10)	06:16		19:28 (4)	07:09	17:42 (2)	07:03		32	17:59 (2)	07:59	08:32	
	21:24	17	20:51 (6)	20:23	23	19:51 (4)	19:09	22	18:04 (2)	17:00		16:10	16:05	
27	05:25	20:48 (10)	06:17		19:29 (4)	07:11	17:41 (2)	07:05		32	17:59 (2)	07:59	08:32	
	21:22	16	20:51 (6)	20:21	22	19:51 (4)	19:07	24	18:05 (2)	16:58		16:09	16:05	
28	05:27	20:49 (10)	06:19		19:29 (4)	07:12	17:38 (2)	07:07		32	17:59 (2)	07:59	08:32	
	21:21	17	20:35 (8)	20:18	21	19:50 (4)	19:04	27	18:05 (2)	16:56		16:08	16:06	
29	05:29	20:50 (10)	06:21		19:30 (4)	07:14	17:37 (2)	07:09		32	17:59 (2)	07:59	08:32	
	21:19	17	20:36 (8)	20:16	18	19:48 (4)	19:02	29	18:06 (2)	16:54		16:07	16:07	
30	05:30	20:51 (10)	06:23		19:31 (4)	07:16	17:37 (2)	07:10		32	17:59 (2)	07:59	08:32	
	21:17	18	20:36 (8)	20:14	15	19:46 (4)	18:59	30	18:07 (2)	16:52		16:06	16:08	
31	05:32	20:52 (10)	06:24		19:32 (4)				17:12			16:08	16:08	
	21:16	18	20:36 (8)	20:11	11	19:43 (4)			16:50			16:09	16:09	
Sonnenscheinstunden	508		458		382		330		262		237			
astr.max.mögl.Beschattung	643		954		525		355							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29							
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96							
Reduktion Windrichtung	0.63		0.67		0.72		0.72							
Gesamte Reduktion	0.23		0.27		0.24		0.20							
Met.wahrsch.Beschattung	147		262		126		72							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AA - IO27

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni					
1	08:32	08:03	07:07	16:42 (2)	06:54	05:46	19:54 (8)	04:58	20:09 (10)		
	16:10	17:00	17:54	31 17:13 (2)	19:51	20:45	18 20:12 (8)	21:33	40 20:49 (5)		
2	08:32	08:02	07:05	16:42 (2)	06:52	05:44	19:54 (8)	04:57	20:09 (10)		
	16:11	17:02	17:56	31 17:13 (2)	19:53	20:47	19 20:13 (8)	21:35	39 20:48 (5)		
3	08:32	08:00	07:03	16:43 (2)	06:49	05:42	19:54 (8)	04:57	20:10 (10)		
	16:12	17:04	17:58	30 17:13 (2)	19:55	20:49	19 20:13 (8)	21:36	39 20:49 (9)		
4	08:32	07:58	07:00	16:42 (2)	06:47	05:40	19:54 (8)	04:56	20:09 (10)		
	16:14	17:06	18:00	29 17:11 (2)	19:57	9 19:30 (4)	20:50	20:12 (8)	21:37	39 20:48 (9)	
5	08:31	07:57	06:58	16:43 (2)	06:44	19:12 (3)	05:38	19:54 (8)	04:55	20:10 (10)	
	16:15	17:08	18:02	28 17:11 (2)	19:58	20 19:32 (4)	20:52	18 20:12 (8)	21:38	39 20:49 (9)	
6	08:31	07:55	06:56	16:44 (2)	06:42	19:08 (3)	05:36	19:54 (8)	04:54	20:10 (10)	
	16:16	17:10	18:04	27 17:11 (2)	20:00	25 19:33 (4)	20:54	17 20:11 (8)	21:39	39 20:49 (9)	
7	08:31	07:53	06:54	16:44 (2)	06:40	19:06 (3)	05:35	19:55 (8)	04:54	20:10 (10)	
	16:18	17:12	18:06	25 17:09 (2)	20:02	29 19:35 (4)	20:56	16 20:11 (8)	21:40	38 20:48 (9)	
8	08:30	07:51	06:51	16:45 (2)	06:37	19:04 (3)	05:33	19:56 (8)	04:53	20:10 (10)	
	16:19	17:14	18:08	23 17:08 (2)	20:04	32 19:36 (4)	20:57	14 20:10 (8)	21:41	39 20:49 (9)	
9	08:30	07:49	06:49	16:47 (2)	06:35	19:02 (3)	05:31	19:57 (8)	04:53	20:11 (10)	
	16:20	17:16	18:09	19 17:06 (2)	20:06	34 19:36 (4)	20:59	12 20:28 (6)	21:42	38 20:49 (9)	
10	08:29	07:47	06:47	16:49 (2)	06:33	19:01 (3)	05:29	19:58 (8)	04:52	20:10 (10)	
	16:22	17:18	18:11	14 17:03 (2)	20:07	35 19:36 (4)	21:01	14 20:30 (6)	21:43	39 20:49 (9)	
11	08:28	07:45	06:44	16:54 (2)	06:30	19:01 (3)	05:27	20:23 (6)	04:52	20:11 (10)	
	16:23	17:20	18:13	4 16:58 (2)	20:09	35 19:36 (4)	21:02	9 20:32 (6)	21:43	38 20:49 (9)	
12	08:28	07:44	06:42	16:58 (2)	06:28	18:59 (3)	05:26	20:22 (6)	04:51	20:11 (10)	
	16:25	17:22	18:15	20:11	36 19:35 (4)	21:04	11 20:33 (6)	21:44	39 20:50 (9)		
13	08:27	07:42	06:39	16:59 (2)	06:26	18:59 (3)	05:24	20:22 (6)	04:51	20:11 (10)	
	16:26	17:24	18:17	20:13	36 19:35 (4)	21:06	13 20:35 (6)	21:45	38 20:49 (9)		
14	08:26	07:40	06:37	16:58 (2)	06:23	18:58 (3)	05:22	20:21 (6)	04:51	20:11 (10)	
	16:28	17:26	18:19	20:15	36 19:34 (4)	21:07	15 20:36 (6)	21:45	38 20:49 (9)		
15	08:25	07:38	06:35	17:43 (1)	06:21	18:58 (3)	05:21	20:20 (10)	04:51	20:12 (10)	
	16:29	17:28	18:21	10 17:53 (1)	20:16	36 19:34 (4)	21:09	17 20:37 (6)	21:46	37 20:49 (9)	
16	08:24	07:35	06:32	17:41 (1)	06:19	18:58 (3)	05:19	20:17 (10)	04:50	20:12 (10)	
	16:31	17:29	18:22	15 17:56 (1)	20:18	35 19:33 (4)	21:11	20 20:37 (6)	21:47	39 21:10 (7)	
17	08:23	07:33	06:30	17:38 (1)	06:16	18:57 (3)	05:17	20:16 (10)	04:50	20:12 (10)	
	16:33	17:31	18:24	19 17:57 (1)	20:20	34 19:31 (3)	21:12	22 20:41 (5)	21:47	42 21:11 (7)	
18	08:22	07:31	06:28	17:37 (1)	06:14	18:58 (3)	05:16	20:14 (10)	04:50	20:12 (10)	
	16:34	17:33	18:26	21 17:58 (1)	20:22	33 19:31 (3)	21:14	28 20:42 (5)	21:47	43 21:12 (7)	
19	08:21	07:29	06:25	17:35 (1)	06:12	18:58 (3)	05:14	20:13 (10)	04:50	20:13 (10)	
	16:36	17:35	18:28	23 17:58 (1)	20:24	32 19:30 (3)	21:15	30 20:43 (5)	21:48	42 21:12 (7)	
20	08:20	07:27	16:53 (2)	06:23	17:35 (1)	06:10	18:58 (3)	05:13	20:13 (10)	04:50	20:13 (10)
	16:38	17:37	12 17:05 (2)	18:30	24 17:59 (1)	20:25	32 19:30 (3)	21:17	32 20:45 (5)	21:48	43 21:13 (7)
21	08:19	07:25	16:50 (2)	06:20	17:34 (1)	06:08	18:59 (3)	05:11	20:11 (10)	04:50	20:14 (10)
	16:40	17:39	18 17:08 (2)	18:31	26 17:41 (1)	20:27	30 19:29 (3)	21:18	35 20:46 (5)	21:48	43 21:14 (7)
22	08:18	07:23	16:49 (2)	06:18	17:33 (1)	06:05	19:00 (3)	05:10	20:11 (10)	04:51	20:14 (10)
	16:42	17:41	21 17:10 (2)	18:33	26 17:59 (1)	20:29	28 19:28 (3)	21:20	36 20:47 (5)	21:49	43 21:14 (7)
23	08:16	07:21	16:46 (2)	06:16	17:33 (1)	06:03	19:00 (3)	05:09	20:11 (10)	04:51	20:14 (10)
	16:43	17:43	24 17:10 (2)	18:35	26 17:59 (1)	20:31	26 19:26 (3)	21:21	38 20:49 (5)	21:49	43 21:14 (7)
24	08:15	07:18	16:45 (2)	06:13	17:33 (1)	06:01	19:01 (3)	05:07	20:10 (10)	04:51	20:13 (10)
	16:45	17:45	26 17:11 (2)	18:37	25 17:58 (1)	20:33	24 19:25 (3)	21:23	40 20:50 (5)	21:49	43 21:13 (7)
25	08:14	07:16	16:45 (2)	06:11	17:33 (1)	05:59	19:02 (3)	05:06	20:10 (10)	04:52	20:14 (10)
	16:47	17:47	27 17:12 (2)	18:39	25 17:58 (1)	20:34	21 19:23 (3)	21:24	41 20:51 (5)	21:49	43 21:14 (7)
26	08:12	07:14	16:43 (2)	06:08	17:33 (1)	05:57	19:04 (3)	05:05	20:10 (10)	04:52	20:14 (10)
	16:49	17:49	29 17:12 (2)	18:40	23 17:56 (1)	20:36	24 20:07 (8)	21:26	41 20:51 (5)	21:49	41 21:13 (7)
27	08:11	07:12	16:43 (2)	06:06	17:34 (1)	05:55	19:07 (3)	05:04	20:10 (10)	04:52	20:15 (10)
	16:51	17:51	30 17:13 (2)	18:42	21 17:55 (1)	20:38	22 20:09 (8)	21:27	41 20:51 (5)	21:49	37 20:52 (9)
28	08:10	07:10	16:43 (2)	06:03	17:35 (1)	05:52	19:56 (8)	05:02	20:10 (10)	04:53	20:14 (10)
	16:53	17:53	30 17:13 (2)	18:44	19 17:54 (1)	20:40	15 20:11 (8)	21:28	41 20:51 (5)	21:49	38 20:52 (9)
29	08:08		07:01	18:36 (1)	05:50	19:55 (8)	05:01	20:09 (10)	04:53	20:15 (10)	
	16:54		19:46	16 18:52 (1)	20:41	16 20:11 (8)	21:30	42 20:51 (5)	21:49	38 20:53 (9)	
30	08:07		06:59	18:39 (1)	05:48	19:54 (8)	05:00	20:09 (10)	04:54	20:15 (10)	
	16:56		19:48	10 18:49 (1)	20:43	18 20:12 (8)	21:31	41 20:50 (5)	21:48	38 20:53 (9)	
31	08:05		06:56			04:59		20:09 (10)			
	16:58		19:49			21:32		20:50 (5)			
Sonnenscheinstunden	253	275	367	418	491	506	1195				
astr.max.mögl.Beschattung		217	590	753	799	1195					
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39					
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96					
Reduktion Windrichtung		0.73	0.72	0.69	0.64	0.63					
Gesamte Reduktion		0.17	0.19	0.25	0.27	0.24					
Met.wahrsch.Beschattung		36	114	188	212	283					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattenende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AA - IO27

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55	20:15 (10) 05:33	20:32 (6) 06:26	19:00 (3) 07:18		07:14 08:08
	21:48	38 20:53 (9) 21:14	11 20:43 (6) 20:09	35 19:35 (4) 18:57		16:48 16:05
2	04:55	20:16 (10) 05:35	20:11 (8) 06:28	19:00 (3) 07:19		07:16 08:09
	21:48	38 20:54 (9) 21:12	12 20:42 (6) 20:07	35 19:35 (4) 18:55		16:46 16:04
3	04:56	20:15 (10) 05:37	20:08 (8) 06:29	19:00 (3) 07:21		17:28 (2) 07:18 08:11
	21:47	39 20:54 (9) 21:11	13 20:39 (6) 20:04	34 19:34 (4) 18:52	11 17:39 (2) 16:44 16:04	
4	04:57	20:15 (10) 05:38	20:07 (8) 06:31	19:01 (3) 07:23		17:25 (2) 07:20 08:12
	21:47	39 20:54 (9) 21:09	12 20:19 (8) 20:02	32 19:33 (4) 18:50	17 17:42 (2) 16:42 16:03	
5	04:58	20:16 (10) 05:40	20:05 (8) 06:33	19:02 (3) 07:25		17:23 (2) 07:22 08:14
	21:46	39 20:55 (9) 21:07	15 20:20 (8) 20:00	29 19:31 (4) 18:47	21 17:44 (2) 16:40 16:03	
6	04:59	20:16 (10) 05:42	20:04 (8) 06:35	19:04 (3) 07:26		17:21 (2) 07:24 08:15
	21:46	39 20:55 (9) 21:05	17 20:21 (8) 19:57	25 19:29 (4) 18:45	24 17:45 (2) 16:39 16:02	
7	05:00	20:16 (10) 05:43	20:03 (8) 06:36	19:07 (3) 07:28		17:19 (2) 07:26 08:16
	21:45	39 20:55 (9) 21:03	18 20:21 (8) 19:55	20 19:27 (4) 18:43	26 17:45 (2) 16:37 16:02	
8	05:01	20:17 (10) 05:45	20:03 (8) 06:38	19:15 (4) 07:30		17:18 (2) 07:27 08:17
	21:44	39 20:56 (9) 21:01	18 20:21 (8) 19:53	9 19:24 (4) 18:40	28 17:46 (2) 16:35 16:01	
9	05:02	20:17 (10) 05:47	20:03 (8) 06:40		07:32	17:17 (2) 07:29 08:19
	21:44	39 20:56 (9) 20:59	19 20:22 (8) 19:50		18:38	29 17:46 (2) 16:33 16:01
10	05:03	20:17 (10) 05:48	20:02 (8) 06:41		07:34	17:17 (2) 07:31 08:20
	21:43	39 20:56 (9) 20:57	19 20:21 (8) 19:48		18:36	30 17:47 (2) 16:32 16:01
11	05:04	20:17 (10) 05:50	20:03 (8) 06:43		07:35	17:16 (2) 07:33 08:21
	21:42	40 20:57 (5) 20:55	18 20:21 (8) 19:45		18:33	31 17:47 (2) 16:30 16:00
12	05:05	20:18 (10) 05:52	20:02 (8) 06:45		07:37	17:16 (2) 07:35 08:22
	21:41	40 20:58 (5) 20:53	18 20:20 (8) 19:43		18:31	31 17:47 (2) 16:28 16:00
13	05:06	20:18 (10) 05:53	20:03 (8) 06:47		07:39	17:16 (2) 07:37 08:23
	21:40	40 20:58 (5) 20:51	17 20:20 (8) 19:41	9 18:31 (1) 18:29	31 17:47 (2) 16:27 16:00	
14	05:07	20:18 (10) 05:55	20:04 (8) 06:48		07:41	17:15 (2) 07:39 08:24
	21:39	41 20:59 (5) 20:49	16 20:20 (8) 19:38	15 18:42 (1) 18:26	30 17:45 (2) 16:25 16:00	
15	05:09	20:18 (10) 05:57	19:18 (3) 06:50		07:43	17:15 (2) 07:41 08:25
	21:38	41 20:59 (5) 20:47	17 20:18 (8) 19:36	18 18:43 (1) 18:24	30 17:45 (2) 16:24 16:00	
16	05:10	20:18 (10) 05:58	19:13 (3) 06:52		07:44	17:16 (2) 07:42 08:26
	21:37	41 20:59 (5) 20:45	25 20:16 (8) 19:33	21 18:45 (1) 18:22	28 17:44 (2) 16:22 16:00	
17	05:11	20:18 (10) 06:00	19:10 (3) 06:53		07:46	17:16 (2) 07:44 08:27
	21:36	42 21:00 (5) 20:43	24 20:13 (8) 19:31	22 18:44 (1) 18:20	27 17:43 (2) 16:21 16:00	
18	05:12	20:20 (10) 06:02	19:08 (3) 06:55		07:48	17:17 (2) 07:46 08:28
	21:35	41 21:01 (5) 20:41	22 19:30 (3) 19:28	24 18:45 (1) 18:17	25 17:42 (2) 16:19 16:01	
19	05:14	20:20 (10) 06:04	19:07 (3) 06:57		07:50	17:18 (2) 07:48 08:28
	21:34	40 21:00 (5) 20:39	25 19:32 (3) 19:26	25 18:45 (1) 18:15	23 17:41 (2) 16:18 16:01	
20	05:15	20:20 (10) 06:05	19:05 (3) 06:59		07:52	17:19 (2) 07:50 08:29
	21:32	39 20:59 (5) 20:36	27 19:32 (3) 19:24	26 18:45 (1) 18:13	20 17:39 (2) 16:17 16:01	
21	05:17	20:21 (10) 06:07	19:04 (3) 07:00		07:54	17:21 (2) 07:51 08:29
	21:31	38 20:59 (5) 20:34	29 19:33 (3) 19:21	26 18:45 (1) 18:11	16 17:37 (2) 16:15 16:02	
22	05:18	20:22 (10) 06:09	19:04 (3) 07:02		07:55	17:24 (2) 07:53 08:30
	21:30	35 20:57 (5) 20:32	30 19:34 (3) 19:19	25 18:44 (1) 18:09	10 17:34 (2) 16:14 16:02	
23	05:19	20:22 (10) 06:10	19:02 (3) 07:04		07:57	17:25 (2) 07:55 08:31
	21:28	34 20:56 (5) 20:30	32 19:34 (3) 19:16	25 18:44 (1) 18:06		16:13 16:03
24	05:21	20:23 (10) 06:12	19:02 (3) 07:05		07:59	17:26 (2) 07:56 08:31
	21:27	32 20:55 (5) 20:28	32 19:34 (3) 19:14	23 18:42 (1) 18:04		16:12 16:03
25	05:22	20:24 (10) 06:14	19:00 (3) 07:07		08:01	17:27 (2) 07:58 08:31
	21:25	29 20:53 (5) 20:25	34 19:34 (3) 19:11	22 18:41 (1) 17:02		16:11 16:04
26	05:24	20:25 (10) 06:16	19:00 (3) 07:09		08:03	17:28 (2) 08:00 08:32
	21:24	24 20:51 (5) 20:23	34 19:34 (3) 19:09	20 18:40 (1) 17:00		16:10 16:05
27	05:25	20:27 (10) 06:17	19:00 (3) 07:11		08:05	17:29 (2) 08:01 08:32
	21:22	21 20:48 (6) 20:21	35 19:35 (4) 19:07	17 18:39 (1) 16:58		16:09 16:05
28	05:27	20:28 (10) 06:19	18:59 (3) 07:12		08:07	17:30 (2) 08:03 08:32
	21:21	19 20:47 (6) 20:18	36 19:35 (4) 19:04	12 18:35 (1) 16:56		16:08 16:06
29	05:29	20:31 (6) 06:21	18:59 (3) 07:14		08:09	17:31 (2) 08:05 08:32
	21:19	17 20:48 (6) 20:16	36 19:35 (4) 19:02	2 18:30 (1) 16:54		16:07 16:07
30	05:30	20:31 (6) 06:22	19:00 (3) 07:16		08:10	17:32 (2) 08:06 08:32
	21:17	15 20:46 (6) 20:14	36 19:36 (4) 18:59		16:52	16:06 16:08
31	05:32	20:32 (6) 06:24	18:59 (3) 07:17		08:11	17:33 (2) 08:07 08:32
	21:16	13 20:45 (6) 20:11	36 19:35 (4) 18:58		16:50	16:05 16:09
Sonnenscheinstunden	509	458	382	330	262	237
astr. max.mögl. Beschattung	1070	733	551	468		
Red. Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29		
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96		
Reduktion Windrichtung	0.64	0.68	0.71	0.73		
Gesamte Reduktion	0.23	0.28	0.24	0.20		
Met. wahrsch. Beschattung	248	204	131	100		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AB - IO28

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni					
1	08:32	08:03	07:07	16:35 (2)	06:54	19:00 (3)	05:46	19:47 (8)	04:58	19:59 (10)	
	16:10	17:00	17:54	17:03 (2)	19:51	19:25 (4)	20:45	19:20 (8)	21:33	41 20:40 (9)	
2	08:32	08:02	07:05	16:36 (2)	06:52	18:58 (3)	05:44	19:48 (8)	04:57	19:59 (10)	
	16:11	17:02	17:56	17:02 (2)	19:53	19:27 (4)	20:47	18:20 (6)	21:35	41 20:40 (9)	
3	08:32	08:00	07:03	16:37 (2)	06:49	18:56 (3)	05:42	19:49 (8)	04:57	20:00 (10)	
	16:12	17:04	17:58	17:02 (2)	19:55	19:28 (4)	20:49	16:20 (5)	21:36	40 20:40 (9)	
4	08:32	07:58	07:00	16:38 (2)	06:47	18:54 (3)	05:40	19:49 (8)	04:56	20:00 (10)	
	16:14	17:06	18:00	17:00 (2)	19:57	19:30 (4)	20:50	15:20 (4)	21:37	40 20:40 (9)	
5	08:31	07:57	06:58	16:39 (2)	06:44	18:53 (3)	05:38	19:50 (8)	04:55	20:01 (10)	
	16:15	17:08	18:02	19:16 (2)	19:58	19:31 (4)	20:52	13:20 (3)	21:38	39 20:40 (9)	
6	08:31	07:55	06:56	16:42 (2)	06:42	18:52 (3)	05:36	19:52 (8)	04:54	20:01 (10)	
	16:16	17:10	18:04	14:16 (5)	20:00	19:30 (4)	20:54	12:20 (4)	21:39	44 21:04 (7)	
7	08:31	07:53	06:54	16:46 (2)	06:40	18:51 (3)	05:35	19:56 (8)	04:54	20:00 (10)	
	16:18	17:12	18:06	4 16:50 (2)	20:02	19:30 (4)	20:56	9 20:26 (6)	21:40	47 21:05 (7)	
8	08:30	07:51	06:51	16:47 (2)	06:37	18:51 (3)	05:33	20:18 (6)	04:53	20:01 (10)	
	16:19	17:14	18:08	16:48 (2)	06:37	19:30 (4)	20:57	9 20:27 (6)	21:41	47 21:06 (7)	
9	08:30	07:49	06:49	16:49 (2)	06:35	18:49 (3)	05:31	20:09 (10)	04:53	20:02 (10)	
	16:20	17:16	18:09	16:50 (2)	20:06	19:29 (4)	20:59	19 20:28 (6)	21:42	49 21:08 (7)	
10	08:29	07:47	06:47	16:51 (2)	06:33	18:49 (3)	05:29	20:06 (10)	04:52	20:02 (10)	
	16:22	17:18	18:11	16:52 (2)	20:07	19:29 (4)	21:01	24 20:30 (6)	21:43	49 21:08 (7)	
11	08:28	07:45	06:44	17:40 (1)	06:30	18:49 (3)	05:27	20:05 (10)	04:52	20:02 (10)	
	16:23	17:20	18:13	5 17:45 (1)	20:09	19:28 (4)	21:02	27 20:32 (6)	21:43	50 21:09 (7)	
12	08:28	07:44	06:42	17:35 (1)	06:28	18:49 (3)	05:26	20:03 (10)	04:51	20:03 (10)	
	16:25	17:22	18:15	13 17:48 (1)	20:11	19:27 (4)	21:04	28 20:31 (6)	21:44	49 21:09 (7)	
13	08:27	07:42	06:39	17:33 (1)	06:26	18:49 (3)	05:24	20:03 (10)	04:51	20:03 (10)	
	16:26	17:24	18:17	17 17:50 (1)	20:13	19:25 (4)	21:06	29 20:32 (6)	21:45	49 21:09 (7)	
14	08:26	07:40	06:37	17:31 (1)	06:23	18:49 (3)	05:22	20:01 (10)	04:51	20:03 (10)	
	16:28	17:26	18:19	21 17:52 (1)	20:15	19:24 (4)	21:07	32 20:33 (9)	21:45	49 21:10 (7)	
15	08:25	07:38	06:35	17:30 (1)	06:21	18:50 (3)	05:21	20:01 (10)	04:51	20:03 (10)	
	16:29	17:28	18:21	22 17:52 (1)	20:16	19:21 (3)	21:09	37 20:38 (5)	21:46	49 21:10 (7)	
16	08:24	07:35	16:45 (2)	16:57 (2)	06:32	17:29 (1)	06:19	18:49 (3)	05:19	20:00 (10)	
	16:31	17:29	18:22	24 17:53 (1)	20:18	30 19:19 (3)	21:11	39 20:39 (5)	21:47	49 21:11 (7)	
17	08:23	07:33	16:42 (2)	06:30	17:28 (1)	06:16	18:50 (3)	05:17	20:00 (10)	04:50	20:04 (10)
	16:33	17:31	18 17:00 (2)	18:24	24 17:52 (1)	20:20	28 19:18 (3)	21:12	41 20:41 (5)	21:47	49 21:11 (7)
18	08:22	07:31	16:40 (2)	06:28	17:27 (1)	06:14	18:51 (3)	05:16	19:59 (10)	04:50	20:04 (10)
	16:34	17:33	21 17:01 (2)	18:26	26 17:53 (1)	20:22	26 19:17 (3)	21:14	43 20:42 (5)	21:47	49 21:11 (7)
19	08:21	07:29	16:39 (2)	06:25	17:26 (1)	06:12	18:53 (3)	05:14	19:59 (10)	04:50	20:05 (10)
	16:36	17:35	23 17:02 (2)	18:28	26 17:52 (1)	20:24	23 19:16 (3)	21:15	44 20:43 (5)	21:48	49 21:12 (7)
20	08:20	07:27	16:38 (2)	06:23	17:27 (1)	06:10	18:54 (3)	05:13	19:59 (10)	04:50	20:05 (10)
	16:38	17:37	25 17:03 (2)	18:30	25 17:52 (1)	20:25	20 19:14 (3)	21:17	46 20:45 (5)	21:48	49 21:12 (7)
21	08:19	07:25	16:37 (2)	06:20	17:27 (1)	06:08	18:57 (3)	05:11	19:58 (10)	04:50	20:06 (10)
	16:40	17:39	27 17:04 (2)	18:31	25 17:52 (1)	20:27	15 19:12 (3)	21:18	48 20:46 (5)	21:48	49 21:13 (7)
22	08:18	07:23	16:37 (2)	06:18	17:27 (1)	06:05	19:00 (3)	05:10	19:58 (10)	04:51	20:06 (10)
	16:42	17:41	28 17:05 (2)	18:33	24 17:51 (1)	20:29	8 19:08 (3)	21:20	48 20:46 (5)	21:49	49 21:13 (7)
23	08:16	07:21	16:35 (2)	06:16	17:28 (1)	06:03	19:53 (8)	05:09	19:58 (10)	04:51	20:06 (10)
	16:43	17:43	30 17:05 (2)	18:35	22 17:50 (1)	20:31	9 20:02 (8)	21:21	48 20:46 (5)	21:49	49 21:13 (7)
24	08:15	07:18	16:35 (2)	06:13	17:28 (1)	06:01	19:51 (8)	05:07	19:58 (10)	04:51	20:05 (10)
	16:45	17:45	30 17:05 (2)	18:37	20 17:48 (1)	20:33	13 20:04 (8)	21:23	48 20:46 (5)	21:49	49 21:12 (7)
25	08:14	07:16	16:35 (2)	06:11	17:30 (1)	05:59	19:50 (8)	05:06	19:58 (10)	04:52	20:06 (10)
	16:47	17:47	30 17:05 (2)	18:39	17 17:47 (1)	20:34	15 20:05 (8)	21:24	48 20:46 (5)	21:49	49 21:13 (7)
26	08:12	07:14	16:34 (2)	06:08	17:31 (1)	05:57	19:49 (8)	05:05	19:58 (10)	04:52	20:06 (10)
	16:49	17:49	30 17:04 (2)	18:40	12 17:43 (1)	20:36	17 20:06 (8)	21:26	48 20:46 (5)	21:49	49 21:13 (7)
27	08:11	07:12	16:35 (2)	06:06	17:36 (1)	05:55	19:48 (8)	05:04	19:58 (10)	04:52	20:07 (10)
	16:51	17:51	29 17:04 (2)	18:42	2 17:38 (1)	20:38	18 20:06 (8)	21:27	47 20:45 (5)	21:49	48 21:13 (7)
28	08:10	07:10	16:35 (2)	06:03	17:30 (1)	05:52	19:48 (8)	05:02	19:58 (10)	04:53	20:06 (10)
	16:53	17:53	29 17:04 (2)	18:44	20:40	18 20:06 (8)	21:28	47 20:45 (5)	21:49	49 21:13 (7)	
29	08:08		07:01	05:50	19:47 (8)	05:01	19:59 (10)	04:53	20:07 (10)		
	16:54		19:46	20:41	19 20:06 (8)	21:30	45 20:44 (5)	21:49	49 21:13 (7)		
30	08:07		06:59	05:48	19:47 (8)	05:00	19:59 (10)	04:54	20:06 (10)		
	16:56		19:48	20:43	19 20:06 (8)	21:31	43 20:42 (5)	21:48	50 21:13 (7)		
31	08:05		06:56	19:03 (3)		04:59		19:59 (10)			
	16:58		19:49	19:14 (3)		21:32	41 20:40 (9)				
Sonnenscheinstunden	253	275	367	419	491	506					
astr.max.mögl.Beschattung		332	474	813	1031	1418					
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39					
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96					
Reduktion Windrichtung		0.73	0.72	0.70	0.64	0.64					
Gesamte Reduktion		0.17	0.19	0.25	0.27	0.24					
Met.wahrsch.Beschattung		55	91	204	275	336					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattenende (WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	--	---

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AB - IO28

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:55	20:07 (10) 05:33	20:14 (10) 06:26	18:48 (3) 07:18	18:14 (1) 07:14	08:08	
	21:48	49 21:13 (7) 21:14	28 20:42 (6) 20:09	39 19:27 (4) 18:57	15 18:29 (1) 16:48	16:05	
2	04:55	20:07 (10) 05:35	20:16 (10) 06:28	18:48 (3) 07:19	18:15 (1) 07:16	08:09	
	21:48	49 21:13 (7) 21:12	26 20:42 (6) 20:07	40 19:28 (4) 18:55	10 18:25 (1) 16:46	16:04	
3	04:56	20:06 (10) 05:37	20:18 (10) 06:29	18:47 (3) 07:21		07:18	08:11
	21:47	49 21:12 (7) 21:11	21 20:39 (6) 20:04	40 19:27 (4) 18:52		16:44	16:04
4	04:57	20:07 (10) 05:38	20:21 (10) 06:31	18:48 (3) 07:23		07:20	08:12
	21:47	47 21:12 (7) 21:09	17 20:38 (6) 20:02	39 19:27 (4) 18:50		16:42	16:03
5	04:58	20:07 (10) 05:40	20:28 (6) 06:33	18:47 (3) 07:25		07:22	08:14
	21:46	47 21:12 (7) 21:07	8 20:36 (6) 20:00	39 19:26 (4) 18:47		16:40	16:03
6	04:59	20:07 (10) 05:42	20:03 (8) 06:35	18:48 (3) 07:26		07:24	08:15
	21:46	45 21:11 (7) 21:05	12 20:35 (6) 19:57	38 19:26 (4) 18:45		16:39	16:02
7	05:00	20:07 (10) 05:43	20:00 (8) 06:36	18:48 (3) 07:28	17:19 (2) 07:26	08:16	
	21:45	41 21:09 (7) 21:03	11 20:11 (8) 19:55	38 19:26 (4) 18:43	10 17:29 (2) 16:37	16:02	
8	05:01	20:07 (10) 05:45	19:59 (8) 06:38	18:48 (3) 07:30		17:16 (2) 07:27	08:17
	21:44	40 20:47 (9) 21:01	14 20:13 (8) 19:53	36 19:24 (4) 18:40	16 17:32 (2) 16:35	16:01	
9	05:02	20:07 (10) 05:47	19:59 (8) 06:40	18:50 (3) 07:32		17:13 (2) 07:29	08:19
	21:44	40 20:47 (9) 20:59	15 20:14 (8) 19:50	32 19:22 (4) 18:38	21 17:34 (2) 16:33	16:01	
10	05:03	20:07 (10) 05:48	19:57 (8) 06:41	18:51 (3) 07:34		17:12 (2) 07:31	08:20
	21:43	41 20:48 (9) 20:57	17 20:14 (8) 19:48	29 19:20 (4) 18:36	23 17:35 (2) 16:32	16:01	
11	05:04	20:07 (10) 05:50	19:57 (8) 06:43	18:52 (3) 07:35		17:11 (2) 07:33	08:21
	21:42	41 20:48 (9) 20:55	18 20:15 (8) 19:45	25 19:17 (4) 18:33	25 17:36 (2) 16:30	16:00	
12	05:05	20:07 (10) 05:52	19:56 (8) 06:45	18:55 (3) 07:37		17:10 (2) 07:35	08:22
	21:41	42 20:49 (9) 20:53	18 20:14 (8) 19:43	15 19:14 (4) 18:31	27 17:37 (2) 16:28	16:00	
13	05:06	20:07 (10) 05:53	19:56 (8) 06:47		07:39	17:09 (2) 07:37	08:23
	21:40	43 20:50 (5) 20:51	19 20:15 (8) 19:41		18:29	28 17:37 (2) 16:27	16:00
14	05:07	20:07 (10) 05:55	19:56 (8) 06:48		07:41	17:07 (2) 07:39	08:24
	21:39	45 20:52 (5) 20:49	19 20:15 (8) 19:38		18:26	30 17:37 (2) 16:25	16:00
15	05:09	20:07 (10) 05:57	19:55 (8) 06:50		07:43	17:07 (2) 07:41	08:25
	21:38	46 20:53 (5) 20:47	19 20:14 (8) 19:36		18:24	30 17:37 (2) 16:24	16:00
16	05:10	20:07 (10) 05:58	19:56 (8) 06:52		07:44	17:07 (2) 07:42	08:26
	21:37	46 20:53 (5) 20:45	18 20:14 (8) 19:33		18:22	30 17:37 (2) 16:22	16:00
17	05:11	20:07 (10) 06:00	19:56 (8) 06:53		18:20 (1) 07:46	17:06 (2) 07:44	08:27
	21:36	47 20:54 (5) 20:43	16 20:12 (8) 19:31	11 18:31 (1) 18:20	31 17:37 (2) 16:21	16:00	
18	05:12	20:08 (10) 06:02	19:57 (8) 06:55		18:18 (1) 07:48	17:06 (2) 07:46	08:28
	21:35	47 20:55 (5) 20:41	15 20:12 (8) 19:28	16 18:34 (1) 18:17	30 17:36 (2) 16:19	16:01	
19	05:14	20:08 (10) 06:04	19:58 (8) 06:57		18:16 (1) 07:50	17:07 (2) 07:48	08:28
	21:34	47 20:55 (5) 20:39	12 20:10 (8) 19:26	19 18:35 (1) 18:15	29 17:36 (2) 16:18	16:01	
20	05:15	20:07 (10) 06:05	19:59 (8) 06:59		18:14 (1) 07:52	17:07 (2) 07:50	08:29
	21:32	49 20:56 (5) 20:36	8 20:07 (8) 19:24	21 18:35 (1) 18:13	28 17:35 (2) 16:17	16:01	
21	05:17	20:08 (10) 06:07	19:04 (3) 07:00		18:13 (1) 07:54	17:08 (2) 07:51	08:29
	21:31	48 20:56 (5) 20:34	10 19:14 (3) 19:21	23 18:36 (1) 18:11	26 17:34 (2) 16:15	16:02	
22	05:18	20:08 (10) 06:09	19:01 (3) 07:02		18:12 (1) 07:55	17:08 (2) 07:53	08:30
	21:30	48 20:56 (5) 20:32	16 19:17 (3) 19:19	24 18:36 (1) 18:09	25 17:33 (2) 16:14	16:02	
23	05:19	20:08 (10) 06:10	18:58 (3) 07:04		18:11 (1) 07:57	17:09 (2) 07:55	08:31
	21:28	48 20:56 (5) 20:30	20 19:18 (3) 19:16	26 18:37 (1) 18:06	23 17:32 (2) 16:13	16:03	
24	05:21	20:09 (10) 06:12	18:56 (3) 07:05		18:10 (1) 07:59	17:11 (2) 07:56	08:31
	21:27	46 20:55 (5) 20:28	24 19:20 (3) 19:14	26 18:36 (1) 18:04	20 17:31 (2) 16:12	16:03	
25	05:22	20:09 (10) 06:14	18:54 (3) 07:07		18:10 (1) 07:01	16:12 (2) 07:58	08:31
	21:25	44 20:53 (5) 20:25	26 19:20 (3) 19:11	26 18:36 (1) 17:02	17 16:29 (2) 16:11	16:04	
26	05:24	20:09 (10) 06:16	18:53 (3) 07:09		18:10 (1) 07:03	16:15 (2) 08:00	08:32
	21:24	42 20:51 (5) 20:23	28 19:21 (3) 19:09	25 18:35 (1) 17:00	11 16:26 (2) 16:10	16:05	
27	05:25	20:10 (10) 06:17	18:52 (3) 07:11		18:10 (1) 07:05	08:01	08:32
	21:22	41 20:51 (5) 20:21	30 19:22 (3) 19:07	25 18:35 (1) 16:58		16:09	16:05
28	05:27	20:11 (10) 06:19	18:51 (3) 07:12		18:10 (1) 07:07	08:03	08:32
	21:21	38 20:49 (5) 20:18	31 19:22 (3) 19:04	23 18:33 (1) 16:56		16:08	16:06
29	05:29	20:12 (10) 06:21	18:50 (3) 07:14		18:11 (1) 07:09	08:05	08:32
	21:19	35 20:48 (5) 20:16	35 19:25 (4) 19:02	21 18:32 (1) 16:54		16:07	16:07
30	05:30	20:12 (10) 06:22	18:50 (3) 07:16		18:12 (1) 07:10	08:06	08:32
	21:17	30 20:42 (9) 20:14	36 19:26 (4) 18:59	19 18:31 (1) 16:52		16:06	16:08
31	05:32	20:14 (10) 06:24	18:48 (3)		07:12		08:32
	21:16	28 20:42 (6) 20:11	38 19:26 (4)		16:50		16:09
Sonnenscheinstunden		509	458	382	330	262	237
astr.max.mögl.Beschattung		1349	625	715	505		
Red.Sonnenscheinwahrsch.		0.38	0.42	0.35	0.29		
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96		
Reduktion Windrichtung		0.64	0.68	0.71	0.73		
Gesamte Reduktion		0.23	0.28	0.24	0.20		
Met.wahrsch.Beschattung		315	173	171	103		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AC - IO29

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni						
1	08:32	08:03	07:07	16:30 (2)	06:54	18:52 (3)	05:46	19:45 (8) 04:58				
	16:10	17:00	17:54	25 16:55 (2)	19:51	33 19:25 (4)	20:45	19 20:04 (8) 21:33				
2	08:32	08:02	07:05	16:32 (2)	06:52	18:51 (3)	05:44	19:47 (8) 04:57				
	16:11	17:02	17:56	22 16:54 (2)	19:53	36 19:27 (4)	20:47	17 20:04 (8) 21:35				
3	08:32	08:00	07:03	16:33 (2)	06:49	18:49 (3)	05:42	19:47 (8) 04:57				
	16:12	17:04	17:58	20 16:53 (2)	19:55	38 19:27 (4)	20:49	17 20:04 (8) 21:36				
4	08:32	07:58	07:01	16:35 (2)	06:47	18:48 (3)	05:40	19:48 (8) 04:56				
	16:14	17:06	18:00	14 16:49 (2)	19:57	40 19:28 (4)	20:50	14 20:02 (8) 21:37				
5	08:31	07:57	06:58	16:40 (2)	06:44	18:47 (3)	05:38	19:49 (8) 04:55				
	16:15	17:08	18:02	5 16:45 (2)	19:58	41 19:28 (4)	20:52	12 20:01 (8) 21:38				
6	08:31	07:55	06:56		06:42	18:46 (3)	05:36	19:50 (8) 04:54				
	16:16	17:10	18:04		20:00	42 19:28 (4)	20:54	13 20:24 (6) 21:39				
7	08:31	07:53	06:54		06:40	18:45 (3)	05:35	20:18 (6) 04:54				
	16:18	17:12	18:06		20:02	43 19:28 (4)	20:56	8 20:26 (6) 21:40				
8	08:30	07:51	06:51		06:37	18:45 (3)	05:33	20:12 (10) 04:53				
	16:19	17:14	18:08		20:04	43 19:28 (4)	20:57	13 20:27 (6) 21:41				
9	08:30	07:49	06:49		06:35	18:44 (3)	05:31	20:07 (10) 04:53				
	16:20	17:16	18:09		20:06	42 19:26 (4)	20:59	21 20:28 (6) 21:42				
10	08:29	07:47	06:47		06:33	18:44 (3)	05:29	20:04 (10) 04:52				
	16:22	17:18	18:11	11 17:32 (1)	20:07	42 19:26 (4)	21:01	26 20:30 (6) 21:43				
11	08:28	07:45	06:44		06:30	18:44 (3)	05:27	20:03 (10) 04:52				
	16:23	17:20	18:13	16 17:46 (1)	20:09	41 19:25 (4)	21:02	28 20:31 (6) 21:43				
12	08:28	07:44	06:42		06:28	18:44 (3)	05:26	20:01 (10) 04:51				
	16:25	17:22	18:15	20 17:47 (1)	20:11	39 19:23 (4)	21:04	30 20:31 (6) 21:44				
13	08:27	07:42	06:39		06:26	18:44 (3)	05:24	20:00 (10) 04:51				
	16:26	17:24	18:17	22 17:48 (1)	20:13	37 19:21 (4)	21:06	31 20:31 (6) 21:45				
14	08:26	07:40	06:37		06:23	18:45 (3)	05:22	19:59 (10) 04:51				
	16:28	17:26	18:19	24 17:49 (1)	20:15	34 19:19 (4)	21:07	32 20:31 (9) 21:45				
15	08:25	07:38	06:35		06:21	18:45 (3)	05:21	19:58 (10) 04:51				
	16:29	17:28	18:21	25 17:49 (1)	20:16	31 19:16 (3)	21:09	40 20:38 (5) 21:46				
16	08:24	07:36	06:32		06:19	18:46 (3)	05:19	19:57 (10) 04:50				
	16:31	17:29	18:22	25 17:49 (1)	20:18	29 19:15 (3)	21:11	42 20:39 (5) 21:47				
17	08:23	07:33	06:30		06:16	18:46 (3)	05:17	19:57 (10) 04:50				
	16:33	17:31	18:24	26 17:49 (1)	20:20	27 19:13 (3)	21:12	44 20:41 (5) 21:47				
18	08:22	07:31	06:28		06:14	18:48 (3)	05:16	19:56 (10) 04:50				
	16:34	17:33	18:26	26 17:49 (1)	20:22	24 19:12 (3)	21:14	46 20:42 (5) 21:47				
19	08:21	07:29	06:25		06:12	18:49 (3)	05:14	19:56 (10) 04:50				
	16:36	17:35	18:28	26 17:48 (1)	20:24	21 19:10 (3)	21:15	47 20:43 (5) 21:48				
20	08:20	07:27	06:23		06:10	18:52 (3)	05:13	19:56 (10) 04:50				
	16:38	17:37	18:30	25 17:48 (1)	20:25	16 19:08 (3)	21:17	49 20:45 (5) 21:48				
21	08:19	07:25	06:20		06:08	18:55 (3)	05:11	19:55 (10) 04:50				
	16:40	17:39	18:31	24 17:47 (1)	20:27	9 19:04 (3)	21:18	50 20:45 (5) 21:48				
22	08:18	07:23	06:18		06:05	19:54 (8)	05:10	19:55 (10) 04:51				
	16:42	17:41	18:33	22 17:45 (1)	20:29	6 20:00 (8)	21:20	51 20:46 (5) 21:49				
23	08:16	07:21	06:16		06:03	19:50 (8)	05:09	19:55 (10) 04:51				
	16:43	17:43	18:35	19 17:44 (1)	20:31	12 20:02 (8)	21:21	51 20:46 (5) 21:49				
24	08:15	07:18	06:13		06:01	19:49 (8)	05:07	19:55 (10) 04:51				
	16:45	17:45	18:37	16 17:42 (1)	20:33	14 20:03 (8)	21:23	51 20:46 (5) 21:49				
25	08:14	07:16	06:11		05:59	19:48 (8)	05:06	19:55 (10) 04:52				
	16:47	17:47	18:39	11 17:39 (1)	20:34	16 20:04 (8)	21:24	51 20:46 (5) 21:49				
26	08:12	07:14	06:08		05:57	19:47 (8)	05:05	19:55 (10) 04:52				
	16:49	17:49	18:40		20:36	18 20:05 (8)	21:26	50 20:45 (5) 21:49				
27	08:11	07:12	06:06		05:55	19:46 (8)	05:04	19:56 (10) 04:52				
	16:50	17:51	18:42	28 16:57 (2)	18:42	19 20:05 (8)	21:27	49 20:45 (5) 21:49				
28	08:10	07:10	06:03		05:52	19:46 (8)	05:02	19:56 (10) 04:53				
	16:53	17:53	18:44		20:40	19 20:05 (8)	21:28	48 20:44 (5) 21:49				
29	08:08		07:01		05:50	19:45 (8)	05:01	19:56 (10) 04:53				
	16:54		19:46	5 19:08 (3)	20:41	20 20:05 (8)	21:30	48 20:44 (5) 21:49				
30	08:07		06:59		05:48	19:45 (8)	05:00	19:56 (10) 04:54				
	16:56		19:48	17 19:19 (4)	20:43	20 20:05 (8)	21:31	47 20:43 (5) 21:48				
31	08:05		06:56		05:46		04:59	19:56 (10)				
	16:58		19:49	29 19:23 (4)			21:32	45 20:41 (5)				
Sonnenscheinstunden	253	275	367		419		491		506			
astr.max.mögl.Beschattung		417		475		852		1090		1482		
Red.Sonnenscheinwahrsch.		0.24		0.28		0.37		0.43		0.39		
Reduktion Betriebsdauer		0.96		0.96		0.96		0.96		0.96		
Reduktion Windrichtung		0.73		0.72		0.70		0.64		0.64		
Gesamte Reduktion		0.17		0.19		0.25		0.27		0.24		
Met.wahrsch.Beschattung		69		91		214		290		352		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattenende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AC - IO29

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:55	20:03 (10) 05:33	20:12 (10) 06:26	18:43 (3) 07:18	18:07 (1) 07:14	08:08	
	21:48	51 21:12 (7) 21:14	29 20:41 (6) 20:09	41 19:24 (4) 18:57	20 18:27 (1) 16:48	16:05	
2	04:55	20:04 (10) 05:35	20:14 (10) 06:28	18:43 (3) 07:19	18:07 (1) 07:16	08:09	
	21:48	50 21:12 (7) 21:12	27 20:41 (6) 20:07	42 19:25 (4) 18:55	18 18:25 (1) 16:46	16:04	
3	04:56	20:03 (10) 05:37	20:15 (10) 06:29	18:42 (3) 07:21	18:09 (1) 07:18	08:11	
	21:47	49 21:11 (7) 21:11	24 20:39 (6) 20:04	42 19:24 (4) 18:52	14 18:23 (1) 16:44	16:04	
4	04:57	20:03 (10) 05:38	20:16 (10) 06:31	18:42 (3) 07:23	18:12 (1) 07:20	08:12	
	21:47	49 21:11 (7) 21:09	20 20:38 (6) 20:02	43 19:25 (4) 18:50	7 18:19 (1) 16:42	16:03	
5	04:58	20:04 (10) 05:40	20:26 (6) 06:33	18:41 (3) 07:25		07:22 08:14	
	21:46	47 21:10 (7) 21:07	10 20:36 (6) 20:00	43 19:24 (4) 18:47		16:40 16:03	
6	04:59	20:04 (10) 05:42	20:03 (8) 06:35	18:42 (3) 07:26		07:24 08:15	
	21:46	41 20:45 (9) 21:05	11 20:35 (6) 19:57	42 19:24 (4) 18:45		16:39 16:02	
7	05:00	20:04 (10) 05:43	19:59 (8) 06:36	18:42 (3) 07:28		07:26 08:16	
	21:45	42 20:46 (9) 21:03	11 20:32 (6) 19:55	41 19:23 (4) 18:43		16:37 16:02	
8	05:01	20:04 (10) 05:45	19:58 (8) 06:38	18:42 (3) 07:30		07:27 08:17	
	21:44	42 20:46 (9) 21:01	13 20:11 (8) 19:53	40 19:22 (4) 18:40		16:35 16:01	
9	05:02	20:04 (10) 05:47	19:57 (8) 06:40	18:43 (3) 07:32		07:29 08:19	
	21:44	43 20:47 (9) 20:59	15 20:12 (8) 19:50	38 19:21 (4) 18:38	11 17:23 (2) 16:33	16:01	
10	05:03	20:04 (10) 05:48	19:55 (8) 06:41	18:44 (3) 07:34		17:09 (2) 07:31 08:20	
	21:43	43 20:47 (9) 20:57	17 20:12 (8) 19:48	36 19:20 (4) 18:36	17 17:26 (2) 16:32	16:01	
11	05:04	20:04 (10) 05:50	19:55 (8) 06:43	18:44 (3) 07:35		17:07 (2) 07:33 08:21	
	21:42	44 20:48 (9) 20:55	18 20:13 (8) 19:45	33 19:17 (4) 18:33	20 17:27 (2) 16:30	16:00	
12	05:05	20:04 (10) 05:52	19:54 (8) 06:45	18:46 (3) 07:37		17:05 (2) 07:35 08:22	
	21:41	44 20:48 (9) 20:53	19 20:13 (8) 19:43	29 19:15 (4) 18:31	24 17:29 (2) 16:28	16:00	
13	05:06	20:04 (10) 05:53	19:54 (8) 06:47	18:48 (3) 07:39		17:04 (2) 07:37 08:23	
	21:40	46 20:50 (5) 20:51	19 20:13 (8) 19:41	22 19:12 (4) 18:29	26 17:30 (2) 16:27	16:00	
14	05:07	20:04 (10) 05:55	19:54 (8) 06:48	18:51 (3) 07:41		17:02 (2) 07:39 08:24	
	21:39	48 20:52 (5) 20:49	19 20:13 (8) 19:38	8 18:59 (3) 18:26	27 17:29 (2) 16:25	16:00	
15	05:09	20:04 (10) 05:57	19:53 (8) 06:50		07:43	17:01 (2) 07:41 08:25	
	21:38	49 20:53 (5) 20:47	20 20:13 (8) 19:36		18:24	29 17:30 (2) 16:24	16:00
16	05:10	20:04 (10) 05:58	19:54 (8) 06:52		07:44	17:00 (2) 07:42	08:26
	21:37	49 20:53 (5) 20:45	18 20:12 (8) 19:33		18:22	30 17:30 (2) 16:22	16:00
17	05:11	20:04 (10) 06:00	19:53 (8) 06:53		07:46	17:00 (2) 07:44	08:27
	21:36	50 20:54 (5) 20:43	18 20:11 (8) 19:31		18:20	30 17:30 (2) 16:21	16:00
18	05:12	20:05 (10) 06:02	19:54 (8) 06:55		18:17 (1) 07:48	17:00 (2) 07:46	08:28
	21:35	50 20:55 (5) 20:41	17 20:11 (8) 19:28	9	18:26 (1) 18:17	30 17:30 (2) 16:19	16:01
19	05:14	20:05 (10) 06:04	19:56 (8) 06:57		18:14 (1) 07:50	16:59 (2) 07:48	08:28
	21:34	50 20:55 (5) 20:39	14 20:10 (8) 19:26	15	18:29 (1) 18:15	31 17:30 (2) 16:18	16:01
20	05:15	20:05 (10) 06:05	19:56 (8) 06:59		18:11 (1) 07:52	16:59 (2) 07:50	08:29
	21:32	50 20:55 (5) 20:36	11 20:07 (8) 19:24	18	18:29 (1) 18:13	31 17:30 (2) 16:17	16:01
21	05:17	20:06 (10) 06:07	20:00 (8) 07:00		18:09 (1) 07:54	17:00 (2) 07:51	08:29
	21:31	50 20:56 (5) 20:34	4 20:04 (8) 19:21	22	18:31 (1) 18:11	30 17:30 (2) 16:15	16:02
22	05:18	20:06 (10) 06:09	18:59 (3) 07:02		18:08 (1) 07:55	17:00 (2) 07:53	08:30
	21:30	50 20:56 (5) 20:32	11 19:10 (3) 19:19	23	18:31 (1) 18:09	29 17:29 (2) 16:14	16:02
23	05:19	20:06 (10) 06:10	18:55 (3) 07:04		18:07 (1) 07:57	17:00 (2) 07:55	08:31
	21:28	50 20:56 (5) 20:30	17 19:12 (3) 19:16	25	18:32 (1) 18:06	28 17:28 (2) 16:13	16:03
24	05:21	20:07 (10) 06:12	18:53 (3) 07:05		18:06 (1) 07:59	17:01 (2) 07:56	08:31
	21:27	48 20:55 (5) 20:28	21 19:14 (3) 19:14	25	18:31 (1) 18:04	26 17:27 (2) 16:12	16:03
25	05:22	20:07 (10) 06:14	18:50 (3) 07:07		18:06 (1) 07:01	16:02 (2) 07:58	08:31
	21:25	46 20:53 (5) 20:25	25 19:15 (3) 19:11	26	18:32 (1) 17:02	24 16:26 (2) 16:11	16:04
26	05:24	20:07 (10) 06:16	18:49 (3) 07:09		18:05 (1) 07:03	16:03 (2) 08:00	08:32
	21:24	44 20:51 (5) 20:23	27 19:16 (3) 19:09	27	18:32 (1) 17:00	22 16:25 (2) 16:10	16:05
27	05:25	20:08 (10) 06:17	18:48 (3) 07:11		18:05 (1) 07:05	16:04 (2) 08:01	08:32
	21:22	43 20:51 (5) 20:21	29 19:17 (3) 19:07	26	18:31 (1) 16:58	19 16:23 (2) 16:09	16:05
28	05:27	20:08 (10) 06:19	18:46 (3) 07:12		18:05 (1) 07:07	16:06 (2) 08:03	08:32
	21:21	41 20:49 (5) 20:18	31 19:17 (3) 19:04	25	18:30 (1) 16:56	15 16:21 (2) 16:08	16:06
29	05:29	20:09 (10) 06:21	18:45 (3) 07:14		18:05 (1) 07:09	16:10 (2) 08:05	08:32
	21:19	38 20:48 (5) 20:16	35 19:20 (4) 19:02	24	18:29 (1) 16:54	8 16:18 (2) 16:07	16:07
30	05:30	20:10 (10) 06:22	18:45 (3) 07:16		18:06 (1) 07:10		08:06 08:32
	21:17	31 20:41 (9) 20:14	37 19:22 (4) 18:59	22	18:28 (1) 16:52		16:06 16:08
31	05:32	20:11 (10) 06:24	18:44 (3)		07:12		08:32
	21:16	31 20:42 (6) 20:11	39 19:23 (4)		16:50		16:09
Sonnenscheinstunden	509	458	382	330	262	237	
astr.max.mögl.Beschattung	1409	626	787	566			
Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29			
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96			
Reduktion Windrichtung	0.64	0.68	0.71	0.73			
Gesamte Reduktion	0.23	0.28	0.24	0.20			
Met.wahrsch.Beschattung	329	173	188	115			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AD - IO30

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni										
1	08:32	08:03	07:07	16:36 (2)	06:54	18:56 (3)	05:46	19:46 (8)	04:58	19:57 (10)						
	16:10	17:00	17:54	27	17:03 (2)	19:51	29	19:25 (4)	20:45	17	20:03 (8)	21:33	40	20:58 (7)		
2	08:32	08:02	07:05	16:37 (2)	06:52	18:55 (3)	05:44	19:48 (8)	04:57	19:57 (10)						
	16:11	17:02	17:56	26	17:03 (2)	19:53	32	19:27 (4)	20:47	15	20:03 (8)	21:35	43	21:00 (7)		
3	08:32	08:00	07:03	16:39 (2)	06:49	18:53 (3)	05:42	19:48 (8)	04:57	19:58 (10)						
	16:12	17:04	17:58	23	17:02 (2)	19:55	35	19:28 (4)	20:49	13	20:01 (8)	21:36	46	21:02 (7)		
4	08:32	07:58	07:00	16:39 (2)	06:47	18:52 (3)	05:40	19:50 (8)	04:56	19:58 (10)						
	16:14	17:06	18:00	21	17:00 (2)	19:57	37	19:29 (4)	20:50	10	20:00 (8)	21:37	47	21:03 (7)		
5	08:31	07:57	06:58	16:42 (2)	06:44	18:51 (3)	05:38	19:53 (8)	04:55	19:59 (10)						
	16:15	17:08	18:02	16	16:58 (2)	19:58	38	19:29 (4)	20:52	7	20:22 (6)	21:38	47	21:04 (7)		
6	08:31	07:55	06:56	16:45 (2)	06:42	18:50 (3)	05:36	20:06 (10)	04:54	19:59 (10)						
	16:16	17:10	18:04	10	16:55 (2)	20:00	39	19:29 (4)	20:54	18	20:24 (6)	21:39	48	21:05 (7)		
7	08:31	07:53	06:54	20:02	06:40	18:49 (3)	05:35	20:04 (10)	04:54	19:59 (10)						
	16:18	17:12	18:06	40	20:02	19:29 (4)	20:56	22	20:26 (6)	21:40	47	21:05 (7)	20:00 (10)			
8	08:30	07:51	06:51	06:37	06:37	18:49 (3)	05:33	20:02 (10)	04:53	20:00 (10)						
	16:19	17:14	18:08	40	20:04	19:29 (4)	20:57	25	20:27 (6)	21:41	47	21:06 (7)	20:01 (10)			
9	08:30	07:49	06:49	06:35	06:35	18:48 (3)	05:31	20:00 (10)	04:53	20:01 (10)						
	16:20	17:16	18:09	39	19:27 (4)	20:59	28	20:28 (6)	21:42	47	21:07 (7)	20:01 (10)				
10	08:29	07:47	06:47	06:33	06:33	18:48 (3)	05:29	19:58 (10)	04:52	20:01 (10)						
	16:22	17:18	18:11	39	19:27 (4)	21:01	31	20:29 (6)	21:43	45	21:07 (7)	20:02 (10)				
11	08:28	07:45	06:44	17:37 (1)	06:30	18:49 (3)	05:27	19:58 (10)	04:52	20:02 (10)						
	16:23	17:20	18:13	10	17:47 (1)	20:09	37	19:26 (4)	21:02	32	20:30 (6)	21:43	42	21:07 (7)		
12	08:28	07:44	06:42	17:33 (1)	06:28	18:48 (3)	05:26	19:57 (10)	04:51	20:02 (10)						
	16:25	17:22	18:15	15	17:48 (1)	20:11	36	19:24 (4)	21:04	33	20:30 (9)	21:44	43	21:08 (7)		
13	08:27	07:42	06:39	17:32 (1)	06:26	18:49 (3)	05:24	19:56 (10)	04:51	20:02 (10)						
	16:26	17:24	18:17	18	17:50 (1)	20:13	33	19:22 (4)	21:06	38	20:35 (5)	21:45	43	21:08 (7)		
14	08:26	07:40	06:37	17:31 (1)	06:23	18:49 (3)	05:22	19:55 (10)	04:51	20:03 (10)						
	16:28	17:26	18:19	21	17:52 (1)	20:15	30	19:19 (4)	21:07	41	20:36 (5)	21:45	41	21:08 (7)		
15	08:25	07:38	06:35	17:29 (1)	06:21	18:50 (3)	05:21	19:55 (10)	04:51	20:03 (10)						
	16:29	17:28	18:21	23	17:52 (1)	20:16	28	19:18 (3)	21:09	43	20:38 (5)	21:46	43	21:09 (7)		
16	08:24	07:35	16:46 (2)	06:32	17:28 (1)	06:19	18:50 (3)	05:19	19:55 (10)	04:50	20:04 (10)					
	16:31	17:29	12	16:58 (2)	18:22	24	17:52 (1)	20:18	25	19:15 (3)	21:11	44	20:39 (5)	21:47	42	21:09 (7)
17	08:23	07:33	16:43 (2)	06:30	17:27 (1)	06:16	18:51 (3)	05:17	19:55 (10)	04:50	20:04 (10)					
	16:33	17:31	18	17:01 (2)	18:24	25	17:52 (1)	20:20	23	19:14 (3)	21:12	46	20:41 (5)	21:47	42	21:09 (7)
18	08:22	07:31	16:41 (2)	06:28	17:27 (1)	06:14	18:53 (3)	05:16	19:54 (10)	04:50	20:04 (10)					
	16:34	17:33	20	17:01 (2)	18:26	25	17:52 (1)	20:22	19	19:12 (3)	21:14	48	20:42 (5)	21:47	42	21:09 (7)
19	08:21	07:29	16:40 (2)	06:25	17:26 (1)	06:12	18:55 (3)	05:14	19:54 (10)	04:50	20:04 (10)					
	16:36	17:35	23	17:03 (2)	18:28	25	17:51 (1)	20:24	15	19:10 (3)	21:15	49	20:43 (5)	21:48	43	21:10 (7)
20	08:20	07:27	16:39 (2)	06:23	17:27 (1)	06:10	19:00 (3)	05:13	19:54 (10)	04:50	20:05 (10)					
	16:38	17:37	25	17:04 (2)	18:30	24	17:51 (1)	20:25	6	19:06 (3)	21:17	50	20:44 (5)	21:48	41	21:10 (7)
21	08:19	07:25	16:38 (2)	06:20	17:27 (1)	06:08	19:55 (8)	05:11	19:54 (10)	04:50	20:06 (10)					
	16:40	17:39	27	17:05 (2)	18:31	24	17:51 (1)	20:27	4	19:59 (8)	21:18	49	20:43 (5)	21:48	41	21:11 (7)
22	08:18	07:23	16:38 (2)	06:18	17:27 (1)	06:05	19:52 (8)	05:10	19:54 (10)	04:51	20:06 (10)					
	16:42	17:41	28	17:06 (2)	18:33	22	17:49 (1)	20:29	9	20:01 (8)	21:20	49	20:43 (5)	21:49	41	21:11 (7)
23	08:16	07:21	16:36 (2)	06:16	17:28 (1)	06:03	19:49 (8)	05:09	19:54 (10)	04:51	20:06 (10)					
	16:43	17:43	29	17:05 (2)	18:35	20	17:48 (1)	20:31	13	20:02 (8)	21:21	49	20:43 (5)	21:49	42	21:11 (7)
24	08:15	07:18	16:36 (2)	06:13	17:29 (1)	06:01	19:48 (8)	05:07	19:54 (10)	04:51	20:05 (10)					
	16:45	17:45	30	17:06 (2)	18:37	17	17:46 (1)	20:33	16	20:04 (8)	21:23	49	20:43 (5)	21:49	42	21:10 (7)
25	08:14	07:16	16:36 (2)	06:11	17:31 (1)	05:59	19:47 (8)	05:06	19:55 (10)	04:52	20:06 (10)					
	16:47	17:47	30	17:06 (2)	18:39	13	17:44 (1)	20:34	17	20:04 (8)	21:24	47	20:42 (5)	21:49	42	21:11 (7)
26	08:12	07:14	16:36 (2)	06:08	17:34 (1)	05:57	19:46 (8)	05:05	19:55 (10)	04:52	20:06 (10)					
	16:49	17:49	29	17:05 (2)	18:40	5	17:39 (1)	20:36	18	20:04 (8)	21:26	47	20:42 (5)	21:49	42	21:11 (7)
27	08:11	07:12	16:36 (2)	06:06	17:35 (1)	05:55	19:46 (8)	05:04	19:55 (10)	04:52	20:06 (10)					
	16:51	17:51	29	17:05 (2)	18:42	20:38	18	20:04 (8)	21:27	46	20:41 (5)	21:49	43	21:12 (7)	20:06 (10)	
28	08:10	07:10	16:37 (2)	06:03	17:37 (1)	05:52	19:46 (8)	05:02	19:56 (10)	04:53	20:06 (10)					
	16:53	17:53	28	17:05 (2)	18:44	20:40	18	20:04 (8)	21:28	40	20:36 (9)	21:49	41	21:11 (7)	20:06 (10)	
29	08:08		07:01	05:50	19:46 (8)	05:01	19:46 (8)	05:01	19:56 (10)	04:53	20:06 (10)					
	16:54		19:46	20:41	18	20:04 (8)	21:30	40	20:36 (9)	21:49	42	21:12 (7)	20:06 (10)			
30	08:07		06:59	19:02 (3)	05:48	19:46 (8)	05:00	19:56 (10)	04:54	20:06 (10)						
	16:56		19:48	13	19:15 (3)	20:43	17	20:03 (8)	21:31	40	20:36 (9)	21:48	42	21:11 (7)	20:06 (10)	
31	08:05		06:56	18:58 (3)		04:59		19:56 (10)								
	16:58		19:49	25	19:23 (4)		21:32	39	20:35 (9)							
Sonnenscheinstunden	253	275	367	419	491	506										
astr.max.mögl.Beschattung		328	472	768	1105	1297										
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39										
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96										
Reduktion Windrichtung		0.73	0.72	0.70	0.64	0.63										
Gesamte Reduktion		0.17	0.19	0.25	0.27	0.24										
Met.wahrsch.Beschattung		55	91	192	295	307										

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	--	---------------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AD - IO30

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:55	20:06 (10) 05:33	20:07 (10) 06:26	18:48 (3) 07:18	18:12 (1) 07:14	08:08	
	21:48	43 21:12 (7) 21:14	33 20:40 (9) 20:09	37 19:25 (4) 18:57	17 18:29 (1) 16:48	16:05	
2	04:55	20:06 (10) 05:35	20:09 (10) 06:28	18:47 (3) 07:19	18:13 (1) 07:16	08:09	
	21:48	44 21:12 (7) 21:12	31 20:40 (6) 20:07	39 19:26 (4) 18:55	13 18:26 (1) 16:46	16:04	
3	04:56	20:05 (10) 05:37	20:09 (10) 06:29	18:46 (3) 07:21	18:17 (1) 07:18	08:11	
	21:47	46 21:11 (7) 21:11	30 20:39 (6) 20:04	39 19:25 (4) 18:52	5 18:22 (1) 16:44	16:04	
4	04:57	20:05 (10) 05:38	20:11 (10) 06:31	18:46 (3) 07:23		07:20	08:12
	21:47	47 21:11 (7) 21:09	27 20:38 (6) 20:02	40 19:26 (4) 18:50		16:42	16:03
5	04:58	20:06 (10) 05:40	20:12 (10) 06:33	18:45 (3) 07:25		07:22	08:14
	21:46	46 21:11 (7) 21:07	24 20:36 (6) 20:00	40 19:25 (4) 18:47		16:40	16:03
6	04:59	20:06 (10) 05:42	20:14 (10) 06:35	18:46 (3) 07:26		07:24	08:15
	21:46	46 21:11 (7) 21:05	21 20:35 (6) 19:57	39 19:25 (4) 18:45		16:39	16:02
7	05:00	20:06 (10) 05:43	20:17 (10) 06:36	18:46 (3) 07:28		17:23 (2) 07:26	08:16
	21:45	47 21:11 (7) 21:03	14 20:32 (6) 19:55	39 19:25 (4) 18:43	4 17:27 (2) 16:37	16:02	
8	05:01	20:05 (10) 05:45	20:01 (8) 06:38	18:46 (3) 07:30		17:18 (2) 07:27	08:17
	21:44	47 21:10 (7) 21:01	9 20:31 (6) 19:53	37 19:23 (4) 18:40	14 17:32 (2) 16:35	16:01	
9	05:02	20:05 (10) 05:47	19:59 (8) 06:40	18:47 (3) 07:32		17:15 (2) 07:29	08:19
	21:44	47 21:10 (7) 20:59	11 20:10 (8) 19:50	35 19:22 (4) 18:38	19 17:34 (2) 16:33	16:01	
10	05:03	20:05 (10) 05:48	19:57 (8) 06:41	18:48 (3) 07:34		17:14 (2) 07:31	08:20
	21:43	45 21:09 (7) 20:57	13 20:10 (8) 19:48	32 19:20 (4) 18:36	21 17:35 (2) 16:32	16:01	
11	05:04	20:05 (10) 05:50	19:56 (8) 06:43	18:48 (3) 07:35		17:12 (2) 07:33	08:21
	21:42	43 21:08 (7) 20:55	15 20:11 (8) 19:45	29 19:17 (4) 18:33	24 17:36 (2) 16:30	16:00	
12	05:05	20:05 (10) 05:52	19:54 (8) 06:45	18:50 (3) 07:37		17:11 (2) 07:35	08:22
	21:41	39 20:44 (9) 20:53	17 20:11 (8) 19:43	25 19:15 (4) 18:31	26 17:37 (2) 16:28	16:00	
13	05:06	20:05 (10) 05:53	19:54 (8) 06:47	18:53 (3) 07:39		17:10 (2) 07:37	08:23
	21:40	39 20:44 (9) 20:51	18 20:12 (8) 19:41	15 19:12 (4) 18:29	28 17:38 (2) 16:27	16:00	
14	05:07	20:04 (10) 05:55	19:54 (8) 06:48	18:58 (3) 07:41		17:09 (2) 07:39	08:24
	21:39	40 20:44 (9) 20:49	19 20:13 (8) 19:38	1 18:59 (3) 18:26	28 17:37 (2) 16:25	16:00	
15	05:09	20:04 (10) 05:57	19:53 (8) 06:50		07:43	17:08 (2) 07:41	08:25
	21:38	41 20:45 (9) 20:47	19 20:12 (8) 19:36		18:24	29 17:37 (2) 16:24	16:00
16	05:10	20:04 (10) 05:58	19:54 (8) 06:52		07:44	17:08 (2) 07:42	08:26
	21:37	44 20:48 (5) 20:45	18 20:12 (8) 19:33		18:22	29 17:37 (2) 16:22	16:00
17	05:11	20:04 (10) 06:00	19:53 (8) 06:53		07:46	17:08 (2) 07:44	08:27
	21:36	46 20:50 (5) 20:43	18 20:11 (8) 19:31		18:20	29 17:37 (2) 16:21	16:00
18	05:12	20:04 (10) 06:02	19:54 (8) 06:55		18:19 (1) 07:48	17:08 (2) 07:46	08:28
	21:35	48 20:52 (5) 20:41	17 20:11 (8) 19:28	12 18:31 (1) 18:17	29 17:37 (2) 16:19	16:01	
19	05:14	20:04 (10) 06:04	19:55 (8) 06:57		18:17 (1) 07:50	17:08 (2) 07:48	08:28
	21:34	48 20:52 (5) 20:39	15 20:10 (8) 19:26	16 18:33 (1) 18:15	28 17:36 (2) 16:18	16:01	
20	05:15	20:04 (10) 06:05	19:55 (8) 06:59		18:14 (1) 07:52	17:08 (2) 07:50	08:29
	21:32	49 20:53 (5) 20:36	12 20:07 (8) 19:24	20 18:34 (1) 18:13	28 17:36 (2) 16:17	16:01	
21	05:17	20:05 (10) 06:07	19:57 (8) 07:00		18:13 (1) 07:54	17:09 (2) 07:51	08:29
	21:31	49 20:54 (5) 20:34	9 20:06 (8) 19:21	22 18:35 (1) 18:11	26 17:35 (2) 16:15	16:02	
22	05:18	20:04 (10) 06:09	20:01 (8) 07:02		18:12 (1) 07:55	17:09 (2) 07:53	08:30
	21:30	50 20:54 (5) 20:32	2 20:03 (8) 19:19	23 18:35 (1) 18:09	25 17:34 (2) 16:14	16:02	
23	05:19	20:04 (10) 06:10	19:02 (3) 07:04		18:12 (1) 07:57	17:10 (2) 07:55	08:31
	21:28	50 20:54 (5) 20:30	8 19:10 (3) 19:16	24 18:36 (1) 18:06	23 17:33 (2) 16:13	16:03	
24	05:21	20:05 (10) 06:12	18:59 (3) 07:05		18:10 (1) 07:59	17:12 (2) 07:56	08:31
	21:27	49 20:54 (5) 20:28	15 19:14 (3) 19:14	25 18:35 (1) 18:04	19 17:31 (2) 16:12	16:03	
25	05:22	20:05 (10) 06:14	18:56 (3) 07:07		18:10 (1) 07:01	16:13 (2) 07:58	08:31
	21:25	48 20:53 (5) 20:25	19 19:15 (3) 19:11	25 18:35 (1) 17:02	17 16:30 (2) 16:11	16:04	
26	05:24	20:04 (10) 06:16	18:54 (3) 07:09		18:10 (1) 07:03	16:16 (2) 08:00	08:32
	21:24	47 20:51 (5) 20:23	23 19:17 (3) 19:09	25 18:35 (1) 17:00	11 16:27 (2) 16:10	16:05	
27	05:25	20:05 (10) 06:17	18:53 (3) 07:11		18:10 (1) 07:05	08:01	08:32
	21:22	46 20:51 (5) 20:21	25 19:18 (3) 19:07	24 18:34 (1) 16:58		16:09	16:05
28	05:27	20:05 (10) 06:19	18:51 (3) 07:12		18:09 (1) 07:07	08:03	08:32
	21:21	44 20:49 (5) 20:18	27 19:18 (3) 19:04	24 18:33 (1) 16:56		16:08	16:06
29	05:29	20:06 (10) 06:21	18:50 (3) 07:14		18:10 (1) 07:09	08:05	08:32
	21:19	42 20:48 (5) 20:16	30 19:20 (4) 19:02	22 18:32 (1) 16:54		16:07	16:07
30	05:30	20:06 (10) 06:22	18:49 (3) 07:16		18:11 (1) 07:10	08:06	08:32
	21:17	40 20:46 (5) 20:14	34 19:23 (4) 18:59	20 18:31 (1) 16:52		16:06	16:08
31	05:32	20:07 (10) 06:24	18:48 (3)		07:12		08:32
	21:16	36 20:45 (5) 20:11	36 19:24 (4)		16:50		16:09
Sonnenscheinstunden		509	458	382	330	262	237
astr.max.mögl.Beschattung		1396	609	729	492		
Red.Sonnenscheinwahrsch.		0.38	0.42	0.35	0.29		
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96		
Reduktion Windrichtung		0.64	0.67	0.71	0.73		
Gesamte Reduktion		0.23	0.27	0.24	0.20		
Met.wahrsch.Beschattung		327	167	174	100		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt

Berechnet:
Dennis Kramer / dennis.kramer@i17-wind.de
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AE - IO31

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni									
1	08:32	08:03	07:07	16:38 (2)	06:54	18:58 (3)	05:46	19:46 (8)	04:58	19:57 (10)					
	16:10	17:00	17:54	27	17:05 (2)	19:51	27	19:25 (4)	20:45	17	20:03 (8)	21:33	42	20:59 (7)	
2	08:32	08:02	07:05	16:39 (2)	06:52	18:56 (3)	05:44	19:48 (8)	04:57	19:57 (10)					
	16:11	17:02	17:56	25	17:04 (2)	19:53	31	19:27 (4)	20:47	15	20:03 (8)	21:35	44	21:00 (7)	
3	08:32	08:00	07:03	16:40 (2)	06:49	18:54 (3)	05:42	19:49 (8)	04:57	19:59 (10)					
	16:12	17:04	17:58	24	17:04 (2)	19:55	34	19:28 (4)	20:49	13	20:02 (8)	21:36	45	21:02 (7)	
4	08:32	07:58	07:00	16:40 (2)	06:47	18:53 (3)	05:40	19:50 (8)	04:56	19:59 (10)					
	16:14	17:06	18:00	21	17:01 (2)	19:57	36	19:29 (4)	20:50	10	20:00 (8)	21:37	46	21:03 (7)	
5	08:31	07:57	06:58	16:42 (2)	06:44	18:52 (3)	05:38	19:53 (8)	04:55	20:00 (10)					
	16:15	17:08	18:02	18	17:00 (2)	19:58	38	19:30 (4)	20:52	8	20:22 (6)	21:38	46	21:04 (7)	
6	08:31	07:55	06:56	16:45 (2)	06:42	18:51 (3)	05:36	20:06 (10)	04:54	20:00 (10)					
	16:16	17:10	18:04	13	16:58 (2)	20:00	38	19:29 (4)	20:54	18	20:24 (6)	21:39	47	21:05 (7)	
7	08:31	07:53	06:54	20:02	06:40	18:51 (3)	05:35	20:04 (10)	04:54	20:00 (10)					
	16:18	17:12	18:06	20:02	06:37	18:50 (3)	05:33	20:02 (10)	04:53	20:01 (10)					
8	08:30	07:51	06:51	20:04	06:35	18:49 (3)	05:31	20:00 (10)	04:53	20:02 (10)					
	16:19	17:14	18:08	20:04	06:33	18:49 (3)	05:29	19:59 (10)	04:52	20:01 (10)					
9	08:30	07:49	06:49	17:39 (1)	06:30	18:50 (3)	05:27	19:58 (10)	04:52	20:02 (10)					
	16:20	17:16	18:09	7	17:46 (1)	20:09	37	19:27 (4)	21:02	32	20:30 (6)	21:43	42	21:07 (7)	
10	08:29	07:47	06:47	17:35 (1)	06:28	18:49 (3)	05:26	19:57 (10)	04:51	20:03 (10)					
	16:22	17:18	18:11	13	17:48 (1)	20:11	35	19:24 (4)	21:04	33	20:30 (9)	21:44	42	21:08 (7)	
11	08:28	07:45	06:44	17:33 (1)	06:26	18:49 (3)	05:24	19:57 (10)	04:51	20:03 (10)					
	16:23	17:20	18:13	18	17:51 (1)	20:13	34	19:23 (4)	21:06	37	20:35 (5)	21:45	42	21:08 (7)	
12	08:28	07:44	06:42	17:32 (1)	06:23	18:50 (3)	05:22	19:56 (10)	04:51	20:03 (10)					
	16:25	17:22	18:15	20	17:52 (1)	20:15	30	19:20 (4)	21:07	40	20:36 (5)	21:45	41	21:08 (7)	
13	08:27	07:42	06:39	17:30 (1)	06:21	18:51 (3)	05:21	19:56 (10)	04:51	20:04 (10)					
	16:26	17:24	18:17	22	17:52 (1)	20:16	28	19:19 (3)	21:09	42	20:38 (5)	21:46	42	21:09 (7)	
14	08:26	07:40	06:37	17:30 (1)	06:19	18:51 (3)	05:19	19:55 (10)	04:50	20:04 (10)					
	16:28	17:26	18:19	23	17:53 (1)	20:18	26	19:17 (3)	21:11	44	20:39 (5)	21:47	42	21:09 (7)	
15	08:25	07:38	06:35	17:28 (1)	06:16	18:52 (3)	05:17	19:55 (10)	04:50	20:05 (10)					
	16:29	17:28	18:21	25	17:53 (1)	20:20	23	19:15 (3)	21:12	46	20:41 (5)	21:47	41	21:09 (7)	
16	08:24	07:35	16:49 (2)	17:28 (1)	06:14	18:54 (3)	05:16	19:54 (10)	04:50	20:05 (10)					
	16:31	17:29	18:22	25	17:53 (1)	20:22	20	19:14 (3)	21:14	48	20:42 (5)	21:47	41	21:09 (7)	
17	08:23	07:33	16:46 (2)	17:28 (1)	06:12	18:56 (3)	05:14	19:55 (10)	04:50	20:05 (10)					
	16:33	17:31	15	17:01 (2)	18:24	19:11 (3)	21:15	48	20:43 (5)	21:48	42	21:10 (7)			
18	08:22	07:31	16:43 (2)	17:28 (1)	06:10	18:59 (3)	05:13	19:55 (10)	04:50	20:05 (10)					
	16:34	17:33	19	17:02 (2)	18:26	17:52 (1)	20:24	15	19:11 (3)	21:15	48	20:43 (5)	21:48	42	21:10 (7)
19	08:21	07:29	16:42 (2)	17:28 (1)	06:08	19:08 (3)	21:17	49	20:44 (5)	21:48	42	21:10 (7)			
	16:36	17:35	22	17:04 (2)	18:28	19:56 (8)	05:11	49	20:43 (5)	21:48	41	21:11 (7)			
20	08:20	07:27	16:41 (2)	17:28 (1)	06:06	19:56 (8)	05:10	49	20:43 (5)	21:49	41	21:11 (7)			
	16:38	17:37	24	17:05 (2)	18:30	19:49 (8)	05:09	49	20:43 (5)	21:49	41	21:11 (7)			
21	08:19	07:25	16:40 (2)	17:28 (1)	06:04	19:48 (8)	05:07	48	20:43 (5)	21:49	41	21:11 (7)			
	16:40	17:39	26	17:06 (2)	18:31	19:48 (8)	05:07	48	20:43 (5)	21:49	41	21:11 (7)			
22	08:18	07:23	16:39 (2)	17:28 (1)	06:03	19:47 (8)	05:06	48	20:43 (5)	21:49	41	21:11 (7)			
	16:42	17:41	28	17:07 (2)	18:33	19:47 (8)	05:06	47	20:42 (5)	21:49	41	21:11 (7)			
23	08:16	07:21	16:38 (2)	17:29 (1)	06:03	19:47 (8)	05:05	46	20:42 (5)	21:49	42	21:11 (7)			
	16:43	17:43	28	17:06 (2)	18:35	19:46 (8)	05:04	45	20:41 (5)	21:49	42	21:12 (7)			
24	08:15	07:18	16:38 (2)	17:29 (1)	06:01	19:46 (8)	05:02	45	20:41 (5)	21:49	42	21:12 (7)			
	16:45	17:45	29	17:07 (2)	18:37	19:46 (8)	05:02	45	20:41 (5)	21:49	42	21:12 (7)			
25	08:14	07:16	16:38 (2)	17:31 (1)	05:59	19:46 (8)	05:01	45	20:41 (5)	21:49	42	21:12 (7)			
	16:47	17:47	29	17:07 (2)	18:39	19:46 (8)	05:01	45	20:41 (5)	21:49	42	21:12 (7)			
26	08:12	07:14	16:37 (2)	17:34 (1)	05:57	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
	16:49	17:49	29	17:06 (2)	18:40	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
27	08:11	07:12	16:37 (2)	17:34 (1)	05:55	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
	16:51	17:51	29	17:06 (2)	18:42	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
28	08:10	07:10	16:38 (2)	17:34 (1)	05:52	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
	16:53	17:53	28	17:06 (2)	18:44	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
29	08:08		07:01	19:04 (3)	05:48	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
	16:54		19:46	19:14 (3)	20:43	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
30	08:07		06:59	19:00 (3)	20:43	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
	16:56		19:48	19:23 (4)	20:43	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
31	08:05		06:56	19:00 (3)	20:43	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
	16:58		19:49	19:23 (4)	20:43	19:46 (8)	05:00	45	20:41 (5)	21:49	42	21:12 (7)			
Sonnenscheinstunden	253	275	367	419	765	491	1094	506	1283						
astr.max.mögl.Beschattung		314	470	765	1094	506	1283								
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.43	0.39								
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96	0.96								
Reduktion Windrichtung		0.73	0.72	0.70	0.64	0.64	0.63								
Gesamte Reduktion		0.17	0.19	0.25	0.27	0.27	0.24								
Met.wahrsch.Beschattung		52	90	191	292	292	304								

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AE - IO31

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember		
1	04:55	20:07 (10) 05:33	20:08 (10) 06:26	18:49 (3) 07:18	18:14 (1) 07:14	08:08		
	21:48	42 21:12 (7) 21:14	32 20:40 (9) 20:09	36 19:25 (4) 18:57	15 18:29 (1) 16:48	16:05		
2	04:55	20:07 (10) 05:35	20:09 (10) 06:28	18:48 (3) 07:19	18:15 (1) 07:16	08:09		
	21:48	42 21:12 (7) 21:12	31 20:40 (6) 20:07	38 19:26 (4) 18:55	11 18:26 (1) 16:46	16:04		
3	04:56	20:06 (10) 05:37	20:10 (10) 06:29	18:47 (3) 07:21		08:11		
	21:47	45 21:11 (7) 21:11	29 20:39 (6) 20:04	39 19:26 (4) 18:52		16:44		
4	04:57	20:06 (10) 05:38	20:11 (10) 06:31	18:47 (3) 07:23		08:12		
	21:47	46 21:11 (7) 21:09	27 20:38 (6) 20:02	39 19:26 (4) 18:50		16:42		
5	04:58	20:06 (10) 05:40	20:12 (10) 06:33	18:47 (3) 07:25		08:14		
	21:46	46 21:11 (7) 21:07	24 20:36 (6) 20:00	38 19:25 (4) 18:47		16:40		
6	04:59	20:06 (10) 05:42	20:14 (10) 06:35	18:47 (3) 07:26		08:15		
	21:46	47 21:11 (7) 21:05	21 20:35 (6) 19:57	38 19:25 (4) 18:45		16:39		
7	05:00	20:06 (10) 05:43	20:17 (10) 06:36	18:47 (3) 07:28	17:22 (2) 07:26	08:16		
	21:45	47 21:11 (7) 21:03	14 20:32 (6) 19:55	38 19:25 (4) 18:43	9 17:31 (2) 16:37	16:02		
8	05:01	20:06 (10) 05:45	20:01 (8) 06:38	18:47 (3) 07:30		08:17		
	21:44	46 21:10 (7) 21:01	9 20:31 (6) 19:53	37 19:24 (4) 18:40	16 17:34 (2) 16:35	16:01		
9	05:02	20:06 (10) 05:47	19:59 (8) 06:40	18:48 (3) 07:32		08:19		
	21:44	46 21:10 (7) 20:59	11 20:10 (8) 19:50	34 19:22 (4) 18:38	20 17:36 (2) 16:33	16:01		
10	05:03	20:06 (10) 05:48	19:57 (8) 06:41	18:49 (3) 07:34		08:20		
	21:43	45 21:09 (7) 20:57	14 20:11 (8) 19:48	31 19:20 (4) 18:36	23 17:37 (2) 16:32	16:01		
11	05:04	20:06 (10) 05:50	19:56 (8) 06:43	18:50 (3) 07:35		08:21		
	21:42	42 21:08 (7) 20:55	16 20:12 (8) 19:45	27 19:17 (4) 18:33	25 17:38 (2) 16:30	16:00		
12	05:05	20:06 (10) 05:52	19:55 (8) 06:45	18:52 (3) 07:37		08:22		
	21:41	38 20:44 (9) 20:53	17 20:12 (8) 19:43	23 19:15 (4) 18:31	27 17:39 (2) 16:28	16:00		
13	05:06	20:05 (10) 05:53	19:55 (8) 06:47	18:55 (3) 07:39		08:23		
	21:40	39 20:44 (9) 20:51	17 20:12 (8) 19:41	11 19:06 (3) 18:29	28 17:39 (2) 16:27	16:00		
14	05:07	20:05 (10) 05:55	19:55 (8) 06:48		17:10 (2) 07:39	08:24		
	21:39	40 20:45 (9) 20:49	18 20:13 (8) 19:38		18:26	28 17:38 (2) 16:25	16:00	
15	05:09	20:05 (10) 05:57	19:54 (8) 06:50		17:10 (2) 07:41	08:25		
	21:38	40 20:45 (9) 20:47	18 20:12 (8) 19:36		18:24	29 17:39 (2) 16:24	16:00	
16	05:10	20:05 (10) 05:58	19:54 (8) 06:52		07:44	17:09 (2) 07:42	08:26	
	21:37	43 20:48 (5) 20:45	18 20:12 (8) 19:33		18:22	29 17:38 (2) 16:22	16:00	
17	05:11	20:04 (10) 06:00	19:53 (8) 06:53		18:23 (1) 07:46	17:09 (2) 07:44	08:27	
	21:36	46 20:50 (5) 20:43	18 20:11 (8) 19:31	6 18:29 (1) 18:20	29 17:38 (2) 16:21	16:00		
18	05:12	20:05 (10) 06:02	19:54 (8) 06:55		18:19 (1) 07:48	17:09 (2) 07:46	08:28	
	21:35	47 20:52 (5) 20:41	17 20:11 (8) 19:28	14 18:33 (1) 18:17	29 17:38 (2) 16:19	16:01		
19	05:14	20:05 (10) 06:04	19:55 (8) 06:57		18:17 (1) 07:50	17:10 (2) 07:48	08:28	
	21:34	47 20:52 (5) 20:39	15 20:10 (8) 19:26	17 18:34 (1) 18:15	27 17:37 (2) 16:18	16:01		
20	05:15	20:04 (10) 06:05	19:55 (8) 06:59		18:15 (1) 07:52	17:10 (2) 07:50	08:29	
	21:32	49 20:53 (5) 20:36	12 20:07 (8) 19:24	20 18:35 (1) 18:13	27 17:37 (2) 16:17	16:01		
21	05:17	20:05 (10) 06:07	19:57 (8) 07:00		18:14 (1) 07:54	17:11 (2) 07:51	08:29	
	21:31	49 20:54 (5) 20:34	9 20:06 (8) 19:21	22 18:36 (1) 18:11	25 17:36 (2) 16:15	16:02		
22	05:18	20:05 (10) 06:09		07:02		18:13 (1) 07:55	17:11 (2) 07:53	08:30
	21:30	49 20:54 (5) 20:32		19:19	23 18:36 (1) 18:09	24 17:35 (2) 16:14	16:02	
23	05:19	20:05 (10) 06:10	19:02 (3) 07:04		18:12 (1) 07:57	17:12 (2) 07:55	08:31	
	21:28	49 20:54 (5) 20:30	10 19:12 (3) 19:16	25 18:37 (1) 18:06	22 17:34 (2) 16:13	16:03		
24	05:21	20:05 (10) 06:12	18:59 (3) 07:05		18:11 (1) 07:59	17:14 (2) 07:56	08:31	
	21:27	49 20:54 (5) 20:28	17 19:16 (3) 19:14	25 18:36 (1) 18:04	18 17:32 (2) 16:12	16:03		
25	05:22	20:05 (10) 06:14	18:56 (3) 07:07		18:11 (1) 07:01	16:16 (2) 07:58	08:31	
	21:25	48 20:53 (5) 20:25	21 19:17 (3) 19:11	25 18:36 (1) 17:02	13 16:29 (2) 16:11	16:04		
26	05:24	20:05 (10) 06:16	18:55 (3) 07:09		18:11 (1) 07:03	16:20 (2) 08:00	08:32	
	21:24	46 20:51 (5) 20:23	23 19:18 (3) 19:09	24 18:35 (1) 17:00	5 16:25 (2) 16:10	16:05		
27	05:25	20:06 (10) 06:17	18:54 (3) 07:11		18:11 (1) 07:05		08:01	
	21:22	45 20:51 (5) 20:21	26 19:20 (3) 19:07	24 18:35 (1) 16:58		16:09	16:05	
28	05:27	20:06 (10) 06:19	18:52 (3) 07:12		18:11 (1) 07:07		08:03	
	21:21	43 20:49 (5) 20:18	28 19:20 (3) 19:04	22 18:33 (1) 16:56		16:08	16:06	
29	05:29	20:07 (10) 06:21	18:51 (3) 07:14		18:11 (1) 07:09		08:05	
	21:19	41 20:48 (5) 20:16	30 19:21 (4) 19:02	21 18:32 (1) 16:54		16:07	16:07	
30	05:30	20:07 (10) 06:22	18:50 (3) 07:16		18:12 (1) 07:10		08:06	
	21:17	39 20:46 (5) 20:14	34 19:24 (4) 18:59	19 18:31 (1) 16:52		16:06	16:08	
31	05:32	20:08 (10) 06:24	18:49 (3)		07:12		08:32	
	21:16	35 20:45 (5) 20:11	35 19:24 (4)		16:50		16:09	
Sonnenscheinstunden 509 458 382 300 262 237								
astr.max.mögl.Beschattung 1376 611 716 479								
Red.Sonnenscheinwahrsch. 0.38 0.42 0.35 0.29								
Reduktion Betriebsdauer 0.96 0.96 0.96 0.96								
Reduktion Windrichtung 0.64 0.67 0.71 0.73								
Gesamte Reduktion 0.23 0.27 0.24 0.20								
Met.wahrsch.Beschattung 322 168 171 98								

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AF - IO32

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32 08:03		07:07	16:39 (2) 06:54	18:59 (3) 05:46	19:47 (8) 04:58		19:58 (10)
	16:10 17:00		17:54	27 17:06 (2) 19:51	26 19:25 (4) 20:45	16 20:03 (8) 21:33	41	20:59 (7)
2	08:32 08:02		07:05	16:39 (2) 06:52	18:57 (3) 05:44	19:48 (8) 04:57		19:58 (10)
	16:11 17:02		17:56	27 17:06 (2) 19:53	30 19:27 (4) 20:47	15 20:03 (8) 21:35	43	21:00 (7)
3	08:32 08:00		07:03	16:40 (2) 06:49	18:55 (3) 05:42	19:49 (8) 04:57		19:59 (10)
	16:12 17:04		17:58	25 17:05 (2) 19:55	33 19:28 (4) 20:49	13 20:02 (8) 21:36	45	21:02 (7)
4	08:32 07:58		07:00	16:41 (2) 06:47	18:54 (3) 05:40	19:50 (8) 04:56		19:59 (10)
	16:14 17:06		18:00	22 17:03 (2) 19:57	36 19:30 (4) 20:50	10 20:00 (8) 21:37	46	21:03 (7)
5	08:31 07:57		06:58	16:42 (2) 06:44	18:53 (3) 05:38	19:53 (8) 04:55		20:00 (10)
	16:15 17:08		18:02	20 17:02 (2) 19:58	37 19:30 (4) 20:52	8 20:22 (6) 21:38	46	21:04 (7)
6	08:31 07:55		06:56	16:45 (2) 06:42	18:52 (3) 05:36	20:07 (10) 04:54		20:00 (10)
	16:16 17:10		18:04	15 17:00 (2) 20:00	38 19:30 (4) 20:54	17 20:24 (6) 21:39	47	21:05 (7)
7	08:31 07:53		06:54	16:48 (2) 06:40	18:51 (3) 05:35	20:05 (10) 04:54		20:00 (10)
	16:18 17:12		18:06	7 16:55 (2) 20:02	39 19:30 (4) 20:56	21 20:26 (6) 21:40	46	21:05 (7)
8	08:30 07:51		06:51		06:37	18:51 (3) 05:33		20:02 (10)
	16:19 17:14		18:08		20:04	39 19:30 (4) 20:57	25	20:27 (6) 21:41
9	08:30 07:49		06:49		06:35	18:50 (3) 05:31		20:01 (10) 04:53
	16:20 17:16		18:09		20:06	38 19:28 (4) 20:59	27	20:28 (6) 21:42
10	08:29 07:47		06:47		06:33	18:50 (3) 05:29		19:59 (10) 04:52
	16:22 17:18		18:11		20:07	38 19:28 (4) 21:01	30	20:29 (6) 21:43
11	08:28 07:45		06:44	17:42 (1) 06:30		18:50 (3) 05:27		19:59 (10) 04:52
	16:23 17:20		18:13	3 17:45 (1) 20:09	37 19:27 (4) 21:02	31 20:30 (6) 21:43	41	21:07 (7)
12	08:28 07:44		06:42	17:36 (1) 06:28		18:50 (3) 05:26		19:58 (10) 04:51
	16:25 17:22		18:15	12 17:48 (1) 20:11	35 19:25 (4) 21:04	33 20:31 (9) 21:44	41	21:08 (7)
13	08:27 07:42		06:39	17:34 (1) 06:26		18:50 (3) 05:24		19:57 (10) 04:51
	16:26 17:24		18:17	17 17:51 (1) 20:13	33 19:23 (4) 21:06	38 20:35 (5) 21:45	42	21:08 (7)
14	08:26 07:40		06:37	17:33 (1) 06:23		18:51 (3) 05:22		19:56 (10) 04:51
	16:28 17:26		18:19	20 17:53 (1) 20:15	30 19:21 (4) 21:07	40 20:36 (5) 21:45	41	21:08 (7)
15	08:25 07:38		06:35	17:31 (1) 06:21		18:52 (3) 05:21		19:56 (10) 04:51
	16:29 17:28		18:21	22 17:53 (1) 20:16	27 19:19 (3) 21:09	42 20:38 (5) 21:46	42	21:09 (7)
16	08:24 07:35		06:32	17:30 (1) 06:19		18:52 (3) 05:19		19:56 (10) 04:50
	16:31 17:29		18:22	24 17:54 (1) 20:18	25 19:17 (3) 21:11	43 20:39 (5) 21:47	41	21:09 (7)
17	08:23 07:33	16:48 (2)	06:30	17:29 (1) 06:16		18:53 (3) 05:17		19:56 (10) 04:50
	16:33 17:31	13 17:01 (2) 18:24	24 17:53 (1) 20:20	23 19:16 (3) 21:12	45 20:41 (5) 21:47	41 21:09 (7)		20:05 (10)
18	08:22 07:31	16:45 (2) 06:28	17:29 (1) 06:14		18:54 (3) 05:16	19:55 (10) 04:50		20:06 (10)
	16:34 17:33	17 17:02 (2) 18:26	25 17:54 (1) 20:22	21 19:15 (3) 21:14	47 20:42 (5) 21:47	40 21:09 (7)		20:06 (10)
19	08:21 07:29	16:43 (2) 06:25	17:28 (1) 06:12		18:56 (3) 05:14	19:55 (10) 04:50		20:06 (10)
	16:36 17:35	21 17:04 (2) 18:28	25 17:53 (1) 20:24	17 19:13 (3) 21:15	48 20:43 (5) 21:48	41 21:10 (7)		20:06 (10)
20	08:20 07:27	16:42 (2) 06:23	17:28 (1) 06:10		18:59 (3) 05:13	19:55 (10) 04:50		20:06 (10)
	16:38 17:37	23 17:05 (2) 18:30	25 17:53 (1) 20:25	10 19:09 (3) 21:17	49 20:44 (5) 21:48	40 21:10 (7)		20:07 (10)
21	08:19 07:25	16:41 (2) 06:20	17:29 (1) 06:08		19:57 (8) 05:11	19:55 (10) 04:50		20:07 (10)
	16:40 17:39	26 17:07 (2) 18:31	24 17:53 (1) 20:27	1 19:58 (8) 21:18	48 20:43 (5) 21:48	40 21:11 (7)		20:07 (10)
22	08:18 07:23	16:41 (2) 06:18	17:29 (1) 06:05		19:53 (8) 05:10	19:55 (10) 04:51		20:07 (10)
	16:42 17:41	26 17:07 (2) 18:33	22 17:51 (1) 20:29	8 20:01 (8) 21:20	48 20:43 (5) 21:49	40 21:11 (7)		20:07 (10)
23	08:16 07:21	16:39 (2) 06:16	17:30 (1) 06:03		19:50 (8) 05:09	19:55 (10) 04:51		20:07 (10)
	16:43 17:43	28 17:07 (2) 18:35	20 17:50 (1) 20:31	12 20:02 (8) 21:21	48 20:43 (5) 21:49	41 21:11 (7)		20:07 (10)
24	08:15 07:18	16:39 (2) 06:13	17:30 (1) 06:01		19:49 (8) 05:07	19:55 (10) 04:51		20:07 (10)
	16:45 17:45	29 17:08 (2) 18:37	18 17:48 (1) 20:33	15 20:04 (8) 21:23	48 20:43 (5) 21:49	40 21:10 (7)		20:07 (10)
25	08:14 07:16	16:39 (2) 06:11	17:32 (1) 05:59		19:48 (8) 05:06	19:56 (10) 04:52		20:07 (10)
	16:47 17:47	29 17:08 (2) 18:39	15 17:47 (1) 20:34	17 20:05 (8) 21:24	46 20:42 (5) 21:49	41 21:11 (7)		20:07 (10)
26	08:12 07:14	16:38 (2) 06:08	17:33 (1) 05:57		19:47 (8) 05:05	19:56 (10) 04:52		20:07 (10)
	16:49 17:49	29 17:07 (2) 18:40	10 17:43 (1) 20:36	18 20:05 (8) 21:26	46 20:42 (5) 21:49	41 21:11 (7)		20:07 (10)
27	08:11 07:12	16:38 (2) 06:06		05:55	19:47 (8) 05:04	19:56 (10) 04:52		20:08 (10)
	16:51 17:51	29 17:07 (2) 18:42		20:38	18 20:05 (8) 21:27	45 20:41 (5) 21:49	41	21:12 (7)
28	08:10 07:10	16:39 (2) 06:03		05:52	19:46 (8) 05:02	19:57 (10) 04:53		20:07 (10)
	16:53 17:53	28 17:07 (2) 18:44		20:40	19 20:05 (8) 21:28	40 20:37 (9) 21:49	41	21:11 (7)
29	08:08		07:01		05:50	19:46 (8) 05:01		19:57 (10) 04:53
	16:54		19:46		20:41	19 20:05 (8) 21:30	39	20:36 (9) 21:49
30	08:06		06:59	19:06 (3) 05:48		19:46 (8) 05:00		19:57 (10) 04:54
	16:56		19:48	7 19:13 (3) 20:43	18 20:04 (8) 21:31	39 20:36 (9) 21:48	41	21:11 (7)
31	08:05		06:56	19:01 (3)		04:59		19:57 (10)
	16:58		19:49	22 19:23 (4)		21:32	38	20:35 (9)
Sonnenscheinstunden	253	275	367	419	491	506		
astr.max.mögl.Beschattung		298	478	757	1083	1265		
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96		
Reduktion Windrichtung		0.73	0.72	0.70	0.64	0.63		
Gesamte Reduktion		0.17	0.19	0.25	0.27	0.24		
Met.wahrsch.Beschattung		50	92	189	289	299		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AF - IO32

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1 04:55	20:07 (10) 05:33	20:08 (10) 06:26	18:49 (3) 07:18	18:15 (1) 07:14	08:08	
21:48	42 21:12 (7) 21:14	32 20:40 (9) 20:09	37 19:26 (4) 18:57	14 18:29 (1) 16:48	16:05	
2 04:55	20:07 (10) 05:35	20:10 (10) 06:28	18:49 (3) 07:19	18:17 (1) 07:16	08:09	
21:48	42 21:12 (7) 21:12	30 20:40 (6) 20:07	38 19:27 (4) 18:55	8 18:25 (1) 16:46	16:04	
3 04:56	20:07 (10) 05:37	20:10 (10) 06:29	18:48 (3) 07:21	18:18 (1) 07:18	08:11	
21:47	43 21:11 (7) 21:11	29 20:39 (6) 20:04	38 19:26 (4) 18:52	14 18:29 (1) 16:44	16:04	
4 04:57	20:07 (10) 05:38	20:12 (10) 06:31	18:48 (3) 07:23	18:18 (1) 07:20	08:12	
21:47	44 21:11 (7) 21:09	26 20:38 (6) 20:02	39 19:27 (4) 18:50	17:15 (2) 07:31	08:20	
5 04:58	20:07 (10) 05:40	20:13 (10) 06:33	18:48 (3) 07:25	18:18 (1) 07:22	08:14	
21:46	46 21:12 (7) 21:07	23 20:36 (6) 20:00	38 19:26 (4) 18:47	17:14 (2) 07:33	08:21	
6 04:59	20:07 (10) 05:42	20:15 (10) 06:35	18:48 (3) 07:26	18:18 (1) 07:24	08:15	
21:46	46 21:11 (7) 21:05	20 20:35 (6) 19:57	38 19:26 (4) 18:45	17:13 (2) 07:31	08:20	
7 05:00	20:07 (10) 05:43	20:18 (10) 06:36	18:48 (3) 07:28	17:21 (2) 07:26	08:16	
21:45	46 21:11 (7) 21:03	13 20:32 (6) 19:55	37 19:25 (4) 18:43	12 17:33 (2) 16:37	16:02	
8 05:01	20:07 (10) 05:45	20:01 (8) 06:38	18:48 (3) 07:30	17:19 (2) 07:27	08:17	
21:44	45 21:10 (7) 21:01	10 20:31 (6) 19:53	36 19:24 (4) 18:40	17 17:36 (2) 16:35	16:01	
9 05:02	20:07 (10) 05:47	19:59 (8) 06:40	18:49 (3) 07:32	17:17 (2) 07:29	08:19	
21:44	45 21:10 (7) 20:59	11 20:10 (8) 19:50	33 19:22 (4) 18:38	20 17:37 (2) 16:33	16:01	
10 05:03	20:06 (10) 05:48	19:57 (8) 06:41	18:50 (3) 07:34	17:15 (2) 07:31	08:20	
21:43	45 21:09 (7) 20:57	14 20:11 (8) 19:48	30 19:20 (4) 18:36	24 17:39 (2) 16:32	16:01	
11 05:04	20:06 (10) 05:50	19:57 (8) 06:43	18:51 (3) 07:35	17:14 (2) 07:33	08:21	
21:42	43 21:08 (7) 20:55	15 20:12 (8) 19:45	26 19:17 (4) 18:33	25 17:39 (2) 16:30	16:00	
12 05:05	20:06 (10) 05:52	19:55 (8) 06:45	18:53 (3) 07:37	17:13 (2) 07:35	08:22	
21:41	38 20:44 (9) 20:53	17 20:12 (8) 19:43	22 19:15 (4) 18:31	27 17:40 (2) 16:28	16:00	
13 05:06	20:06 (10) 05:53	19:55 (8) 06:47	18:57 (3) 07:39	17:12 (2) 07:37	08:23	
21:40	38 20:44 (9) 20:51	18 20:13 (8) 19:41	9 19:06 (3) 18:29	28 17:40 (2) 16:27	16:00	
14 05:07	20:06 (10) 05:55	19:55 (8) 06:48	18:57 (3) 07:41	17:11 (2) 07:39	08:24	
21:39	39 20:45 (9) 20:49	18 20:13 (8) 19:38	18:26 (1) 07:42	29 17:40 (2) 16:25	16:00	
15 05:09	20:05 (10) 05:57	19:54 (8) 06:50	18:54 (3) 07:43	17:11 (2) 07:41	08:25	
21:38	40 20:45 (9) 20:47	18 20:12 (8) 19:36	18:24 (1) 07:44	29 17:40 (2) 16:24	16:00	
16 05:10	20:05 (10) 05:58	19:54 (8) 06:52	18:54 (3) 07:45	17:10 (2) 07:42	08:26	
21:37	43 20:48 (5) 20:45	18 20:12 (8) 19:33	18:22 (1) 07:46	29 17:39 (2) 16:22	16:00	
17 05:11	20:05 (10) 06:00	19:54 (8) 06:53	18:23 (1) 07:46	17:10 (2) 07:44	08:27	
21:36	45 20:50 (5) 20:43	17 20:11 (8) 19:31	8 18:31 (1) 18:20	29 17:39 (2) 16:21	16:00	
18 05:12	20:05 (10) 06:02	19:54 (8) 06:55	18:20 (1) 07:48	17:11 (2) 07:46	08:28	
21:35	47 20:52 (5) 20:41	17 20:11 (8) 19:28	14 18:34 (1) 18:17	28 17:39 (2) 16:19	16:01	
19 05:14	20:05 (10) 06:04	19:55 (8) 06:57	18:18 (1) 07:50	17:11 (2) 07:48	08:28	
21:34	47 20:52 (5) 20:39	15 20:10 (8) 19:26	17 18:35 (1) 18:15	27 17:38 (2) 16:18	16:01	
20 05:15	20:05 (10) 06:05	19:56 (8) 06:59	18:15 (1) 07:52	17:11 (2) 07:50	08:29	
21:32	48 20:53 (5) 20:36	11 20:07 (8) 19:24	21 18:36 (1) 18:13	27 17:38 (2) 16:17	16:01	
21 05:17	20:06 (10) 06:07	19:58 (8) 07:00	18:14 (1) 07:54	17:12 (2) 07:51	08:29	
21:31	48 20:54 (5) 20:34	8 20:06 (8) 19:21	22 18:36 (1) 18:11	25 17:37 (2) 16:15	16:02	
22 05:18	20:05 (10) 06:09	19:57 (8) 07:02	18:14 (1) 07:55	17:13 (2) 07:53	08:30	
21:30	49 20:54 (5) 20:32	19:19	23 18:37 (1) 18:09	22 17:35 (2) 16:14	16:02	
23 05:19	20:05 (10) 06:10	19:03 (3) 07:04	18:13 (1) 07:57	17:14 (2) 07:55	08:31	
21:28	49 20:54 (5) 20:30	11 19:14 (3) 19:16	24 18:37 (1) 18:06	20 17:34 (2) 16:13	16:03	
24 05:21	20:06 (10) 06:12	19:00 (3) 07:05	18:12 (1) 07:59	17:16 (2) 07:56	08:31	
21:27	49 20:55 (5) 20:28	17 19:17 (3) 19:14	24 18:36 (1) 18:04	16 17:32 (2) 16:12	16:03	
25 05:22	20:06 (10) 06:14	18:57 (3) 07:07	18:12 (1) 07:01	16:19 (2) 07:58	08:31	
21:25	47 20:53 (5) 20:25	21 19:18 (3) 19:11	24 18:36 (1) 17:02	10 16:29 (2) 16:11	16:04	
26 05:24	20:05 (10) 06:16	18:55 (3) 07:09	18:12 (1) 07:03	18:00	08:32	
21:24	46 20:51 (5) 20:23	24 19:19 (3) 19:09	24 18:36 (1) 17:00	16:10	16:05	
27 05:25	20:06 (10) 06:17	18:54 (3) 07:11	18:12 (1) 07:05	18:01	08:32	
21:22	45 20:51 (5) 20:21	26 19:20 (3) 19:07	24 18:36 (1) 16:58	16:09	16:05	
28 05:27	20:06 (10) 06:19	18:52 (3) 07:12	18:12 (1) 07:07	18:03	08:32	
21:21	43 20:49 (5) 20:18	28 19:20 (3) 19:04	22 18:34 (1) 16:56	16:08	16:06	
29 05:29	20:07 (10) 06:21	18:52 (3) 07:14	18:12 (1) 07:09	18:05	08:32	
21:19	41 20:48 (5) 20:16	30 19:22 (4) 19:02	21 18:33 (1) 16:54	16:07	16:07	
30 05:30	20:07 (10) 06:22	18:51 (3) 07:16	18:13 (1) 07:10	18:06	08:32	
21:17	39 20:46 (5) 20:14	33 19:24 (4) 18:59	18 18:31 (1) 16:52	16:06	16:08	
31 05:32	20:08 (10) 06:24	18:50 (3) 07:17	17:12	18:06	08:32	
21:16	35 20:45 (5) 20:11	35 19:25 (4) 16:50	16:50	16:09	16:09	
Sonnenscheinstunden	509	458	382	330	262	237
astr.max.mögl.Beschattung	1363	605	707	466		
Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29		
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96		
Reduktion Windrichtung	0.64	0.67	0.71	0.73		
Gesamte Reduktion	0.23	0.27	0.24	0.20		
Met.wahrsch.Beschattung	319	166	169	95		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AG - IO33

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni										
1	08:32	08:03	07:07	16:40 (2)	06:54	18:56 (3)	05:46	19:46 (8)	04:58	19:57 (10)						
	16:10	17:00	17:54	27	17:07 (2)	19:51	19:25 (4)	20:45	14	20:00 (8)	21:33	44	21:00 (7)			
2	08:32	08:02	07:05	16:41 (2)	06:52	18:55 (3)	05:44	19:48 (8)	04:57	19:57 (10)						
	16:11	17:02	17:56	25	17:06 (2)	19:53	32	19:27 (4)	20:47	12	20:00 (8)	21:35	44	21:00 (7)		
3	08:32	08:00	07:03	16:42 (2)	06:49	18:53 (3)	05:42	19:50 (8)	04:57	19:59 (10)						
	16:12	17:04	17:58	23	17:05 (2)	19:55	35	19:28 (4)	20:49	12	20:12 (10)	21:36	43	21:02 (7)		
4	08:32	07:58	07:00	16:42 (2)	06:47	18:52 (3)	05:40	20:03 (10)	04:56	19:59 (10)						
	16:14	17:06	18:00	21	17:03 (2)	19:57	37	19:29 (4)	20:50	18	20:21 (6)	21:37	38	21:02 (7)		
5	08:31	07:57	06:58	16:44 (2)	06:44	18:52 (3)	05:38	20:00 (10)	04:55	20:00 (10)						
	16:15	17:08	18:02	18	17:02 (2)	19:58	37	19:29 (4)	20:52	22	20:22 (6)	21:38	39	21:04 (7)		
6	08:31	07:55	06:56	16:47 (2)	06:42	18:51 (3)	05:36	19:58 (10)	04:54	20:01 (10)						
	16:16	17:10	18:04	12	16:59 (2)	20:00	37	19:28 (4)	20:54	26	20:24 (6)	21:39	37	21:04 (7)		
7	08:31	07:53	06:54	20:02	06:40	18:50 (3)	05:35	19:58 (10)	04:54	20:01 (10)						
	16:18	17:12	18:06	38	19:28 (4)	20:56	28	20:26 (6)	21:40	37	21:03 (7)	20:02 (10)				
8	08:30	07:51	06:51	20:04	06:37	18:50 (3)	05:33	19:56 (10)	04:53	20:02 (10)						
	16:19	17:14	18:08	38	19:28 (4)	20:57	31	20:27 (6)	21:41	36	21:04 (7)	20:04 (10)				
9	08:30	07:49	06:49	20:06	06:35	18:49 (3)	05:31	19:55 (10)	04:53	20:04 (10)						
	16:20	17:16	18:09	38	19:27 (4)	20:59	32	20:27 (6)	21:42	35	21:05 (7)	20:04 (10)				
10	08:29	07:47	06:47	20:07	06:33	18:50 (3)	05:29	19:54 (10)	04:52	20:04 (10)						
	16:22	17:18	18:11	36	19:26 (4)	21:01	34	20:28 (9)	21:43	34	21:05 (7)	20:05 (10)				
11	08:28	07:45	06:44	17:39 (1)	06:30	18:50 (3)	05:27	19:54 (10)	04:52	20:05 (10)						
	16:23	17:20	18:13	8	17:47 (1)	20:09	35	19:25 (4)	21:02	36	20:30 (9)	21:43	33	21:05 (7)		
12	08:28	07:44	06:42	17:35 (1)	06:28	18:50 (3)	05:26	19:53 (10)	04:51	20:06 (10)						
	16:25	17:22	18:15	13	17:48 (1)	20:11	32	19:22 (4)	21:04	40	20:33 (5)	21:44	32	21:06 (7)		
13	08:27	07:42	06:39	17:33 (1)	06:26	18:50 (3)	05:24	19:53 (10)	04:51	20:06 (10)						
	16:26	17:24	18:17	18	17:51 (1)	20:13	30	19:20 (4)	21:06	42	20:35 (5)	21:45	30	21:05 (7)		
14	08:26	07:40	06:37	17:32 (1)	06:23	18:51 (3)	05:22	19:52 (10)	04:51	20:07 (10)						
	16:28	17:26	18:19	21	17:53 (1)	20:15	26	19:17 (3)	21:07	44	20:36 (5)	21:45	30	21:06 (7)		
15	08:25	07:38	06:35	17:31 (1)	06:21	18:52 (3)	05:20	19:53 (10)	04:51	20:08 (10)						
	16:29	17:28	18:21	22	17:53 (1)	20:16	24	19:16 (3)	21:09	45	20:38 (5)	21:46	29	21:06 (7)		
16	08:24	07:35	06:32	17:30 (1)	06:19	18:53 (3)	05:19	19:52 (10)	04:50	20:09 (10)						
	16:31	17:29	18:22	23	17:53 (1)	20:18	21	19:14 (3)	21:11	47	20:39 (5)	21:47	26	21:06 (7)		
17	08:23	07:33	16:49 (2)	06:30	17:29 (1)	06:16	18:55 (3)	05:17	19:52 (10)	04:50	20:10 (10)					
	16:33	17:31	12	17:01 (2)	18:24	24	17:53 (1)	20:20	17	19:12 (3)	21:12	49	20:41 (5)	21:47	26	21:07 (7)
18	08:22	07:31	16:46 (2)	06:28	17:29 (1)	06:14	18:57 (3)	05:16	19:52 (10)	04:50	20:10 (10)					
	16:34	17:33	17	17:03 (2)	18:26	24	17:53 (1)	20:22	12	19:09 (3)	21:14	49	20:41 (5)	21:47	26	21:07 (7)
19	08:21	07:29	16:45 (2)	06:25	17:28 (1)	06:12	19:54 (10)	04:50	20:11 (10)							
	16:36	17:35	20	17:05 (2)	18:28	24	17:52 (1)	20:24	21:15	50	20:42 (5)	21:48	24	21:07 (7)		
20	08:20	07:27	16:43 (2)	06:23	17:28 (1)	06:10	19:54 (8)	05:13	19:52 (10)	04:50	20:11 (10)					
	16:38	17:37	23	17:06 (2)	18:30	24	17:52 (1)	20:25	4	19:58 (8)	21:17	50	20:42 (5)	21:48	24	21:07 (7)
21	08:19	07:25	16:43 (2)	06:20	17:29 (1)	06:08	19:51 (8)	05:11	19:52 (10)	04:50	20:12 (10)					
	16:40	17:39	24	17:07 (2)	18:31	23	17:52 (1)	20:27	8	19:59 (8)	21:18	49	20:41 (5)	21:48	24	21:08 (7)
22	08:18	07:23	16:42 (2)	06:18	17:29 (1)	06:05	19:49 (8)	05:10	19:52 (10)	04:51	20:12 (10)					
	16:41	17:41	26	17:08 (2)	18:33	21	17:50 (1)	20:29	12	20:01 (8)	21:20	48	20:40 (5)	21:49	24	21:08 (7)
23	08:16	07:21	16:41 (2)	06:16	17:30 (1)	06:03	19:47 (8)	05:09	19:53 (10)	04:51	20:12 (10)					
	16:43	17:43	27	17:08 (2)	18:35	19	17:49 (1)	20:31	15	20:02 (8)	21:21	47	20:40 (5)	21:49	24	21:08 (7)
24	08:15	07:18	16:40 (2)	06:13	17:31 (1)	06:01	19:46 (8)	05:07	19:53 (10)	04:51	20:12 (10)					
	16:45	17:45	28	17:08 (2)	18:37	16	17:47 (1)	20:33	17	20:03 (8)	21:23	46	20:39 (5)	21:49	25	21:08 (7)
25	08:14	07:16	16:40 (2)	06:11	17:33 (1)	05:59	19:45 (8)	05:06	19:54 (10)	04:52	20:12 (10)					
	16:47	17:47	29	17:09 (2)	18:39	12	17:45 (1)	20:34	18	20:03 (8)	21:24	44	20:38 (5)	21:49	26	21:09 (7)
26	08:12	07:14	16:40 (2)	06:08	17:34 (1)	05:57	19:45 (8)	05:05	19:54 (10)	04:52	20:11 (10)					
	16:49	17:49	28	17:08 (2)	18:40	18	20:03 (8)	21:26	39	20:33 (9)	21:49	27	21:09 (7)			
27	08:11	07:12	16:40 (2)	06:06	17:35 (1)	05:55	19:45 (8)	05:04	19:55 (10)	04:52	20:11 (10)					
	16:51	17:51	28	17:08 (2)	18:42	20:38	18	20:03 (8)	21:27	37	20:32 (9)	21:49	29	21:09 (7)		
28	08:10	07:10	16:40 (2)	06:03	17:36 (1)	05:52	19:45 (8)	05:02	19:55 (10)	04:53	20:10 (10)					
	16:53	17:53	28	17:08 (2)	18:44	20:40	18	20:03 (8)	21:28	37	20:32 (9)	21:49	30	21:09 (7)		
29	08:08	07:07	16:41 (2)	06:01	19:05 (3)	05:50	19:45 (8)	05:01	19:56 (10)	04:53	20:10 (10)					
	16:54	17:54	29	17:09 (2)	18:46	7	19:12 (3)	20:41	17	20:02 (8)	21:30	41	20:57 (7)	21:49	31	21:10 (7)
30	08:06	07:05	16:40 (2)	05:59	19:01 (3)	05:48	19:46 (8)	05:00	19:56 (10)	04:54	20:09 (10)					
	16:56	17:56	19:48	20	19:22 (4)	20:43	15	20:01 (8)	21:31	43	20:58 (7)	21:48	31	21:09 (7)		
31	08:05	07:04	16:40 (2)	05:56	18:58 (3)	05:46	19:45 (8)	04:59	19:57 (10)							
	16:58	17:58	25	19:23 (4)	20:44	21:32	43	20:59 (7)								
Sonnenscheinstunden	253	275	367	419	491	506										
astr.max.mögl.Beschattung		290	470	714	1155	938										
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39										
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96										
Reduktion Windrichtung		0.73	0.72	0.70	0.65	0.63										
Gesamte Reduktion		0.17	0.19	0.25	0.27	0.24										
Met.wahrsch.Beschattung		48	90	179	309	221										

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattenende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AG - IO33

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:55	20:09 (10) 05:33	20:03 (10) 06:26	18:49 (3) 07:18	18:14 (1) 07:14	08:08	
	21:48	33 21:10 (7) 21:14	39 20:43 (5) 20:09	35 19:24 (4) 18:57	15 18:29 (1) 16:48	16:05	
2	04:55	20:09 (10) 05:35	20:04 (10) 06:28	18:49 (3) 07:19	18:15 (1) 07:16	08:09	
	21:48	34 21:10 (7) 21:12	36 20:40 (9) 20:07	36 19:25 (4) 18:55	11 18:26 (1) 16:46	16:04	
3	04:56	20:08 (10) 05:37	20:04 (10) 06:29	18:47 (3) 07:21		08:11	
	21:47	35 21:09 (7) 21:11	34 20:38 (6) 20:04	38 19:25 (4) 18:52		16:44	
4	04:57	20:08 (10) 05:38	20:06 (10) 06:31	18:47 (3) 07:23		08:12	
	21:47	36 21:10 (7) 21:09	32 20:38 (6) 20:02	38 19:25 (4) 18:50		16:42	
5	04:58	20:08 (10) 05:40	20:06 (10) 06:33	18:46 (3) 07:25		08:14	
	21:46	37 21:10 (7) 21:07	30 20:36 (6) 20:00	38 19:24 (4) 18:47		16:40	
6	04:59	20:07 (10) 05:42	20:07 (10) 06:35	18:47 (3) 07:26		08:15	
	21:46	37 21:10 (7) 21:05	28 20:35 (6) 19:57	37 19:24 (4) 18:45		16:39	
7	05:00	20:07 (10) 05:43	20:08 (10) 06:36	18:47 (3) 07:28	17:24 (2) 07:26	08:16	
	21:45	37 21:10 (7) 21:03	24 20:32 (6) 19:55	37 19:24 (4) 18:43	9 17:33 (2) 16:37	16:02	
8	05:01	20:07 (10) 05:45	20:10 (10) 06:38	18:46 (3) 07:30		08:17	
	21:44	38 21:10 (7) 21:01	21 20:31 (6) 19:53	37 19:23 (4) 18:40	16 17:36 (2) 16:35	16:01	
9	05:02	20:06 (10) 05:47	20:13 (10) 06:40	18:47 (3) 07:32		08:19	
	21:44	40 21:10 (7) 20:59	15 20:30 (6) 19:50	35 19:22 (4) 18:38	20 17:38 (2) 16:33	16:01	
10	05:03	20:06 (10) 05:48	19:58 (8) 06:41	18:48 (3) 07:34		08:20	
	21:43	43 21:09 (7) 20:57	9 20:07 (8) 19:48	32 19:20 (4) 18:36	22 17:39 (2) 16:32	16:01	
11	05:04	20:06 (10) 05:50	19:56 (8) 06:43	18:48 (3) 07:35		08:21	
	21:42	43 21:08 (7) 20:55	13 20:09 (8) 19:45	29 19:17 (4) 18:33	24 17:40 (2) 16:30	16:00	
12	05:05	20:05 (10) 05:52	19:55 (8) 06:45	18:50 (3) 07:37		08:22	
	21:41	44 21:08 (7) 20:53	14 20:09 (8) 19:43	25 19:15 (4) 18:31	25 17:40 (2) 16:28	16:00	
13	05:06	20:05 (10) 05:53	19:54 (8) 06:47	18:52 (3) 07:39		08:23	
	21:40	43 21:07 (7) 20:51	16 20:10 (8) 19:41	21 19:13 (4) 18:29	27 17:41 (2) 16:27	16:00	
14	05:07	20:04 (10) 05:55	19:54 (8) 06:48	18:54 (3) 07:41		08:24	
	21:39	43 21:06 (7) 20:49	17 20:11 (8) 19:38	10 19:04 (3) 18:26	28 17:40 (2) 16:25	16:00	
15	05:09	20:04 (10) 05:57	19:52 (8) 06:50		17:12 (2) 07:41	08:25	
	21:38	39 21:04 (7) 20:47	18 20:10 (8) 19:36		18:24	28 17:40 (2) 16:24	16:00
16	05:10	20:03 (10) 05:58	19:53 (8) 06:52		07:44		08:26
	21:37	38 20:41 (9) 20:45	18 20:11 (8) 19:33		18:22	28 17:40 (2) 16:22	16:00
17	05:11	20:03 (10) 06:00	19:52 (8) 06:53		07:46		08:27
	21:36	38 20:41 (9) 20:43	18 20:10 (8) 19:31		18:20	28 17:40 (2) 16:21	16:00
18	05:12	20:04 (10) 06:02	19:52 (8) 06:55	18:21 (1) 07:48		08:28	
	21:35	40 20:46 (5) 20:41	18 20:10 (8) 19:28	10 18:31 (1) 18:17	27 17:39 (2) 16:19	16:01	
19	05:14	20:03 (10) 06:04	19:53 (8) 06:57		18:19 (1) 07:50		08:28
	21:34	45 20:48 (5) 20:39	16 20:09 (8) 19:26	15 18:34 (1) 18:15	27 17:39 (2) 16:18	16:01	
20	05:15	20:03 (10) 06:05	19:53 (8) 06:59		18:16 (1) 07:52		08:29
	21:32	46 20:49 (5) 20:36	14 20:07 (8) 19:24	18 18:34 (1) 18:13	25 17:38 (2) 16:17	16:01	
21	05:17	20:03 (10) 06:07	19:54 (8) 07:00		18:15 (1) 07:54		08:29
	21:31	48 20:51 (5) 20:34	12 20:06 (8) 19:21	20 18:35 (1) 18:11	24 17:37 (2) 16:15	16:02	
22	05:18	20:03 (10) 06:09	19:56 (8) 07:02		07:55		08:30
	21:30	48 20:51 (5) 20:32	8 20:04 (8) 19:19	22 18:36 (1) 18:09	22 17:36 (2) 16:14	16:02	
23	05:19	20:02 (10) 06:10	19:59 (8) 07:04		18:13 (1) 07:57		08:31
	21:28	49 20:51 (5) 20:30	1 20:00 (8) 19:16	24 18:37 (1) 18:06	20 17:35 (2) 16:13	16:03	
24	05:21	20:03 (10) 06:12		07:05	18:12 (1) 07:59		08:31
	21:27	49 20:52 (5) 20:28		19:14	24 18:36 (1) 18:04	16 17:33 (2) 16:12	16:03
25	05:22	20:02 (10) 06:14		19:00 (3) 07:07	18:12 (1) 07:01		08:31
	21:25	50 20:52 (5) 20:25	12 19:12 (3) 19:11	24 18:36 (1) 17:02	10 16:30 (2) 16:11	16:04	
26	05:24	20:02 (10) 06:16		18:57 (3) 07:09		18:12 (1) 07:03	08:32
	21:24	49 20:51 (5) 20:23	18 19:15 (3) 19:09	24 18:36 (1) 17:00		16:10	16:05
27	05:25	20:03 (10) 06:17		18:56 (3) 07:11		18:12 (1) 07:05	08:32
	21:22	48 20:51 (5) 20:21	21 19:17 (3) 19:07	23 18:35 (1) 16:58		16:09	16:05
28	05:27	20:02 (10) 06:19		18:53 (3) 07:12		18:11 (1) 07:07	08:32
	21:21	47 20:49 (5) 20:18	24 19:17 (3) 19:04	23 18:34 (1) 16:56		16:08	16:06
29	05:29	20:03 (10) 06:21		18:52 (3) 07:14		18:12 (1) 07:09	08:32
	21:19	45 20:48 (5) 20:16	26 19:18 (3) 19:02	21 18:33 (1) 16:54		16:07	16:07
30	05:30	20:03 (10) 06:22		18:51 (3) 07:16		18:13 (1) 07:10	08:32
	21:17	43 20:46 (5) 20:14	30 19:21 (4) 18:59	18 18:31 (1) 16:52		16:06	16:08
31	05:32	20:04 (10) 06:24		18:50 (3)		07:12	08:32
	21:16	41 20:45 (5) 20:11	32 19:22 (4)			16:50	16:09
	Sonnenscheinstunden	509	458	382	330	262	237
	astr.max.mögl.Beschattung	1306	614	714	452		
	Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29		
	Reduktion Betriebsdauer	0.96	0.96	0.96	0.96		
	Reduktion Windrichtung	0.64	0.67	0.71	0.73		
	Gesamte Reduktion	0.23	0.27	0.24	0.20		
	Met.wahrsch.Beschattung	306	167	171	92		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt

-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AH - IO34

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni								
1	08:32	08:03	07:07	16:52 (2)	06:54	05:46	19:54 (8)	04:58					20:09 (10)	
	16:10	17:00	17:54	27	17:19 (2)	19:51	20:45	18	20:12 (8)	21:33	37	20:46 (9)		
2	08:32	08:02	07:05	16:51 (2)	06:52	05:44	19:55 (8)	04:57					20:09 (10)	
	16:11	17:02	17:56	29	17:20 (2)	19:53	20:47	18	20:13 (8)	21:35	36	20:45 (9)		
3	08:32	08:00	07:03	16:51 (2)	06:49	05:42	19:55 (8)	04:57					20:10 (10)	
	16:12	17:04	17:58	29	17:20 (2)	19:55	20:49	17	20:12 (8)	21:36	36	20:46 (9)		
4	08:32	07:58	07:00	16:50 (2)	06:47	05:40	19:57 (4)	05:40					20:10 (10)	
	16:14	17:06	18:00	29	17:19 (2)	19:57	3	19:30 (4)	20:50	17	20:12 (8)	21:37	36	20:46 (9)
5	08:31	07:57	06:58	16:51 (2)	06:44	05:38	19:20 (3)	05:38					20:10 (10)	
	16:15	17:08	18:02	29	17:20 (2)	19:58	12	19:32 (4)	20:52	16	20:11 (8)	21:38	36	20:46 (9)
6	08:31	07:55	06:56	16:51 (2)	06:42	05:36	19:14 (3)	05:36					20:10 (10)	
	16:16	17:10	18:04	28	17:19 (2)	20:00	19	19:33 (4)	20:54	15	20:10 (8)	21:39	36	20:46 (9)
7	08:31	07:53	06:54	16:51 (2)	06:40	05:34	19:11 (3)	05:35					20:10 (10)	
	16:18	17:12	18:06	27	17:18 (2)	20:02	24	19:35 (4)	20:56	13	20:10 (8)	21:40	35	20:45 (9)
8	08:30	07:51	06:51	16:52 (2)	06:37	05:33	19:10 (3)	05:33					20:11 (10)	
	16:19	17:14	18:08	26	17:18 (2)	20:04	27	19:37 (4)	20:57	11	20:27 (6)	21:41	37	21:06 (7)
9	08:30	07:49	06:49	16:53 (2)	06:35	05:31	19:07 (3)	05:31					20:12 (10)	
	16:20	17:16	18:09	24	17:17 (2)	20:06	30	19:37 (4)	20:59	10	20:28 (6)	21:42	39	21:08 (7)
10	08:29	07:47	06:47	16:53 (2)	06:33	05:29	19:06 (3)	05:29					20:11 (10)	
	16:22	17:18	18:11	22	17:15 (2)	20:07	32	19:38 (4)	21:01	8	20:30 (6)	21:43	41	21:08 (7)
11	08:28	07:45	06:44	16:55 (2)	06:30	05:27	19:06 (3)	05:27					20:12 (10)	
	16:23	17:20	18:13	18	17:13 (2)	20:09	32	19:38 (4)	21:02	10	20:32 (6)	21:43	42	21:09 (7)
12	08:28	07:43	06:42	16:56 (2)	06:28	05:26	19:04 (3)	05:26					20:12 (10)	
	16:25	17:22	18:15	14	17:10 (2)	20:11	33	19:37 (4)	21:04	12	20:33 (6)	21:44	43	21:10 (7)
13	08:27	07:42	06:39	17:01 (2)	06:26	05:24	19:04 (3)	05:24					20:12 (10)	
	16:26	17:24	18:17	5	17:06 (2)	20:13	33	19:37 (4)	21:06	17	20:35 (6)	21:45	43	21:10 (7)
14	08:26	07:40	06:37	17:02 (2)	06:23	05:22	19:03 (3)	05:22					20:12 (10)	
	16:28	17:26	18:19		20:15	33	19:36 (4)	21:07	20	20:36 (6)	21:45	43	21:10 (7)	
15	08:25	07:38	06:35		06:21	33	19:03 (3)	05:21					20:13 (10)	
	16:29	17:28	18:21		20:16	33	19:36 (4)	21:09	21	20:36 (6)	21:46	43	21:11 (7)	
16	08:24	07:35	06:32	17:51 (1)	06:19	05:19	19:02 (3)	05:19					20:13 (10)	
	16:31	17:29	18:22	3	17:54 (1)	20:18	32	19:34 (3)	21:11	24	20:37 (9)	21:47	43	21:11 (7)
17	08:23	07:33	06:30	17:46 (1)	06:16	05:17	19:02 (3)	05:17					20:13 (10)	
	16:33	17:31	18:24	12	17:58 (1)	20:20	32	19:34 (3)	21:12	29	20:41 (5)	21:47	44	21:12 (7)
18	08:22	07:31	06:28	17:44 (1)	06:14	05:16	19:02 (3)	05:16					20:14 (10)	
	16:34	17:33	18:26	16	18:00 (1)	20:22	31	19:33 (3)	21:14	31	20:42 (5)	21:47	43	21:12 (7)
19	08:21	07:29	06:25	17:42 (1)	06:12	05:14	19:03 (3)	05:14					20:14 (10)	
	16:36	17:35	18:28	19	18:01 (1)	20:24	30	19:33 (3)	21:15	32	20:43 (5)	21:48	44	21:13 (7)
20	08:20	07:27	06:23	17:41 (1)	06:10	05:13	19:03 (3)	05:13					20:14 (10)	
	16:38	17:37	18:30	21	18:02 (1)	20:25	29	19:32 (3)	21:17	35	20:45 (5)	21:48	44	21:13 (7)
21	08:19	07:25	06:20	17:40 (1)	06:08	05:11	19:04 (3)	05:11					20:15 (10)	
	16:40	17:39	18:31	23	18:03 (1)	20:27	28	19:32 (3)	21:18	37	20:46 (5)	21:48	44	21:14 (7)
22	08:18	07:23	06:18	17:39 (1)	06:05	05:10	19:05 (3)	05:10					20:15 (10)	
	16:42	17:41	18:33	24	18:03 (1)	20:29	26	19:31 (3)	21:20	38	20:47 (5)	21:49	44	21:14 (7)
23	08:16	07:21	17:01 (2)	06:16	17:39 (1)	06:03	19:05 (3)	05:09					20:15 (10)	
	16:43	17:43	11	17:12 (2)	18:35	24	18:03 (1)	20:31	24	19:29 (3)	21:21	40	20:49 (5)	21:49
24	08:15	07:18	16:58 (2)	06:13	17:38 (1)	06:01	19:06 (3)	05:07					20:15 (10)	
	16:45	17:45	17	17:15 (2)	18:37	24	18:02 (1)	20:33	21	19:27 (3)	21:23	40	20:49 (5)	21:49
25	08:14	07:16	16:57 (2)	06:11	17:38 (1)	05:59	19:07 (3)	05:06					20:15 (10)	
	16:47	17:47	20	17:17 (2)	18:39	24	18:02 (1)	20:34	20	20:05 (8)	21:24	40	20:49 (5)	21:49
26	08:12	07:14	16:54 (2)	06:08	17:37 (1)	05:57	19:10 (3)	05:05					20:15 (10)	
	16:49	17:49	23	17:17 (2)	18:40	24	18:01 (1)	20:36	21	20:07 (8)	21:26	40	20:49 (5)	21:49
27	08:11	07:12	16:54 (2)	06:06	17:38 (1)	05:55	19:14 (3)	05:04					20:16 (10)	
	16:51	17:51	25	17:19 (2)	18:42	22	18:00 (1)	20:38	16	20:09 (8)	21:27	40	20:49 (5)	21:49
28	08:10	07:10	16:53 (2)	06:03	17:39 (1)	05:52	19:56 (8)	05:02					20:16 (10)	
	16:53	17:53	27	17:20 (2)	18:44	21	18:00 (1)	20:40	15	20:11 (8)	21:28	40	20:49 (5)	21:49
29	08:08		07:01		18:39 (1)	05:50	19:55 (8)	05:01					20:16 (10)	
	16:54		19:46	18	18:57 (1)	20:41	17	20:12 (8)	21:30	39	20:48 (5)	21:49	43	21:14 (7)
30	08:06		06:59		18:41 (1)	05:48	19:55 (8)	05:00					20:16 (10)	
	16:56		19:48	15	18:56 (1)	20:43	17	20:12 (8)	21:31	38	20:47 (5)	21:48	42	21:13 (7)
31	08:05		06:56		18:43 (1)		04:59						20:16 (10)	
	16:58		19:49	9	18:52 (1)		21:32		37	20:46 (5)			20:16 (10)	
Sonnenscheinstunden	253	275	367	418	491	506	670	803	903	1234				
astr.max.mögl.Beschattung		123	606	670	803	903	1234							
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39								
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96								
Reduktion Windrichtung		0.73	0.72	0.69	0.64	0.63								
Gesamte Reduktion		0.17	0.19	0.25	0.27	0.24								
Met.wahrsch.Beschattung		20	117	166	213	291								

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattenende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AH - IO34

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember						
1	04:55	20:16 (10) 05:33	20:31 (6) 06:26	19:05 (3) 07:18	17:38 (2) 07:14	08:08						
	21:48	42 21:13 (7) 21:14	12 20:43 (6) 20:09	32 19:37 (4) 18:57	11 17:49 (2) 16:48	16:05						
2	04:55	20:16 (10) 05:35	20:32 (6) 06:28	19:05 (3) 07:19	17:34 (2) 07:16	08:09						
	21:48	42 21:13 (7) 21:12	10 20:42 (6) 20:07	32 19:37 (4) 18:55	16 17:50 (2) 16:46	16:04						
3	04:56	20:16 (10) 05:37	20:33 (6) 06:29	19:05 (3) 07:21	17:32 (2) 07:18	08:11						
	21:47	39 21:12 (7) 21:11	6 20:39 (6) 20:04	30 19:35 (4) 18:52	20 17:52 (2) 16:44	16:04						
4	04:57	20:16 (10) 05:38	20:09 (8) 06:31	19:07 (3) 07:23	17:30 (2) 07:20	08:12						
	21:47	39 21:12 (7) 21:09	11 20:38 (6) 20:02	27 19:34 (4) 18:50	23 17:53 (2) 16:42	16:03						
5	04:58	20:16 (10) 05:40	20:07 (8) 06:33	19:07 (3) 07:25	17:29 (2) 07:22	08:14						
	21:46	35 20:51 (9) 21:07	11 20:18 (8) 20:00	24 19:31 (4) 18:47	25 17:54 (2) 16:40	16:03						
6	04:59	20:17 (10) 05:42	20:06 (8) 06:35	19:10 (3) 07:26	17:28 (2) 07:24	08:15						
	21:46	35 20:52 (9) 21:05	14 20:20 (8) 19:57	19 19:29 (4) 18:45	27 17:55 (2) 16:39	16:02						
7	05:00	20:17 (10) 05:43	20:04 (8) 06:36	19:15 (3) 07:28	17:26 (2) 07:26	08:16						
	21:45	36 20:53 (9) 21:03	16 20:20 (8) 19:55	12 19:27 (4) 18:43	28 17:54 (2) 16:37	16:02						
8	05:01	20:17 (10) 05:45	20:04 (8) 06:38	19:20 (4) 07:30	17:26 (2) 07:27	08:17						
	21:44	36 20:53 (9) 21:01	17 20:21 (8) 19:53	4 19:24 (4) 18:40	29 17:55 (2) 16:35	16:01						
9	05:02	20:17 (10) 05:47	20:04 (8) 06:40		17:26 (2) 07:29	08:19						
	21:44	36 20:53 (9) 20:59	18 20:22 (8) 19:50		18:38	29 17:55 (2) 16:33	16:01					
10	05:03	20:17 (10) 05:48	20:03 (8) 06:41		17:25 (2) 07:31	08:20						
	21:43	37 20:54 (9) 20:57	18 20:21 (8) 19:48		18:36	29 17:54 (2) 16:32	16:01					
11	05:04	20:17 (10) 05:50	20:03 (8) 06:43		17:25 (2) 07:33	08:21						
	21:42	37 20:54 (9) 20:55	18 20:21 (8) 19:45		18:33	29 17:54 (2) 16:30	16:00					
12	05:05	20:17 (10) 05:52	20:03 (8) 06:45	18:36 (1) 07:37	17:25 (2) 07:35	08:22						
	21:41	37 20:54 (5) 20:53	17 20:20 (8) 19:43	8 18:44 (1) 18:31	29 17:54 (2) 16:28	16:00						
13	05:06	20:17 (10) 05:53	20:03 (8) 06:47	18:33 (1) 07:39	17:26 (2) 07:37	08:23						
	21:40	38 20:55 (5) 20:51	17 20:20 (8) 19:41	14 18:47 (1) 18:29	27 17:53 (2) 16:27	16:00						
14	05:07	20:17 (10) 05:55	20:04 (8) 06:48	18:30 (1) 07:41	17:25 (2) 07:39	08:24						
	21:39	39 20:56 (5) 20:49	16 20:20 (8) 19:38	17 18:47 (1) 18:26	26 17:51 (2) 16:25	16:00						
15	05:09	20:17 (10) 05:57	20:04 (8) 06:50	18:29 (1) 07:43	17:26 (2) 07:41	08:25						
	21:38	40 20:57 (5) 20:47	14 20:18 (8) 19:36	20 18:49 (1) 18:24	24 17:50 (2) 16:24	16:00						
16	05:10	20:17 (10) 05:58	19:20 (3) 06:52	18:28 (1) 07:44	17:27 (2) 07:42	08:26						
	21:37	40 20:57 (5) 20:45	18 20:16 (8) 19:33	22 18:50 (1) 18:22	22 17:49 (2) 16:22	16:00						
17	05:11	20:17 (10) 06:00	19:16 (3) 06:53	18:26 (1) 07:46	17:28 (2) 07:44	08:27						
	21:36	41 20:58 (5) 20:43	21 20:13 (8) 19:31	23 18:49 (1) 18:20	19 17:47 (2) 16:21	16:00						
18	05:12	20:18 (10) 06:02	19:14 (3) 06:55	18:25 (1) 07:48	17:30 (2) 07:46	08:27						
	21:35	41 20:59 (5) 20:41	18 19:32 (3) 19:28	24 18:49 (1) 18:17	15 17:45 (2) 16:19	16:01						
19	05:14	20:18 (10) 06:04	19:12 (3) 06:57	18:25 (1) 07:50	17:34 (2) 07:48	08:28						
	21:34	41 20:59 (5) 20:39	22 19:34 (3) 19:26	25 18:50 (1) 18:15	8 17:42 (2) 16:18	16:01						
20	05:15	20:19 (10) 06:05	19:10 (3) 06:59	18:24 (1) 07:52		07:50	08:29					
	21:32	40 20:59 (5) 20:36	24 19:34 (3) 19:24	25 18:49 (1) 18:13		16:17	16:01					
21	05:17	20:20 (10) 06:07	19:09 (3) 07:00	18:24 (1) 07:54		07:51	08:29					
	21:31	39 20:59 (5) 20:34	27 19:36 (3) 19:21	24 18:48 (1) 18:11		16:15	16:02					
22	05:18	20:20 (10) 06:09	19:08 (3) 07:02	18:24 (1) 07:55		07:53	08:30					
	21:30	37 20:57 (5) 20:32	28 19:36 (3) 19:19	24 18:48 (1) 18:09		16:14	16:02					
23	05:19	20:20 (10) 06:10	19:07 (3) 07:04	18:25 (1) 07:57		07:55	08:31					
	21:28	36 20:56 (5) 20:30	29 19:36 (3) 19:16	22 18:47 (1) 18:06		16:13	16:03					
24	05:21	20:21 (10) 06:12	19:06 (3) 07:05	18:25 (1) 07:59		07:56	08:31					
	21:27	34 20:55 (5) 20:28	31 19:37 (3) 19:14	20 18:45 (1) 18:04		16:12	16:03					
25	05:22	20:21 (10) 06:14	19:05 (3) 07:07	18:26 (1) 07:01		07:58	08:31					
	21:25	32 20:53 (5) 20:25	31 19:36 (3) 19:11	17 18:43 (1) 17:02		16:11	16:04					
26	05:24	20:22 (10) 06:16	19:05 (3) 07:09	18:28 (1) 07:03		08:00	08:32					
	21:24	29 20:51 (5) 20:23	32 19:37 (3) 19:09	13 18:41 (1) 17:00		16:10	16:05					
27	05:25	20:23 (10) 06:17	19:05 (3) 07:11	18:31 (1) 07:05		08:01	08:32					
	21:22	28 20:51 (5) 20:21	32 19:37 (3) 19:07	8 18:39 (1) 16:58		16:09	16:05					
28	05:27	20:24 (10) 06:19	19:04 (3) 07:12		07:07		08:03	08:32				
	21:21	22 20:46 (6) 20:18	32 19:36 (3) 19:04		16:56		16:08	16:06				
29	05:29	20:26 (10) 06:21	19:04 (3) 07:14		07:09		08:05	08:32				
	21:19	21 20:47 (6) 20:16	33 19:37 (4) 19:02		16:54		16:07	16:07				
30	05:30	20:27 (10) 06:22	19:04 (3) 07:16		07:10		08:06	08:32				
	21:17	19 20:46 (6) 20:14	34 19:38 (4) 18:59		16:52		16:06	16:08				
31	05:32	20:30 (10) 06:24	19:04 (3)		07:12		08:32	08:32				
	21:16	15 20:45 (6) 20:11	33 19:37 (4)		16:50		16:09	16:09				
Sonnenscheinstunden							508	458	382	330	262	237
astr.max.mögl.Beschattung							1083	660	486	436		
Red.Sonnenscheinwahrsch.							0.38	0.42	0.35	0.29		
Reduktion Betriebsdauer							0.96	0.96	0.96	0.96		
Reduktion Windrichtung							0.64	0.68	0.71	0.73		
Gesamte Reduktion							0.23	0.28	0.24	0.20		
Met.wahrsch.Beschattung							252	183	116	89		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AI - IO35

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:07	17:02 (2) 06:54	05:46	19:52 (8) 04:58	20:07 (10)		
	16:10	17:00	17:54	23 17:25 (2) 19:51	20:45	15 20:07 (8) 21:33	35 21:00 (7)		
2	08:32	08:02	07:05	17:01 (2) 06:51	05:44	19:53 (8) 04:57	20:07 (10)		
	16:11	17:02	17:56	25 17:26 (2) 19:53	20:47	14 20:07 (8) 21:35	32 21:00 (7)		
3	08:32	08:00	07:03	17:01 (2) 06:49	05:42	19:54 (8) 04:57	20:09 (10)		
	16:12	17:04	17:58	25 17:26 (2) 19:55	4 19:28 (4) 20:49	11 20:05 (8) 21:36	32 21:02 (7)		
4	08:32	07:58	07:00	17:00 (2) 06:47	05:40	19:55 (8) 04:56	20:09 (10)		
	16:14	17:06	18:00	26 17:26 (2) 19:57	15 19:30 (4) 20:50	8 20:03 (8) 21:37	32 21:03 (7)		
5	08:31	07:57	06:58	17:00 (2) 06:44	05:38	19:13 (3) 05:38	20:13 (10) 04:55	20:11 (10)	
	16:15	17:08	18:02	26 17:26 (2) 19:58	19 19:32 (4) 20:52	9 20:22 (6) 21:38	31 21:04 (7)		
6	08:31	07:55	06:56	17:00 (2) 06:42	05:36	19:10 (3) 05:36	20:09 (10) 04:54	20:11 (10)	
	16:16	17:10	18:04	26 17:26 (2) 20:00	23 19:33 (4) 20:54	15 20:24 (6) 21:39	30 21:04 (7)		
7	08:31	07:53	06:54	16:59 (2) 06:40	05:35	19:09 (3) 05:35	20:08 (10) 04:54	20:12 (10)	
	16:18	17:12	18:06	26 17:25 (2) 20:02	26 19:35 (4) 20:56	18 20:26 (6) 21:40	28 21:04 (7)		
8	08:30	07:51	06:51	17:00 (2) 06:37	05:33	19:08 (3) 05:33	20:06 (10) 04:53	20:14 (10)	
	16:19	17:14	18:08	25 17:25 (2) 20:04	29 19:37 (4) 20:57	21 20:27 (6) 21:41	26 21:05 (7)		
9	08:30	07:49	06:49	17:01 (2) 06:35	05:31	19:06 (3) 05:31	20:05 (10) 04:53	20:15 (10)	
	16:20	17:16	18:09	24 17:25 (2) 20:06	30 19:36 (4) 20:59	23 20:28 (6) 21:42	25 21:06 (7)		
10	08:29	07:47	06:47	17:01 (2) 06:33	05:29	19:06 (3) 05:29	20:03 (10) 04:52	20:17 (10)	
	16:22	17:18	18:11	22 17:23 (2) 20:07	30 19:36 (4) 21:01	27 20:30 (9) 21:43	21 21:05 (7)		
11	08:28	07:45	06:44	17:02 (2) 06:30	05:27	19:05 (3) 05:27	20:03 (10) 04:52	20:49 (7)	
	16:23	17:20	18:13	20 17:22 (2) 20:09	31 19:36 (4) 21:02	29 20:32 (9) 21:43	17 21:06 (7)		
12	08:28	07:43	06:42	17:03 (2) 06:28	05:26	19:04 (3) 05:26	20:02 (10) 04:51	20:49 (7)	
	16:25	17:22	18:15	16 17:19 (2) 20:11	30 19:34 (4) 21:04	31 20:33 (9) 21:44	17 21:06 (7)		
13	08:27	07:42	06:39	17:06 (2) 06:26	05:24	19:04 (3) 05:24	20:02 (10) 04:51	20:48 (7)	
	16:26	17:24	18:17	10 17:16 (2) 20:13	30 19:34 (4) 21:06	33 20:35 (9) 21:45	18 21:06 (7)		
14	08:26	07:40	06:37	17:06 (2) 06:23	05:22	19:05 (3) 05:22	20:02 (10) 04:51	20:49 (7)	
	16:28	17:26	18:19	28 17:16 (2) 20:15	28 19:33 (3) 21:07	33 20:35 (9) 21:45	17 21:06 (7)		
15	08:25	07:38	06:35	17:05 (2) 06:21	05:20	19:05 (3) 05:20	20:02 (10) 04:51	20:49 (7)	
	16:29	17:28	18:21	27 17:16 (2) 20:16	27 19:32 (3) 21:09	34 20:36 (9) 21:46	18 21:07 (7)		
16	08:24	07:35	06:32	17:04 (2) 06:19	05:19	19:04 (3) 05:19	20:01 (10) 04:50	20:49 (7)	
	16:31	17:29	18:22	27 18:01 (1) 20:18	27 19:31 (3) 21:11	35 20:36 (9) 21:47	18 21:07 (7)		
17	08:23	07:33	06:30	17:49 (1) 06:16	05:17	19:05 (3) 05:17	20:01 (10) 04:50	20:50 (7)	
	16:33	17:31	18:24	9 17:58 (1) 20:20	25 19:30 (3) 21:12	36 20:37 (9) 21:47	17 21:07 (7)		
18	08:22	07:31	06:28	17:47 (1) 06:14	05:16	19:06 (3) 05:16	20:01 (10) 04:50	20:50 (7)	
	16:34	17:33	18:26	13 18:00 (1) 20:22	23 19:29 (3) 21:14	35 20:36 (9) 21:47	17 21:07 (7)		
19	08:21	07:29	06:25	17:45 (1) 06:12	05:14	19:07 (3) 05:14	20:01 (10) 04:50	20:50 (7)	
	16:36	17:35	18:28	16 18:01 (1) 20:24	21 19:28 (3) 21:15	36 20:37 (9) 21:48	17 21:07 (7)		
20	08:20	07:27	06:23	17:44 (1) 06:10	05:13	19:08 (3) 05:13	20:02 (10) 04:50	20:50 (7)	
	16:38	17:37	18:30	20 18:04 (1) 20:25	18 19:26 (3) 21:17	35 20:37 (9) 21:48	17 21:07 (7)		
21	08:19	07:25	06:20	17:44 (1) 06:08	05:11	19:10 (3) 05:11	20:01 (10) 04:50	20:51 (7)	
	16:40	17:39	18:31	21 18:05 (1) 20:27	14 19:24 (3) 21:18	35 20:36 (9) 21:48	17 21:08 (7)		
22	08:18	07:23	06:18	17:42 (1) 06:05	05:10	19:13 (3) 05:10	20:02 (10) 04:51	20:51 (7)	
	16:41	17:41	18:33	22 18:04 (1) 20:29	8 19:21 (3) 21:20	34 20:36 (9) 21:49	17 21:08 (7)		
23	08:16	07:21	06:15	17:42 (1) 06:03	05:09	19:16 (3) 05:09	20:02 (10) 04:51	20:51 (7)	
	16:43	17:43	18:35	23 18:05 (1) 20:31	6 20:02 (8) 21:21	34 20:36 (9) 21:49	17 21:08 (7)		
24	08:15	07:18	06:13	17:41 (1) 06:01	05:07	19:14 (3) 05:07	20:03 (10) 04:51	20:51 (7)	
	16:45	17:45	18:37	23 18:04 (1) 20:33	10 20:04 (8) 21:23	33 20:36 (9) 21:49	17 21:08 (7)		
25	08:14	07:16	06:11	17:42 (1) 05:59	05:06	19:13 (3) 05:06	20:03 (10) 04:52	20:52 (7)	
	16:47	17:47	7 17:18 (2) 18:39	21 18:03 (1) 20:34	12 20:05 (8) 21:24	33 20:36 (9) 21:49	17 21:09 (7)		
26	08:12	07:14	06:08	17:41 (1) 05:57	05:05	19:12 (3) 05:05	20:04 (10) 04:52	20:51 (7)	
	16:49	17:49	14 17:21 (2) 18:40	21 18:02 (1) 20:36	15 20:07 (8) 21:26	32 20:36 (9) 21:49	18 21:09 (7)		
27	08:11	07:12	06:06	17:42 (1) 05:55	05:04	19:12 (3) 05:04	20:04 (10) 04:52	20:52 (7)	
	16:51	17:51	18 17:23 (2) 18:42	19 18:01 (1) 20:38	16 20:08 (8) 21:27	31 20:35 (9) 21:49	18 21:10 (7)		
28	08:10	07:10	06:03	17:44 (1) 05:52	05:02	19:11 (3) 05:02	20:05 (10) 04:53	20:52 (7)	
	16:53	17:53	21 17:25 (2) 18:44	16 18:00 (1) 20:40	17 20:08 (8) 21:28	34 20:56 (7) 21:49	17 21:09 (7)		
29	08:08		07:01	18:44 (1) 05:50	05:01	19:11 (3) 05:01	20:05 (10) 04:53	20:53 (7)	
	16:54		19:46	14 18:58 (1) 20:41	17 20:08 (8) 21:30	35 20:57 (7) 21:49	17 21:10 (7)		
30	08:06		06:59	18:47 (1) 05:48	05:00	19:11 (3) 05:00	20:06 (10) 04:54	20:52 (7)	
	16:56		19:48	8 18:55 (1) 20:43	16 20:07 (8) 21:31	35 20:58 (7) 21:48	18 21:10 (7)		
31	08:05		06:56		04:59		20:06 (10)		
	16:58		19:49		21:32	36 20:59 (7)			
Sonnenscheinstunden	253	275	367	419	491	506	638		
astr.max.mögl.Beschattung		60	540	567	870	638			
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39			
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96			
Reduktion Windrichtung		0.72	0.72	0.69	0.64	0.62			
Gesamte Reduktion		0.17	0.19	0.25	0.27	0.23			
Met.wahrsch.Beschattung		10	104	140	232	149			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AI - IO35

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:55	20:53 (7)	05:33	20:13 (10)	06:26	19:04 (3)	07:18	17:44 (2)	07:14	08:08				
	21:48	17	21:10 (7)	21:14	30	20:43 (9)	20:09	31	19:35 (4)	18:57	14	17:58 (2)	16:48	16:05
2	04:55	20:53 (7)	05:35	20:14 (10)	06:28	19:04 (3)	07:19	17:41 (2)	07:16	08:09				
	21:48	18	21:11 (7)	21:12	28	20:42 (9)	20:07	30	19:34 (4)	18:55	18	17:59 (2)	16:46	16:04
3	04:56	20:20 (10)	05:37	20:14 (10)	06:29	19:04 (3)	07:21	17:39 (2)	07:18	08:11				
	21:47	23	21:10 (7)	21:10	25	20:39 (9)	20:04	30	19:34 (4)	18:52	21	18:00 (2)	16:44	16:04
4	04:57	20:19 (10)	05:38	20:16 (10)	06:31	19:05 (3)	07:23	17:38 (2)	07:20	08:12				
	21:47	26	21:10 (7)	21:09	22	20:38 (9)	20:02	29	19:34 (4)	18:50	23	18:01 (2)	16:42	16:03
5	04:58	20:19 (10)	05:40	20:16 (10)	06:33	19:05 (3)	07:25	17:37 (2)	07:22	08:14				
	21:46	28	21:11 (7)	21:07	20	20:36 (9)	20:00	26	19:31 (4)	18:47	25	18:02 (2)	16:40	16:03
6	04:59	20:18 (10)	05:42	20:18 (10)	06:35	19:06 (3)	07:26	17:37 (2)	07:24	08:15				
	21:46	30	21:11 (7)	21:05	17	20:35 (6)	19:57	23	19:29 (4)	18:45	25	18:02 (2)	16:39	16:02
7	05:00	20:17 (10)	05:43	20:20 (10)	06:36	19:08 (3)	07:28	17:35 (2)	07:26	08:16				
	21:45	31	21:11 (7)	21:03	12	20:32 (6)	19:55	19	19:27 (4)	18:43	26	18:01 (2)	16:37	16:02
8	05:01	20:17 (10)	05:45	20:07 (8)	06:38	19:09 (3)	07:30	17:35 (2)	07:27	08:17				
	21:44	31	21:10 (7)	21:01	6	20:31 (6)	19:53	15	19:24 (4)	18:40	26	18:01 (2)	16:35	16:01
9	05:02	20:16 (10)	05:47	20:04 (8)	06:40	19:14 (3)	07:32	17:35 (2)	07:29	08:19				
	21:44	32	21:10 (7)	20:59	10	20:14 (8)	19:50	7	19:22 (4)	18:38	26	18:01 (2)	16:33	16:01
10	05:03	20:16 (10)	05:48	20:02 (8)	06:41	19:22 (4)	07:34	17:35 (2)	07:31	08:20				
	21:43	32	21:09 (7)	20:57	12	20:14 (8)	19:48	18:36	26	18:01 (2)	16:32	16:01		
11	05:04	20:15 (10)	05:50	20:01 (8)	06:43	19:22 (4)	07:35	17:35 (2)	07:33	08:21				
	21:42	31	21:08 (7)	20:55	14	20:15 (8)	19:45	18:33	25	18:00 (2)	16:30	16:00		
12	05:05	20:15 (10)	05:52	20:00 (8)	06:45	19:22 (4)	07:37	17:36 (2)	07:35	08:22				
	21:41	36	21:08 (7)	20:53	15	20:15 (8)	19:43	18:31	23	17:59 (2)	16:28	16:00		
13	05:06	20:14 (10)	05:53	20:00 (8)	06:47	19:23 (4)	07:39	17:36 (2)	07:37	08:23				
	21:40	36	21:07 (7)	20:51	16	20:16 (8)	19:41	6	18:45 (1)	18:29	22	17:58 (2)	16:27	16:00
14	05:07	20:14 (10)	05:55	20:00 (8)	06:48	18:35 (1)	07:41	17:36 (2)	07:39	08:24				
	21:39	35	21:06 (7)	20:49	16	20:16 (8)	19:38	13	18:48 (1)	18:26	20	17:56 (2)	16:25	16:00
15	05:09	20:13 (10)	05:57	19:59 (8)	06:50	18:33 (1)	07:43	17:38 (2)	07:40	08:25				
	21:38	35	21:05 (7)	20:47	17	20:16 (8)	19:36	16	18:49 (1)	18:24	16	17:54 (2)	16:24	16:00
16	05:10	20:13 (10)	05:58	19:59 (8)	06:52	18:32 (1)	07:44	17:40 (2)	07:42	08:26				
	21:37	31	21:03 (7)	20:45	17	20:16 (8)	19:33	19	18:51 (1)	18:22	12	17:52 (2)	16:22	16:00
17	05:11	20:12 (10)	06:00	19:59 (8)	06:53	18:30 (1)	07:46	17:44 (2)	07:44	08:27				
	21:36	32	20:44 (9)	20:43	14	20:13 (8)	19:31	20	18:50 (1)	18:20			16:21	16:00
18	05:12	20:13 (10)	06:02	20:00 (8)	06:55	18:29 (1)	07:48	17:46 (2)	07:46	08:27				
	21:35	32	20:45 (9)	20:41	12	20:12 (8)	19:28	22	18:51 (1)	18:17			16:19	16:01
19	05:14	20:12 (10)	06:04	20:01 (8)	06:57	18:29 (1)	07:50	17:48 (2)	07:48	08:28				
	21:34	34	20:46 (9)	20:39	9	20:10 (8)	19:26	22	18:51 (1)	18:15			16:18	16:01
20	05:15	20:12 (10)	06:05	20:02 (8)	06:59	18:28 (1)	07:52	17:48 (2)	07:50	08:29				
	21:32	34	20:46 (9)	20:36	5	20:07 (8)	19:24	22	18:50 (1)	18:13			16:17	16:01
21	05:17	20:12 (10)	06:07	19:17 (3)	07:00	18:28 (1)	07:54	17:50 (2)	07:51	08:29				
	21:31	35	20:47 (9)	20:34	9	19:26 (3)	19:21	22	18:50 (1)	18:11			16:15	16:02
22	05:18	20:12 (10)	06:09	19:15 (3)	07:02	18:28 (1)	07:55	17:49 (2)	07:53	08:30				
	21:30	35	20:47 (9)	20:32	14	19:29 (3)	19:19	22	18:50 (1)	18:09			16:14	16:02
23	05:19	20:11 (10)	06:10	19:12 (3)	07:04	18:28 (1)	07:57	17:48 (2)	07:55	08:31				
	21:28	36	20:47 (9)	20:30	18	19:30 (3)	19:16	21	18:49 (1)	18:06			16:13	16:03
24	05:21	20:12 (10)	06:12	19:10 (3)	07:05	18:28 (1)	07:59	17:47 (2)	07:56	08:31				
	21:27	35	20:47 (9)	20:27	22	19:32 (3)	19:14	18	18:46 (1)	18:04			16:12	16:03
25	05:22	20:12 (10)	06:14	19:08 (3)	07:07	18:29 (1)	07:01	17:46 (2)	07:58	08:31				
	21:25	35	20:47 (9)	20:25	24	19:32 (3)	19:11	14	18:43 (1)	17:02			16:11	16:04
26	05:24	20:11 (10)	06:16	19:08 (3)	07:09	18:31 (1)	07:03	17:45 (2)	08:00	08:32				
	21:24	35	20:46 (9)	20:23	25	19:33 (3)	19:09	10	18:41 (1)	17:00			16:10	16:05
27	05:25	20:12 (10)	06:17	19:07 (3)	07:11	18:35 (1)	07:05	17:44 (2)	08:01	08:32				
	21:22	35	20:47 (9)	20:21	27	19:34 (3)	19:07	4	18:39 (1)	16:58			16:09	16:05
28	05:27	20:12 (10)	06:19	19:06 (3)	07:12	18:34 (1)	07:07	17:43 (2)	08:03	08:32				
	21:21	34	20:46 (9)	20:18	27	19:33 (3)	19:04	17:42 (2)	16:58	16:06				
29	05:29	20:12 (10)	06:21	19:05 (3)	07:14	18:33 (1)	07:09	17:41 (2)	08:05	08:32				
	21:19	34	20:46 (9)	20:16	29	19:34 (4)	19:02	17:40 (2)	16:54	16:07				
30	05:30	20:12 (10)	06:22	19:05 (3)	07:16	17:48 (2)	07:10	17:39 (2)	08:06	08:32				
	21:17	33	20:45 (9)	20:14	30	19:35 (4)	18:59	6	17:54 (2)	16:52			16:06	16:08
31	05:32	20:13 (10)	06:24	19:04 (3)	07:17	17:47 (2)	07:12	17:38 (2)	08:07	08:32				
	21:16	32	20:45 (9)	20:11	30	19:34 (4)	18:58	6	17:53 (2)	16:53			16:07	16:09
	Sonnenscheinstunden	509	458	382	330	262	237							
	astr.max.mögl.Beschattung	983	572	467	348									
	Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29									
	Reduktion Betriebsdauer	0.96	0.96	0.96	0.96									
	Reduktion Windrichtung	0.64	0.67	0.71	0.72									
	Gesamte Reduktion	0.23	0.27	0.24	0.20									
	Met.wahrsch.Beschattung	229	157	111	71									

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AJ - IO36

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:07	17:05 (2) 06:54	05:46	19:52 (8) 04:58	20:44 (7)		
	16:10	17:00	17:54	21 17:26 (2) 19:51	20:45	11 20:03 (8) 21:33	16 21:00 (7)		
2	08:32	08:02	07:05	17:04 (2) 06:51	19:26 (4) 05:44	19:54 (8) 04:57	20:43 (7)		
	16:11	17:02	17:56	23 17:27 (2) 19:53	1 19:27 (4) 20:47	11 20:15 (10) 21:35	17 21:00 (7)		
3	08:32	08:00	07:03	17:04 (2) 06:49	19:14 (3) 05:42	20:07 (10) 04:57	20:44 (7)		
	16:12	17:04	17:58	24 17:28 (2) 19:55	14 19:28 (4) 20:49	12 20:19 (10) 21:36	17 21:01 (7)		
4	08:32	07:58	07:00	17:03 (2) 06:47	19:12 (3) 05:40	20:05 (10) 04:56	20:44 (7)		
	16:14	17:06	18:00	25 17:28 (2) 19:57	18 19:30 (4) 20:50	20:21 (10) 21:37	17 21:01 (7)		
5	08:31	07:57	06:58	17:03 (2) 06:44	19:10 (3) 05:38	20:03 (10) 04:55	20:45 (7)		
	16:15	17:08	18:02	25 17:28 (2) 19:58	22 19:32 (4) 20:52	19 20:22 (10) 21:38	17 21:02 (7)		
6	08:31	07:55	06:56	17:03 (2) 06:42	19:08 (3) 05:36	20:02 (10) 04:54	20:44 (7)		
	16:16	17:10	18:04	25 17:28 (2) 20:00	25 19:33 (4) 20:54	22 20:24 (6) 21:39	17 21:01 (7)		
7	08:31	07:53	06:54	17:02 (2) 06:40	19:08 (3) 05:35	20:02 (10) 04:54	20:44 (7)		
	16:17	17:12	18:06	25 17:27 (2) 20:02	27 19:35 (4) 20:56	24 20:26 (6) 21:40	17 21:01 (7)		
8	08:30	07:51	06:51	17:03 (2) 06:37	19:07 (3) 05:33	20:00 (10) 04:53	20:45 (7)		
	16:19	17:14	18:08	24 17:27 (2) 20:04	29 19:36 (4) 20:57	27 20:27 (9) 21:41	17 21:02 (7)		
9	08:30	07:49	06:49	17:04 (2) 06:35	19:06 (3) 05:31	20:00 (10) 04:53	20:45 (7)		
	16:20	17:16	18:09	22 17:26 (2) 20:06	29 19:35 (4) 20:59	28 20:28 (9) 21:42	17 21:02 (7)		
10	08:29	07:47	06:47	17:04 (2) 06:33	19:05 (3) 05:29	19:59 (10) 04:52	20:45 (7)		
	16:22	17:18	18:11	21 17:25 (2) 20:07	30 19:35 (4) 21:01	31 20:30 (9) 21:43	17 21:02 (7)		
11	08:28	07:45	06:44	17:05 (2) 06:30	19:05 (3) 05:27	19:59 (10) 04:52	20:46 (7)		
	16:23	17:20	18:13	18 17:23 (2) 20:09	29 19:34 (4) 21:02	33 20:32 (9) 21:43	16 21:02 (7)		
12	08:28	07:43	06:42	17:06 (2) 06:28	19:04 (3) 05:26	19:58 (10) 04:51	20:46 (7)		
	16:25	17:22	18:15	15 17:21 (2) 20:11	29 19:33 (4) 21:04	34 20:32 (9) 21:44	17 21:03 (7)		
13	08:27	07:42	06:39	17:09 (2) 06:26	19:05 (3) 05:24	19:59 (10) 04:51	20:46 (7)		
	16:26	17:24	18:17	9 17:18 (2) 20:13	26 19:31 (3) 21:06	34 20:33 (9) 21:45	16 21:02 (7)		
14	08:26	07:40	06:37	17:09 (2) 06:23	19:05 (3) 05:22	19:58 (10) 04:51	20:46 (7)		
	16:28	17:26	18:19	19 17:21 (2) 20:15	26 19:31 (3) 21:07	35 20:33 (9) 21:45	16 21:02 (7)		
15	08:25	07:38	06:35	17:06 (2) 06:21	19:06 (3) 05:20	19:59 (10) 04:51	20:46 (7)		
	16:29	17:28	18:21	24 17:26 (2) 20:16	24 19:30 (3) 21:09	34 20:33 (9) 21:46	16 21:02 (7)		
16	08:24	07:35	06:32	17:05 (1) 06:19	19:05 (3) 05:19	19:58 (10) 04:50	20:47 (7)		
	16:31	17:29	18:22	2 17:57 (1) 20:18	23 19:28 (3) 21:11	35 20:33 (9) 21:47	16 21:03 (7)		
17	08:23	07:33	06:30	17:49 (1) 06:16	19:06 (3) 05:17	19:59 (10) 04:50	20:47 (7)		
	16:33	17:31	18:24	9 17:58 (1) 20:20	21 19:27 (3) 21:12	34 20:33 (9) 21:47	16 21:03 (7)		
18	08:22	07:31	06:28	17:48 (1) 06:14	19:08 (3) 05:16	19:59 (10) 04:50	20:47 (7)		
	16:34	17:33	18:26	12 18:00 (1) 20:22	18 19:26 (3) 21:14	34 20:33 (9) 21:47	16 21:03 (7)		
19	08:21	07:29	06:25	17:45 (1) 06:12	19:10 (3) 05:14	19:59 (10) 04:50	20:47 (7)		
	16:36	17:35	18:28	16 18:01 (1) 20:24	14 19:24 (3) 21:15	34 20:33 (9) 21:48	16 21:03 (7)		
20	08:20	07:27	06:23	17:45 (1) 06:10	19:13 (3) 05:13	20:00 (10) 04:50	20:48 (7)		
	16:38	17:37	18:30	19 18:04 (1) 20:25	7 19:20 (3) 21:17	33 20:33 (9) 21:48	15 21:03 (7)		
21	08:19	07:25	06:20	17:44 (1) 06:08	19:57 (8) 05:11	20:00 (10) 04:50	20:48 (7)		
	16:40	17:39	18:31	21 18:05 (1) 20:27	2 19:59 (8) 21:18	32 20:32 (9) 21:48	15 21:03 (7)		
22	08:18	07:23	06:18	17:43 (1) 06:05	19:55 (8) 05:10	20:00 (10) 04:51	20:49 (7)		
	16:41	17:41	18:33	22 18:05 (1) 20:29	6 20:01 (8) 21:20	31 20:31 (9) 21:49	15 21:04 (7)		
23	08:16	07:21	06:15	17:43 (1) 06:03	19:52 (8) 05:09	20:01 (10) 04:51	20:48 (7)		
	16:43	17:43	18:35	22 18:05 (1) 20:31	10 20:02 (8) 21:21	30 20:31 (9) 21:49	16 21:04 (7)		
24	08:15	07:18	06:13	17:42 (1) 06:01	19:51 (8) 05:07	20:02 (10) 04:51	20:48 (7)		
	16:45	17:45	18:37	22 18:04 (1) 20:33	13 20:04 (8) 21:23	30 20:50 (7) 21:49	16 21:04 (7)		
25	08:14	07:16	06:11	17:43 (1) 05:59	19:51 (8) 05:06	20:03 (10) 04:52	20:49 (7)		
	16:47	17:47	18:39	20 18:03 (1) 20:34	14 20:05 (8) 21:24	32 20:52 (7) 21:49	16 21:05 (7)		
26	08:12	07:14	17:11 (2) 06:08	17:43 (1) 05:57	19:50 (8) 05:05	20:04 (10) 04:52	20:49 (7)		
	16:49	17:49	10 17:21 (2) 18:40	19 18:02 (1) 20:36	16 20:06 (8) 21:26	32 20:53 (7) 21:49	16 21:05 (7)		
27	08:11	07:12	17:08 (2) 06:06	17:44 (1) 05:55	19:50 (8) 05:04	20:05 (10) 04:52	20:50 (7)		
	16:50	17:50	15 17:23 (2) 18:42	17 18:01 (1) 20:38	16 20:06 (8) 21:27	28 20:54 (7) 21:49	16 21:06 (7)		
28	08:10	07:10	17:07 (2) 06:03	17:45 (1) 05:52	19:50 (8) 05:02	20:06 (10) 04:53	20:49 (7)		
	16:53	17:53	19 17:26 (2) 18:44	15 18:00 (1) 20:40	16 20:06 (8) 21:28	26 20:56 (7) 21:49	16 21:05 (7)		
29	08:08		07:01	18:47 (1) 05:50	19:50 (8) 05:01	20:07 (10) 04:53	20:50 (7)		
	16:54		19:46	9 18:56 (1) 20:41	15 20:05 (8) 21:30	25 20:57 (7) 21:49	16 21:06 (7)		
30	08:06		06:59	18:47 (1) 05:48	19:51 (8) 05:00	20:09 (10) 04:54	20:49 (7)		
	16:56		19:48	20:43	13 20:04 (8) 21:31	24 20:58 (7) 21:48	17 21:06 (7)		
31	08:05		06:56		04:59	20:11 (10)			
	16:58		19:49		21:32	21 20:59 (7)			
Sonnenscheinstunden	253	275	367	419	491	506			
astr.max.mögl.Beschattung		44	502	533	852	488			
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39			
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96			
Reduktion Windrichtung		0.72	0.72	0.69	0.64	0.62			
Gesamte Reduktion		0.17	0.19	0.25	0.27	0.23			
Met.wahrsch.Beschattung		7	97	132	228	113			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	--	---------------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AJ - IO36

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:55	20:50 (7)	05:33		20:09 (10)	06:26	19:04 (3)	07:18	17:47 (2)	07:14		08:08		
	21:48	16	21:06 (7)	21:14	33	20:42 (9)	20:09	29	19:33 (4)	18:57	13	18:00 (2)	16:48	16:05
2	04:55	20:50 (7)	05:35		20:10 (10)	06:28	19:03 (3)	07:19	17:44 (2)	07:16		08:09		
	21:48	17	21:07 (7)	21:12	32	20:42 (9)	20:07	30	19:33 (4)	18:55	17	18:01 (2)	16:46	16:04
3	04:56	20:50 (7)	05:37		20:09 (10)	06:29	19:04 (3)	07:21	17:42 (2)	07:18		08:11		
	21:47	16	21:06 (7)	21:10	30	20:39 (9)	20:04	29	19:33 (4)	18:52	20	18:02 (2)	16:44	16:04
4	04:57	20:50 (7)	05:38		20:10 (10)	06:31	19:04 (3)	07:23	17:41 (2)	07:20		08:12		
	21:47	17	21:07 (7)	21:09	28	20:38 (9)	20:02	29	19:33 (4)	18:50	22	18:03 (2)	16:42	16:03
5	04:58	20:50 (7)	05:40		20:10 (10)	06:33	19:04 (3)	07:25	17:40 (2)	07:22		08:14		
	21:46	17	21:07 (7)	21:07	26	20:36 (9)	20:00	27	19:31 (4)	18:47	24	18:04 (2)	16:40	16:03
6	04:59	20:51 (7)	05:42		20:11 (10)	06:35	19:04 (3)	07:26	17:39 (2)	07:24		08:15		
	21:46	17	21:08 (7)	21:05	24	20:35 (6)	19:57	25	19:29 (4)	18:45	25	18:04 (2)	16:39	16:02
7	05:00	20:51 (7)	05:43		20:12 (10)	06:36	19:06 (3)	07:28	17:38 (2)	07:26		08:16		
	21:45	17	21:08 (7)	21:03	20	20:32 (10)	19:55	21	19:27 (4)	18:43	25	18:03 (2)	16:37	16:02
8	05:01	20:51 (7)	05:45		20:13 (10)	06:38	19:06 (3)	07:30	17:38 (2)	07:27		08:17		
	21:44	17	21:08 (7)	21:01	18	20:31 (10)	19:53	18	19:24 (3)	18:40	25	18:03 (2)	16:35	16:01
9	05:02	20:51 (7)	05:47		20:15 (10)	06:40	19:08 (3)	07:32	17:38 (2)	07:29		08:19		
	21:44	17	21:08 (7)	20:59	15	20:30 (10)	19:50	14	19:22 (4)	18:38	25	18:03 (2)	16:33	16:01
10	05:03	20:52 (7)	05:48		20:04 (8)	06:41	19:13 (3)	07:34	17:38 (2)	07:31		08:20		
	21:43	16	21:08 (7)	20:57	15	20:27 (10)	19:48	6	19:20 (4)	18:36	25	18:03 (2)	16:32	16:01
11	05:04	20:52 (7)	05:50		20:02 (8)	06:43		07:35	17:38 (2)	07:33		08:21		
	21:42	16	21:08 (7)	20:55	9	20:11 (8)	19:45		18:33	24	18:02 (2)	16:30	16:00	
12	05:05	20:21 (10)	05:52		20:00 (8)	06:45		07:37	17:39 (2)	07:35		08:22		
	21:41	19	21:08 (7)	20:53	12	20:12 (8)	19:43		18:31	22	18:01 (2)	16:28	16:00	
13	05:06	20:18 (10)	05:53		19:59 (8)	06:47		07:39	17:39 (2)	07:37		08:23		
	21:40	23	21:07 (7)	20:51	14	20:13 (8)	19:41		18:29	21	18:00 (2)	16:27	16:00	
14	05:07	20:16 (10)	05:55		19:59 (8)	06:48		18:38 (1)	07:41		17:40 (2)	07:39	08:24	
	21:39	25	21:06 (7)	20:49	15	20:14 (8)	19:38	8	18:46 (1)	18:26	17	17:57 (2)	16:25	16:00
15	05:09	20:15 (10)	05:57		19:58 (8)	06:50		18:35 (1)	07:43		17:41 (2)	07:40	08:25	
	21:38	26	21:05 (7)	20:47	16	20:14 (8)	19:36	14	18:49 (1)	18:24	14	17:55 (2)	16:24	16:00
16	05:10	20:14 (10)	05:58		19:58 (8)	06:52		18:33 (1)	07:44		17:44 (2)	07:42	08:26	
	21:37	25	21:03 (7)	20:45	16	20:14 (8)	19:33	17	18:50 (1)	18:22	9	17:53 (2)	16:22	16:00
17	05:11	20:13 (10)	06:00		19:57 (8)	06:53		18:31 (1)	07:46			07:44	08:27	
	21:36	31	21:02 (7)	20:43	16	20:13 (8)	19:31	19	18:50 (1)	18:20		16:21	16:00	
18	05:12	20:13 (10)	06:02		19:57 (8)	06:55		18:30 (1)	07:48			07:46	08:27	
	21:35	32	21:02 (7)	20:41	15	20:12 (8)	19:28	21	18:51 (1)	18:17		16:19	16:01	
19	05:14	20:12 (10)	06:04		19:58 (8)	06:57		18:30 (1)	07:50			07:48	08:28	
	21:34	32	21:01 (7)	20:39	12	20:10 (8)	19:26	21	18:51 (1)	18:15		16:18	16:01	
20	05:15	20:11 (10)	06:05		19:58 (8)	06:59		18:29 (1)	07:52			07:50	08:29	
	21:32	29	20:40 (9)	20:36	9	20:07 (8)	19:24	21	18:50 (1)	18:13		16:17	16:01	
21	05:17	20:11 (10)	06:07		20:00 (8)	07:00		18:29 (1)	07:54			07:51	08:29	
	21:31	31	20:42 (9)	20:34	6	20:06 (8)	19:21	21	18:50 (1)	18:11		16:15	16:02	
22	05:18	20:11 (10)	06:09		20:02 (8)	07:02		18:29 (1)	07:55			07:53	08:30	
	21:30	31	20:42 (9)	20:32	2	20:04 (8)	19:19	21	18:50 (1)	18:09		16:14	16:02	
23	05:19	20:10 (10)	06:10		19:16 (3)	07:04		18:29 (1)	07:57			07:55	08:31	
	21:28	32	20:42 (9)	20:30	9	19:25 (3)	19:16	20	18:49 (1)	18:06		16:13	16:03	
24	05:21	20:10 (10)	06:12		19:13 (3)	07:05		18:29 (1)	07:59			07:56	08:31	
	21:27	33	20:43 (9)	20:27	15	19:28 (3)	19:14	17	18:46 (1)	18:04		16:12	16:03	
25	05:22	20:09 (10)	06:14		19:10 (3)	07:07		18:30 (1)	07:01			07:58	08:31	
	21:25	34	20:43 (9)	20:25	19	19:29 (3)	19:11	13	18:43 (1)	17:02		16:11	16:04	
26	05:24	20:09 (10)	06:16		19:09 (3)	07:09		18:31 (1)	07:03			08:00	08:32	
	21:24	34	20:43 (9)	20:23	21	19:30 (3)	19:09	10	18:41 (1)	17:00		16:10	16:05	
27	05:25	20:09 (10)	06:17		19:08 (3)	07:11		18:34 (1)	07:05			08:01	08:32	
	21:22	35	20:44 (9)	20:21	23	19:31 (3)	19:07	5	18:39 (1)	16:58		16:09	16:05	
28	05:27	20:09 (10)	06:19		19:06 (3)	07:12			07:07			08:03	08:32	
	21:21	34	20:43 (9)	20:18	25	19:31 (3)	19:04		16:56			16:08	16:06	
29	05:29	20:09 (10)	06:21		19:06 (3)	07:14			07:09			08:05	08:32	
	21:19	35	20:44 (9)	20:16	26	19:32 (3)	19:02		16:54			16:07	16:07	
30	05:30	20:09 (10)	06:22		19:05 (3)	07:16		17:52 (2)	07:10			08:06	08:32	
	21:17	34	20:43 (9)	20:14	27	19:32 (3)	18:59	3	17:55 (2)	16:52		16:06	16:08	
31	05:32	20:09 (10)	06:24		19:04 (3)				07:12			08:32	08:32	
	21:16	34	20:43 (9)	20:11	29	19:33 (4)			16:50			16:09	16:09	
Sonnenscheinstunden		509		458		382			330			262		237
astr.max.mögl.Beschattung		792		577		459			328					
Red.Sonnenscheinwahrsch.		0.38		0.42		0.35			0.29					
Reduktion Betriebsdauer		0.96		0.96		0.96			0.96					
Reduktion Windrichtung		0.64		0.67		0.71			0.72					
Gesamte Reduktion		0.23		0.27		0.24			0.20					
Met.wahrsch.Beschattung		184		157		109			67					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt

Berechnet:
Dennis Kramer / dennis.kramer@i17-wind.de
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AK - IO37

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni					
1	08:32	08:03	07:07	17:12 (2) 06:54	18:48 (1) 05:46	20:00 (8) 04:58	20:16 (10)				
	16:10	17:00	17:54	13 17:25 (2) 19:51	18 19:06 (1) 20:45	15 20:15 (8) 21:33	34 20:50 (9)				
2	08:32	08:02	07:05	17:10 (2) 06:52	18:49 (1) 05:44	20:01 (8) 04:57	20:16 (10)				
	16:11	17:02	17:56	17 17:27 (2) 19:53	16 19:05 (1) 20:47	16 20:17 (8) 21:35	34 20:50 (9)				
3	08:32	08:00	07:03	17:08 (2) 06:49	18:50 (1) 05:42	20:00 (8) 04:57	20:17 (10)				
	16:12	17:04	17:58	21 17:29 (2) 19:55	12 19:02 (1) 20:49	17 20:17 (8) 21:36	33 20:50 (9)				
4	08:32	07:58	07:00	17:06 (2) 06:47	18:55 (1) 05:40	20:00 (8) 04:56	20:17 (10)				
	16:14	17:06	18:00	24 17:30 (2) 19:57	3 18:58 (1) 20:50	17 20:17 (8) 21:37	33 20:50 (9)				
5	08:31	07:57	06:58	17:06 (2) 06:44		20:00 (8) 04:55	20:18 (10)				
	16:15	17:08	18:02	25 17:31 (2) 19:58		20:52 17 20:17 (8) 21:38	33 20:51 (9)				
6	08:31	07:55	06:56	17:05 (2) 06:42		05:36 19:59 (8) 04:54	20:17 (10)				
	16:16	17:10	18:04	27 17:32 (2) 20:00		20:54 17 20:16 (8) 21:39	33 20:50 (9)				
7	08:31	07:53	06:54	17:04 (2) 06:40	19:33 (4) 05:35	20:01 (8) 04:54	20:17 (10)				
	16:18	17:12	18:06	27 17:31 (2) 20:02	2 19:35 (4) 20:56	15 20:16 (8) 21:40	33 20:50 (9)				
8	08:30	07:51	06:51	17:04 (2) 06:37	19:29 (4) 05:33	20:01 (8) 04:53	20:18 (10)				
	16:19	17:14	18:08	28 17:32 (2) 20:04	8 19:37 (4) 20:57	14 20:15 (8) 21:41	32 20:50 (9)				
9	08:30	07:49	06:49	17:04 (2) 06:35	19:26 (4) 05:31	20:01 (8) 04:53	20:19 (10)				
	16:20	17:16	18:09	28 17:32 (2) 20:06	12 19:38 (4) 20:59	13 20:14 (8) 21:42	32 20:51 (9)				
10	08:29	07:47	06:47	17:03 (2) 06:33	19:24 (3) 05:29	20:02 (8) 04:52	20:18 (10)				
	16:22	17:18	18:11	28 17:31 (2) 20:07	16 19:40 (4) 21:01	12 20:30 (6) 21:43	33 21:08 (7)				
11	08:28	07:45	06:44	17:03 (2) 06:30	19:22 (3) 05:27	20:05 (8) 04:52	20:19 (10)				
	16:23	17:20	18:13	28 17:31 (2) 20:09	20 19:42 (4) 21:02	11 20:32 (6) 21:43	34 21:09 (7)				
12	08:28	07:43	06:42	17:03 (2) 06:28	19:19 (3) 05:26	20:25 (6) 04:51	20:19 (10)				
	16:25	17:22	18:15	27 17:30 (2) 20:11	24 19:43 (4) 21:04	8 20:33 (6) 21:44	37 21:10 (7)				
13	08:27	07:42	06:39	17:04 (2) 06:26	19:17 (3) 05:24	20:25 (6) 04:51	20:19 (10)				
	16:26	17:24	18:17	25 17:29 (2) 20:13	26 19:43 (4) 21:06	10 20:35 (6) 21:45	37 21:10 (7)				
14	08:26	07:40	06:37	17:04 (2) 06:23	19:16 (3) 05:22	20:24 (6) 04:51	20:19 (10)				
	16:28	17:26	18:19	23 17:27 (2) 20:15	28 19:44 (4) 21:07	12 20:36 (6) 21:45	37 21:10 (7)				
15	08:25	07:38	06:35	17:05 (2) 06:21	19:16 (3) 05:21	20:24 (6) 04:51	20:20 (10)				
	16:29	17:28	18:21	21 17:26 (2) 20:16	27 19:43 (3) 21:09	14 20:38 (6) 21:46	37 21:11 (7)				
16	08:24	07:35	06:32	17:07 (2) 06:19	19:14 (3) 05:19	20:24 (6) 04:50	20:20 (10)				
	16:31	17:29	18:22	18 17:25 (2) 20:18	28 19:42 (3) 21:11	15 20:39 (6) 21:47	37 21:11 (7)				
17	08:23	07:33	06:30	17:09 (2) 06:16	19:13 (3) 05:17	20:23 (6) 04:50	20:20 (10)				
	16:33	17:31	18:24	12 17:21 (2) 20:20	30 19:43 (3) 21:12	16 20:39 (6) 21:47	38 21:12 (7)				
18	08:22	07:31	06:28		06:14 19:13 (3) 05:16	20:21 (6) 04:50	20:20 (10)				
	16:34	17:33	18:26		20:22 30 19:43 (3) 21:14	20 20:41 (9) 21:47	39 21:12 (7)				
19	08:21	07:29	06:25		06:12 19:13 (3) 05:14	20:20 (6) 04:50	20:21 (10)				
	16:36	17:35	18:28		20:24 30 19:43 (3) 21:15	23 20:43 (9) 21:48	39 21:13 (7)				
20	08:20	07:27	06:23	18:00 (1) 06:10	19:13 (3) 05:13	20:19 (10) 04:50	20:21 (10)				
	16:38	17:37	18:30	2 18:02 (1) 20:25	30 19:43 (3) 21:17	26 20:45 (9) 21:48	39 21:13 (7)				
21	08:19	07:25	06:20	17:55 (1) 06:08	19:13 (3) 05:11	20:18 (10) 04:50	20:22 (10)				
	16:40	17:39	18:31	11 18:06 (1) 20:27	30 19:43 (3) 21:18	27 20:45 (9) 21:48	39 21:14 (7)				
22	08:18	07:23	06:18	17:52 (1) 06:05	19:13 (3) 05:10	20:18 (10) 04:51	20:22 (10)				
	16:42	17:41	18:33	15 18:07 (1) 20:29	29 19:42 (3) 21:20	28 20:46 (9) 21:49	39 21:14 (7)				
23	08:16	07:21	06:16	17:51 (1) 06:03	19:12 (3) 05:09	20:17 (10) 04:51	20:22 (10)				
	16:43	17:43	18:35	18 18:09 (1) 20:31	29 19:41 (3) 21:21	30 20:47 (9) 21:49	39 21:14 (7)				
24	08:15	07:18	06:13	17:49 (1) 06:01	19:13 (3) 05:07	20:17 (10) 04:51	20:22 (10)				
	16:45	17:45	18:37	21 18:10 (1) 20:33	27 19:40 (3) 21:23	31 20:48 (9) 21:49	38 21:13 (7)				
25	08:14	07:16	06:11	17:48 (1) 05:59	19:13 (3) 05:06	20:17 (10) 04:52	20:22 (10)				
	16:47	17:47	18:39	23 18:11 (1) 20:34	26 19:39 (3) 21:24	32 20:49 (9) 21:49	39 21:14 (7)				
26	08:12	07:14	06:08	17:47 (1) 05:57	19:14 (3) 05:05	20:17 (10) 04:52	20:22 (10)				
	16:49	17:49	18:40	23 18:10 (1) 20:36	24 19:38 (3) 21:26	32 20:49 (9) 21:49	38 21:14 (7)				
27	08:11	07:12	06:06	17:47 (1) 05:55	19:15 (3) 05:04	20:17 (10) 04:52	20:23 (10)				
	16:40	17:39	18:31	23 18:10 (1) 20:38	22 19:37 (3) 21:27	32 20:49 (9) 21:49	37 21:14 (7)				
28	08:10	07:10	06:03	17:47 (1) 05:52	19:16 (3) 05:02	20:17 (10) 04:53	20:22 (10)				
	16:53	17:53	1 17:20 (2) 18:44	23 18:10 (1) 20:40	26 20:10 (8) 21:28	33 20:50 (9) 21:49	38 21:14 (7)				
29	08:08		07:01	18:46 (1) 05:50	19:18 (3) 05:01	20:17 (10) 04:53	20:23 (10)				
	16:54		19:46	23 19:09 (1) 20:41	25 20:12 (8) 21:30	33 20:50 (9) 21:49	37 21:14 (7)				
30	08:06		06:59	18:47 (1) 05:48	19:21 (3) 05:00	20:17 (10) 04:54	20:23 (10)				
	16:56		19:48	22 19:09 (1) 20:43	23 20:14 (8) 21:31	33 20:50 (9) 21:48	36 21:13 (7)				
31	08:05		06:56	18:47 (1) 05:47		04:59 20:16 (10)					
	16:58		19:49	20 19:07 (1) 20:41		21:32 20:50 (9)					
Sonnenscheinstunden	253	275	367	418	491	506					
astr.max.mögl.Beschattung		1	616	621	653	1084					
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39					
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96					
Reduktion Windrichtung		0.72	0.72	0.69	0.64	0.63					
Gesamte Reduktion		0.16	0.19	0.25	0.26	0.24					
Met.wahrsch.Beschattung		0	118	153	173	255					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AK - IO37

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 721 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55		20:23 (10)	05:33		20:36 (6)	06:26		19:21 (3)	07:18		17:43 (2)	08:08
	21:48	34	21:13 (7)	21:14	7	20:43 (6)	20:09	20	19:41 (4)	18:57	26	18:09 (2)	16:48
2	04:55		20:23 (10)	05:35		20:14 (8)	06:28		19:22 (3)	07:19		17:41 (2)	07:16
	21:48	34	21:13 (7)	21:12	12	20:42 (6)	20:07	16	19:38 (4)	18:55	28	18:09 (2)	16:46
3	04:56		20:23 (10)	05:37		20:12 (8)	06:29		19:24 (4)	07:21		17:41 (2)	07:18
	21:47	32	20:55 (9)	21:10	11	20:23 (8)	20:04	12	19:36 (4)	18:52	28	18:09 (2)	16:44
4	04:57		20:23 (10)	05:38		20:11 (8)	06:31		19:26 (4)	07:23		17:41 (2)	07:20
	21:47	32	20:55 (9)	21:09	14	20:25 (8)	20:02	8	19:34 (4)	18:50	28	18:09 (2)	16:42
5	04:58		20:24 (10)	05:40		20:10 (8)	06:33		19:29 (4)	07:25		17:41 (2)	07:22
	21:46	32	20:56 (9)	21:07	15	20:25 (8)	20:00	2	19:31 (4)	18:47	28	18:09 (2)	16:40
6	04:59		20:24 (10)	05:42		20:10 (8)	06:35			07:26		17:41 (2)	07:24
	21:46	32	20:56 (9)	21:05	16	20:26 (8)	19:57			18:45	27	18:08 (2)	16:39
7	05:00		20:24 (10)	05:43		20:09 (8)	06:36			07:28		17:40 (2)	07:26
	21:45	33	20:57 (9)	21:03	17	20:26 (8)	19:55			18:43	27	18:07 (2)	16:37
8	05:01		20:24 (10)	05:45		20:09 (8)	06:38			07:30		17:40 (2)	07:27
	21:44	33	20:57 (9)	21:01	17	20:26 (8)	19:53			18:40	26	18:06 (2)	16:35
9	05:02		20:24 (10)	05:47		20:09 (8)	06:40			18:45 (1)	24	17:41 (2)	07:29
	21:44	34	20:58 (9)	20:59	17	20:26 (8)	19:50	11	18:56 (1)	18:38	24	18:05 (2)	16:33
10	05:03		20:25 (10)	05:48		20:09 (8)	06:41			18:42 (1)	24	17:42 (2)	07:31
	21:43	33	20:58 (9)	20:57	17	20:26 (8)	19:48	16	18:58 (1)	18:36	22	18:04 (2)	16:32
11	05:04		20:25 (10)	05:50		20:09 (8)	06:43			18:40 (1)	22	17:43 (2)	07:33
	21:42	33	20:58 (9)	20:55	17	20:26 (8)	19:45	19	18:59 (1)	18:33	20	18:03 (2)	16:30
12	05:05		20:25 (10)	05:52		19:33 (3)	06:45			18:39 (1)	20	17:45 (2)	07:35
	21:41	33	20:58 (9)	20:53	16	20:23 (8)	19:43	21	19:00 (1)	18:31	16	18:01 (2)	16:28
13	05:06		20:25 (10)	05:53		19:28 (3)	06:47			18:38 (1)	16	17:48 (2)	07:37
	21:40	33	20:58 (9)	20:51	24	20:22 (8)	19:41	22	19:00 (1)	18:29	10	17:58 (2)	16:27
14	05:07		20:25 (10)	05:55		19:26 (3)	06:48			18:37 (1)	10	17:58 (2)	16:27
	21:39	33	20:58 (9)	20:49	26	20:20 (8)	19:38	23	19:00 (1)	18:26		16:25	16:00
15	05:09		20:25 (10)	05:57		19:24 (3)	06:50			18:36 (1)	23	17:40	08:25
	21:38	33	20:58 (9)	20:47	25	20:18 (8)	19:36	24	19:00 (1)	18:24		16:24	16:00
16	05:10		20:25 (10)	05:58		19:22 (3)	06:52			18:36 (1)	24	17:42	08:26
	21:37	33	20:58 (9)	20:45	23	19:45 (3)	19:33	24	19:00 (1)	18:22		16:22	16:00
17	05:11		20:25 (10)	06:00		19:21 (3)	06:53			18:35 (1)	24	17:44	08:27
	21:36	33	20:58 (9)	20:43	24	19:45 (3)	19:31	24	18:59 (1)	18:20		16:21	16:00
18	05:12		20:27 (10)	06:02		19:20 (3)	06:55			18:36 (1)	24	17:46	08:27
	21:35	31	20:58 (9)	20:41	26	19:46 (3)	19:28	22	18:58 (1)	18:17		16:19	16:01
19	05:14		20:27 (10)	06:04		19:19 (3)	06:57			18:36 (1)	22	17:48	08:28
	21:34	31	20:58 (9)	20:39	28	19:47 (3)	19:26	21	18:57 (1)	18:15		16:18	16:01
20	05:15		20:27 (10)	06:05		19:18 (3)	06:59			18:36 (1)	21	17:50	08:29
	21:32	30	20:57 (9)	20:36	29	19:47 (3)	19:24	19	18:55 (1)	18:13		16:17	16:01
21	05:17		20:28 (10)	06:07		19:18 (3)	07:00			18:37 (1)	20	17:51	08:29
	21:31	29	20:57 (9)	20:34	29	19:47 (3)	19:21	16	18:53 (1)	18:11		16:15	16:02
22	05:18		20:28 (10)	06:09		19:18 (3)	07:02			18:39 (1)	20	17:53	08:30
	21:30	28	20:56 (9)	20:32	29	19:47 (3)	19:19	12	18:51 (1)	18:09		16:14	16:02
23	05:19		20:29 (10)	06:10		19:17 (3)	07:04			18:42 (1)	20	17:55	08:31
	21:28	26	20:55 (9)	20:30	30	19:47 (3)	19:16	7	18:49 (1)	18:06		16:13	16:03
24	05:21		20:30 (10)	06:12		19:17 (3)	07:05			18:49 (1)	20	17:56	08:31
	21:27	25	20:55 (9)	20:27	30	19:47 (3)	19:14			18:04		16:12	16:03
25	05:22		20:31 (10)	06:14		19:16 (3)	07:07			18:01		16:12	16:03
	21:25	22	20:53 (9)	20:25	30	19:46 (3)	19:11			17:02		16:11	16:04
26	05:24		20:32 (10)	06:16		19:16 (3)	07:09			17:53 (2)	20	17:03	08:00
	21:24	18	20:50 (10)	20:23	30	19:46 (3)	19:09	10	18:03 (2)	17:00		16:10	16:05
27	05:25		20:34 (10)	06:17		19:17 (3)	07:11			17:50 (2)	20	17:05	08:01
	21:22	16	20:50 (6)	20:21	28	19:45 (3)	19:07	16	18:06 (2)	16:58		16:09	16:05
28	05:27		20:34 (6)	06:19		19:16 (3)	07:12			17:47 (2)	20	17:07	08:03
	21:21	15	20:49 (6)	20:18	28	19:44 (3)	19:04	19	18:06 (2)	16:56		16:08	16:06
29	05:29		20:35 (6)	06:21		19:17 (3)	07:14			17:45 (2)	20	17:09	08:05
	21:19	13	20:48 (6)	20:16	27	19:44 (4)	19:02	23	18:08 (2)	16:54		16:07	16:07
30	05:30		20:35 (6)	06:22		19:18 (3)	07:16			17:44 (2)	20	17:10	08:06
	21:17	11	20:46 (6)	20:14	26	19:44 (4)	18:59	25	18:09 (2)	16:52		16:06	16:08
31	05:32		20:36 (6)	06:24		19:19 (3)				17:12		16:06	08:32
	21:16	9	20:45 (6)	20:11	24	19:43 (4)				16:50		16:09	08:32
	Sonnenscheinstunden		508		458		382		330		262		237
	astr.max.mögl.Beschattung		864		692		432		310				
	Red.Sonnenscheinwahrsch.		0.38		0.42		0.35		0.29				
	Reduktion Betriebsdauer		0.96		0.96		0.96		0.96				
	Reduktion Windrichtung		0.63		0.68		0.71		0.72				
	Gesamte Reduktion		0.23		0.28		0.24		0.20				
	Met.wahrsch.Beschattung		200		191		103		63				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AL - IO38

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32 16:10	08:03 17:00	07:07 17:54	06:54 19:51	18:48 (1) 05:46	19:19 (3) 04:58
2	08:32 16:11	08:02 17:02	07:05 17:56	17:15 (2) 19:53	18:49 (1) 05:44	19:21 (3) 04:57
3	08:32 16:12	08:00 17:04	07:03 17:58	17:12 (2) 19:55	18:49 (1) 05:42	19:23 (3) 04:57
4	08:32 16:14	07:58 17:06	07:00 18:00	17:09 (2) 19:57	18:51 (1) 05:40	19:26 (3) 04:56
5	08:31 16:15	07:57 17:08	06:58 18:02	17:08 (2) 19:58	18:53 (1) 05:38	20:03 (8) 04:55
6	08:31 16:16	07:55 17:10	06:56 18:04	17:07 (2) 20:00	19:05 (1) 05:36	20:03 (8) 04:54
7	08:31 16:18	07:53 17:12	06:54 18:06	17:06 (2) 20:02	20:54 05:35	20:03 (8) 04:54
8	08:30 16:19	07:51 17:14	06:51 18:08	17:05 (2) 20:04	20:57 05:33	20:03 (8) 04:53
9	08:30 16:20	07:49 17:16	06:49 18:09	17:05 (2) 20:06	19:34 (4) 05:31	20:03 (8) 04:53
10	08:29 16:22	07:47 17:18	06:47 18:11	17:04 (2) 20:07	19:31 (4) 05:29	20:03 (8) 04:52
11	08:28 16:23	07:45 17:20	06:44 18:13	17:04 (2) 20:09	19:40 (4) 05:27	20:19 (8) 04:52
12	08:28 16:25	07:43 17:22	06:42 18:15	17:04 (2) 20:11	19:29 (4) 05:26	20:04 (8) 04:52
13	08:27 16:26	07:42 17:24	06:39 18:17	17:04 (2) 20:13	19:42 (4) 05:24	20:19 (8) 04:51
14	08:26 16:28	07:40 17:26	06:37 18:19	17:03 (2) 20:15	19:26 (3) 05:24	20:07 (8) 04:51
15	08:25 16:29	07:38 17:28	06:35 18:21	17:03 (2) 20:16	19:45 (4) 05:22	20:35 (6) 04:51
16	08:24 16:31	07:35 17:29	06:32 18:22	17:02 (2) 20:18	19:22 (3) 05:21	20:29 (6) 04:51
17	08:23 16:33	07:33 17:31	06:30 18:24	17:02 (2) 20:20	19:47 (4) 05:19	20:38 (6) 04:51
18	08:22 16:34	07:31 17:33	06:28 18:26	17:02 (2) 20:22	19:46 (4) 05:17	20:39 (6) 04:50
19	08:21 16:36	07:29 17:35	06:25 18:28	17:01 (2) 20:24	19:19 (3) 05:16	20:28 (6) 04:50
20	08:20 16:38	07:27 17:37	06:23 18:30	17:01 (2) 20:25	19:46 (3) 05:14	20:42 (6) 04:50
21	08:19 16:40	07:25 17:39	06:20 18:31	17:00 (2) 20:27	19:18 (3) 05:13	20:27 (6) 04:50
22	08:18 16:42	07:23 17:41	06:18 18:33	17:00 (2) 20:29	19:47 (3) 05:11	20:27 (6) 04:50
23	08:16 16:43	07:21 17:43	06:16 18:35	17:58 (1) 06:05	19:20 (3) 05:10	20:28 (6) 04:50
24	08:15 16:45	07:18 17:45	06:13 18:37	18:07 (1) 06:03	19:16 (3) 05:09	20:27 (6) 04:51
25	08:14 16:47	07:16 17:47	06:11 18:39	17:55 (1) 06:03	19:46 (3) 05:07	20:27 (6) 04:51
26	08:12 16:49	07:14 17:49	06:08 18:40	18:10 (1) 06:01	19:16 (3) 05:06	20:20 (9) 04:52
27	08:11 16:40	07:12 17:51	06:06 18:42	17:52 (1) 05:59	19:46 (3) 05:04	20:26 (10) 04:52
28	08:10 16:53	07:10 17:53	06:03 18:44	18:12 (1) 05:57	19:16 (3) 05:02	20:25 (10) 04:52
29	08:08 16:54	07:08 17:55	06:01 18:46	18:12 (1) 05:55	19:44 (3) 05:02	20:25 (10) 04:53
30	08:06 16:56	07:06 17:57	05:59 18:48	18:13 (1) 05:52	19:17 (3) 05:01	20:24 (10) 04:53
31	08:05 16:58	07:04 17:59	05:56 18:49	18:13 (1) 05:50	19:43 (3) 05:00	20:24 (10) 04:54
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			619	630	626	960
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.69	0.64	0.63
Gesamte Reduktion			0.19	0.25	0.27	0.23
Met.wahrsch.Beschattung			119	155	167	225

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AL - IO38

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 721 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:55		20:28 (10)	05:33		20:15 (8)	06:26		19:28 (4)	07:18		17:44 (2)	08:08	
	21:48	33	21:01 (9)	21:14	13	20:28 (8)	20:09	13	19:41 (4)	18:57	28	18:12 (2)	16:48	
2	04:55		20:29 (10)	05:35		20:15 (8)	06:28		19:30 (4)	07:19		17:42 (2)	07:16	
	21:48	32	21:01 (9)	21:12	14	20:29 (8)	20:07	9	19:39 (4)	18:55	29	18:11 (2)	16:46	
3	04:56		20:29 (10)	05:37		20:13 (8)	06:29		19:32 (4)	07:21		17:42 (2)	07:18	
	21:47	32	21:01 (9)	21:10	16	20:29 (8)	20:04	4	19:36 (4)	18:52	29	18:11 (2)	16:44	
4	04:57		20:29 (10)	05:38		20:13 (8)	06:31			07:23		17:42 (2)	07:20	
	21:47	32	21:01 (9)	21:09	17	20:30 (8)	20:02			18:50	29	18:11 (2)	16:42	
5	04:58		20:29 (10)	05:40		20:12 (8)	06:33			07:25		17:42 (2)	07:22	
	21:46	33	21:02 (9)	21:07	18	20:30 (8)	20:00			18:47	29	18:11 (2)	16:40	
6	04:59		20:30 (10)	05:42		20:13 (8)	06:35			07:26		17:43 (2)	07:24	
	21:46	32	21:02 (9)	21:05	17	20:30 (8)	19:57			18:45	27	18:10 (2)	16:39	
7	05:00		20:30 (10)	05:43		20:12 (8)	06:36		18:48 (1)	07:28		17:42 (2)	07:26	
	21:45	32	21:02 (9)	21:03	18	20:30 (8)	19:55	12	19:00 (1)	18:43	26	18:08 (2)	16:37	
8	05:01		20:31 (10)	05:45		20:13 (8)	06:38			18:45 (1)	07:30		17:43 (2)	07:27
	21:44	32	21:03 (9)	21:01	17	20:30 (8)	19:53	16	19:01 (1)	18:40	24	18:07 (2)	16:35	
9	05:02		20:31 (10)	05:47		19:34 (3)	06:40			18:44 (1)	07:32		17:44 (2)	07:29
	21:44	32	21:03 (9)	20:59	28	20:30 (8)	19:50	18	19:02 (1)	18:38	22	18:06 (2)	16:33	
10	05:03		20:31 (10)	05:48		19:31 (3)	06:41			18:43 (1)	07:34		17:45 (2)	07:31
	21:43	32	21:03 (9)	20:57	30	20:27 (8)	19:48	20	19:03 (1)	18:36	19	18:04 (2)	16:32	
11	05:04		20:32 (10)	05:50		19:29 (3)	06:43			18:41 (1)	07:35		17:47 (2)	07:33
	21:42	31	21:03 (9)	20:55	32	20:26 (8)	19:45	22	19:03 (1)	18:33	15	18:02 (2)	16:30	
12	05:05		20:32 (10)	05:52		19:27 (3)	06:45			18:40 (1)	07:37		17:51 (2)	07:35
	21:41	31	21:03 (9)	20:53	30	20:23 (8)	19:43	23	19:03 (1)	18:31	7	17:58 (2)	16:28	
13	05:06		20:32 (10)	05:53		19:26 (3)	06:47			18:40 (1)	07:39			07:37
	21:40	31	21:03 (9)	20:51	30	20:22 (8)	19:41	24	19:04 (1)	18:29			16:27	
14	05:07		20:33 (10)	05:55		19:26 (3)	06:48			18:39 (1)	07:41			16:27
	21:39	29	21:02 (9)	20:49	26	19:52 (3)	19:38	24	19:03 (1)	18:26			16:25	
15	05:09		20:33 (10)	05:57		19:24 (3)	06:50			18:39 (1)	07:43			16:25
	21:38	29	21:02 (9)	20:47	28	19:52 (3)	19:36	24	19:03 (1)	18:24			16:24	
16	05:10		20:33 (10)	05:58		19:24 (3)	06:52			18:39 (1)	07:44			16:24
	21:37	28	21:01 (9)	20:45	28	19:52 (3)	19:33	23	19:02 (1)	18:22			16:22	
17	05:11		20:34 (10)	06:00		19:22 (3)	06:53			18:38 (1)	07:46			16:22
	21:36	27	21:01 (9)	20:43	30	19:52 (3)	19:31	23	19:01 (1)	18:20			16:21	
18	05:12		20:35 (10)	06:02		19:22 (3)	06:55			18:39 (1)	07:48			16:21
	21:35	26	21:01 (9)	20:41	30	19:52 (3)	19:28	21	19:00 (1)	18:17			16:19	
19	05:14		20:36 (10)	06:04		19:22 (3)	06:57			18:40 (1)	07:50			16:19
	21:34	24	21:00 (9)	20:39	31	19:53 (3)	19:26	18	18:58 (1)	18:15			16:18	
20	05:15		20:36 (10)	06:05		19:21 (3)	06:59			18:40 (1)	07:52			16:18
	21:32	23	20:59 (9)	20:36	31	19:52 (3)	19:24	15	18:55 (1)	18:13			16:17	
21	05:17		20:38 (10)	06:07		19:21 (3)	07:00			18:43 (1)	07:54			16:17
	21:31	20	20:58 (9)	20:34	31	19:53 (3)	19:21	10	18:53 (1)	18:11			16:15	
22	05:18		20:38 (6)	06:09		19:22 (3)	07:02			18:53 (1)	07:55			16:15
	21:30	17	20:55 (9)	20:32	30	19:52 (3)	19:19			18:09				16:14
23	05:19		20:37 (6)	06:10		19:21 (3)	07:04			18:09				16:14
	21:28	16	20:53 (10)	20:30	30	19:51 (3)	19:16			18:06				16:13
24	05:21		20:38 (6)	06:12		19:21 (3)	07:05		17:56 (2)	07:59				16:13
	21:27	16	20:54 (6)	20:27	30	19:51 (3)	19:14	8	18:04 (2)	18:04				16:12
25	05:22		20:38 (6)	06:14		19:21 (3)	07:07			17:52 (2)	07:01			16:12
	21:25	15	20:53 (6)	20:25	28	19:49 (3)	19:11	15	18:07 (2)	17:02				16:11
26	05:24		20:38 (6)	06:16		19:22 (3)	07:09			17:50 (2)	07:03			16:11
	21:24	13	20:51 (6)	20:23	27	19:49 (3)	19:09	19	18:09 (2)	17:00				16:10
27	05:25		20:38 (6)	06:17		19:23 (3)	07:11			17:48 (2)	07:05			16:10
	21:22	13	20:51 (6)	20:21	26	19:49 (4)	19:07	23	18:11 (2)	16:58				16:09
28	05:27		20:38 (6)	06:19		19:23 (3)	07:12			17:46 (2)	07:07			16:08
	21:21	11	20:49 (6)	20:18	25	19:48 (4)	19:04	25	18:11 (2)	16:56				16:08
29	05:29		20:40 (6)	06:21		19:25 (3)	07:14			17:45 (2)	07:09			16:07
	21:19	8	20:48 (6)	20:16	22	19:47 (4)	19:02	26	18:11 (2)	16:54				16:07
30	05:30		20:18 (8)	06:22		19:27 (3)	07:16			17:44 (2)	07:10			16:06
	21:17	13	20:46 (6)	20:14	19	19:46 (4)	18:59	28	18:12 (2)	16:52				16:06
31	05:32		20:17 (8)	06:24		19:27 (4)				07:12				16:06
	21:16	14	20:45 (6)	20:11	16	19:43 (4)				16:50				16:05
Sonnenscheinstunden			508		458		382		330		262		237	
astr.max.mögl.Beschattung		757		768		463			284					
Red.Sonnenscheinwahrsch.		0.38		0.42		0.35			0.29					
Reduktion Betriebsdauer		0.96		0.96		0.96			0.96					
Reduktion Windrichtung		0.63		0.67		0.72			0.72					
Gesamte Reduktion		0.23		0.28		0.24			0.20					
Met.wahrsch.Beschattung		174		211		111			57					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattenende	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AM - IO39

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni					
1	08:32	08:03	07:07	17:00 (2)	06:54	18:45 (1)	05:46	19:19 (3)	04:58	20:17 (10)	
	16:10	17:00	17:54	23 17:23 (2)	19:51	17 19:02 (1)	20:45	23 20:15 (8)	21:33	35 20:52 (5)	
2	08:32	08:02	07:05	16:59 (2)	06:52	18:47 (1)	05:44	20:00 (8)	04:57	20:17 (10)	
	16:11	17:02	17:56	25 17:24 (2)	19:53	13 19:00 (1)	20:47	17 20:17 (8)	21:35	34 20:51 (5)	
3	08:32	08:00	07:03	16:59 (2)	06:49	18:49 (1)	05:42	20:00 (8)	04:57	20:17 (10)	
	16:12	17:04	17:58	26 17:25 (2)	19:55	7 18:56 (1)	20:49	17 20:17 (8)	21:36	35 20:52 (9)	
4	08:32	07:58	07:00	16:57 (2)	06:47		05:40	19:59 (8)	04:56	20:17 (10)	
	16:14	17:06	18:00	28 17:25 (2)	19:57	19:19 (3)	05:29	20:01 (8)	21:37	35 20:52 (9)	
5	08:31	07:57	06:58	16:57 (2)	06:44		05:38	19:59 (8)	04:55	20:18 (10)	
	16:15	17:08	18:02	29 17:26 (2)	19:58	20:52	18 20:17 (8)	21:38	20:53 (9)		
6	08:31	07:55	06:56	16:57 (2)	06:42		05:36	19:59 (8)	04:54	20:18 (10)	
	16:16	17:10	18:04	29 17:26 (2)	20:00		20:54	17 20:16 (8)	21:39	34 20:52 (9)	
7	08:31	07:53	06:54	16:56 (2)	06:40	19:29 (4)	05:35	20:00 (8)	04:54	20:17 (10)	
	16:18	17:12	18:06	29 17:25 (2)	20:02	6 19:35 (4)	20:56	17 20:17 (8)	21:40	35 20:52 (9)	
8	08:30	07:51	06:51	16:56 (2)	06:37	19:26 (4)	05:33	20:00 (8)	04:53	20:18 (10)	
	16:19	17:14	18:08	29 17:25 (2)	20:04	11 19:37 (4)	20:57	16 20:16 (8)	21:41	35 20:53 (9)	
9	08:30	07:49	06:49	16:57 (2)	06:35	19:23 (3)	05:31	20:00 (8)	04:53	20:18 (10)	
	16:20	17:16	18:09	28 17:25 (2)	20:06	15 19:38 (4)	20:59	15 20:15 (8)	21:42	35 20:53 (9)	
10	08:29	07:47	06:47	16:56 (2)	06:33	19:19 (3)	05:29	20:01 (8)	04:52	20:18 (10)	
	16:22	17:18	18:11	28 17:24 (2)	20:07	21 19:40 (4)	21:01	13 20:14 (8)	21:43	35 20:53 (9)	
11	08:28	07:45	06:44	16:57 (2)	06:30	19:17 (3)	05:27	20:03 (8)	04:52	20:19 (10)	
	16:23	17:20	18:13	27 17:24 (2)	20:09	25 19:42 (4)	21:02	13 20:32 (6)	21:43	34 20:53 (9)	
12	08:28	07:43	06:42	16:57 (2)	06:28	19:15 (3)	05:26	20:04 (8)	04:51	20:19 (10)	
	16:25	17:22	18:15	25 17:22 (2)	20:11	27 19:42 (4)	21:04	13 20:33 (6)	21:44	34 20:53 (9)	
13	08:27	07:42	06:39	16:59 (2)	06:26	19:13 (3)	05:24	20:26 (6)	04:51	20:18 (10)	
	16:26	17:24	18:17	22 17:21 (2)	20:13	29 19:42 (4)	21:06	9 20:35 (6)	21:45	35 20:53 (9)	
14	08:26	07:40	06:37	17:00 (2)	06:23	19:12 (3)	05:22	20:25 (6)	04:51	20:19 (10)	
	16:28	17:26	18:19	20 17:20 (2)	20:15	30 19:42 (4)	21:07	11 20:36 (6)	21:45	34 20:53 (9)	
15	08:25	07:38	06:35	17:02 (2)	06:21	19:12 (3)	05:21	20:25 (6)	04:51	20:19 (10)	
	16:29	17:28	18:21	14 17:16 (2)	20:16	30 19:42 (4)	21:09	13 20:38 (6)	21:46	34 20:53 (9)	
16	08:24	07:35	06:32	17:06 (2)	06:19	19:10 (3)	05:19	20:24 (6)	04:50	20:19 (10)	
	16:31	17:29	18:22	7 17:13 (2)	20:18	31 19:41 (4)	21:11	15 20:39 (6)	21:47	34 20:53 (9)	
17	08:23	07:33	06:30		06:16	19:10 (3)	05:17	20:25 (6)	04:50	20:20 (10)	
	16:33	17:31	18:24		20:20	31 19:41 (3)	21:12	15 20:40 (6)	21:47	34 20:54 (9)	
18	08:22	07:31	06:28		06:14	19:09 (3)	05:16	20:24 (10)	04:50	20:20 (10)	
	16:34	17:33	18:26		20:22	32 19:41 (3)	21:14	16 20:40 (6)	21:47	34 20:54 (9)	
19	08:21	07:29	06:25	17:53 (1)	06:12	19:09 (3)	05:14	20:23 (10)	04:50	20:20 (10)	
	16:36	17:35	18:28	8 18:01 (1)	20:24	32 19:41 (3)	21:15	19 20:43 (5)	21:48	35 21:12 (7)	
20	08:20	07:27	06:23	17:50 (1)	06:10	19:09 (3)	05:13	20:22 (10)	04:50	20:20 (10)	
	16:38	17:37	18:30	14 18:04 (1)	20:25	32 19:41 (3)	21:17	23 20:45 (5)	21:48	36 21:13 (7)	
21	08:19	07:25	06:20	17:48 (1)	06:08	19:09 (3)	05:11	20:20 (10)	04:50	20:21 (10)	
	16:40	17:39	18:31	18 18:06 (1)	20:27	32 19:41 (3)	21:18	26 20:46 (5)	21:48	36 21:14 (7)	
22	08:18	07:23	06:18	17:46 (1)	06:05	19:09 (3)	05:10	20:20 (10)	04:51	20:21 (10)	
	16:42	17:41	18:33	20 18:06 (1)	20:29	31 19:40 (3)	21:20	27 20:47 (5)	21:49	36 21:14 (7)	
23	08:16	07:21	06:16	17:45 (1)	06:03	19:09 (3)	05:09	20:19 (10)	04:51	20:21 (10)	
	16:43	17:43	18:35	22 18:07 (1)	20:31	30 19:39 (3)	21:21	30 20:49 (5)	21:49	36 21:14 (7)	
24	08:15	07:18	06:13	17:44 (1)	06:01	19:09 (3)	05:07	20:19 (10)	04:51	20:21 (10)	
	16:45	17:45	18:37	23 18:07 (1)	20:33	29 19:38 (3)	21:23	31 20:50 (5)	21:49	34 20:55 (9)	
25	08:14	07:16	06:11	17:43 (1)	05:59	19:10 (3)	05:06	20:19 (10)	04:52	20:22 (10)	
	16:47	17:47	18:39	25 18:08 (1)	20:34	28 19:38 (3)	21:24	33 20:52 (5)	21:49	34 20:56 (9)	
26	08:12	07:14	17:07 (2)	06:08	17:42 (1)	19:10 (3)	05:05	20:18 (10)	04:52	20:22 (10)	
	16:49	17:49	10 17:17 (2)	18:40	25 18:07 (1)	20:36	27 19:37 (3)	35 20:53 (5)	21:49	33 20:55 (9)	
27	08:11	07:12	17:04 (2)	06:06	17:43 (1)	05:55	19:11 (3)	05:04	20:18 (10)	04:52	20:22 (10)
	16:40	17:39	16 17:20 (2)	18:42	24 18:07 (1)	20:38	24 19:35 (3)	21:27	35 20:53 (5)	21:49	34 20:56 (9)
28	08:10	07:10	17:03 (2)	06:03	17:43 (1)	05:52	19:12 (3)	05:02	20:18 (10)	04:53	20:22 (10)
	16:53	17:53	20 17:23 (2)	18:44	24 18:07 (1)	20:40	27 20:10 (8)	21:28	35 20:53 (5)	21:49	34 20:56 (9)
29	08:08		07:01	18:42 (1)	05:50	19:14 (3)	05:01	20:18 (10)	04:53	20:23 (10)	
	16:54		19:46	24 19:06 (1)	20:41	27 20:12 (8)	21:30	35 20:53 (5)	21:49	34 20:57 (9)	
30	08:06		06:59	18:43 (1)	05:48	19:16 (3)	05:00	20:17 (10)	04:54	20:22 (10)	
	16:56		19:48	22 19:05 (1)	20:43	27 20:14 (8)	21:31	36 20:53 (5)	21:48	34 20:56 (9)	
31	08:05		06:56	18:43 (1)			04:59	20:17 (10)			
	16:58		19:49	20 19:03 (1)			21:32	35 20:52 (5)			
Sonnenscheinstunden	253	275	367	418	491	506					
astr. max.mögl. Beschattung		46	658	671	676	1037					
Red. Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39					
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96					
Reduktion Windrichtung		0.72	0.72	0.69	0.64	0.63					
Gesamte Reduktion		0.17	0.19	0.25	0.26	0.24					
Met. wahrsch. Beschattung		8	127	166	179	244					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattenende (WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	--	---

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AM - IO39

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	20:23 (10) 05:33			20:14 (8) 06:26		19:16 (3) 07:18		17:38 (2) 07:14		08:08	
	21:48	34 20:57 (9) 21:14	13	20:43 (6) 20:09	25	19:41 (4) 18:57	23	18:01 (2) 16:48		16:05		
2	04:55	20:23 (10) 05:35			20:12 (8) 06:28		19:18 (3) 07:19		17:35 (2) 07:16		08:09	
	21:48	35 20:58 (9) 21:12	14	20:42 (6) 20:07	21	19:39 (4) 18:55	26	18:01 (2) 16:46		16:04		
3	04:56	20:23 (10) 05:37			20:11 (8) 06:29		19:21 (3) 07:21		17:35 (2) 07:18		08:11	
	21:47	34 20:57 (9) 21:11	13	20:24 (8) 20:04	15	19:36 (4) 18:52	27	18:02 (2) 16:44		16:04		
4	04:57	20:23 (10) 05:38			20:10 (8) 06:31		19:23 (4) 07:23		17:34 (2) 07:20		08:12	
	21:47	35 20:58 (9) 21:09	16	20:26 (8) 20:02	11	19:34 (4) 18:50	28	18:02 (2) 16:42		16:03		
5	04:58	20:24 (10) 05:40			20:09 (8) 06:33		19:25 (4) 07:25		17:33 (2) 07:22		08:14	
	21:46	34 20:58 (9) 21:07	17	20:26 (8) 20:00	6	19:31 (4) 18:47	29	18:02 (2) 16:40		16:03		
6	04:59	20:24 (10) 05:42			20:09 (8) 06:35		19:26 (4) 07:26		17:33 (2) 07:24		08:15	
	21:46	35 20:59 (9) 21:05	17	20:26 (8) 19:57		18:45	29	18:02 (2) 16:39		16:02		
7	05:00	20:24 (10) 05:43			20:08 (8) 06:36		19:27 (4) 07:28		17:32 (2) 07:26		08:16	
	21:45	35 20:59 (9) 21:03	18	20:26 (8) 19:55		18:43	29	18:01 (2) 16:37		16:02		
8	05:01	20:24 (10) 05:45			20:08 (8) 06:38		19:28 (4) 07:30		17:32 (2) 07:27		08:17	
	21:44	35 20:59 (9) 21:01	18	20:26 (8) 19:53		18:40	29	18:01 (2) 16:35		16:01		
9	05:02	20:25 (10) 05:47			20:09 (8) 06:40		18:44 (1) 07:32		17:32 (2) 07:29		08:19	
	21:44	34 20:59 (9) 20:59	17	20:26 (8) 19:50	6	18:50 (1) 18:38	29	18:01 (2) 16:33		16:01		
10	05:03	20:25 (10) 05:48			20:08 (8) 06:41		18:49 (1) 07:34		17:32 (2) 07:31		08:20	
	21:43	35 21:00 (9) 20:57	18	20:26 (8) 19:48	13	18:53 (1) 18:36	28	18:00 (2) 16:32		16:01		
11	05:04	20:25 (10) 05:50			20:09 (8) 06:43		18:37 (1) 07:35		17:33 (2) 07:33		08:21	
	21:42	35 21:00 (5) 20:55	16	20:25 (8) 19:45	17	18:54 (1) 18:33	26	17:59 (2) 16:30		16:00		
12	05:05	20:25 (10) 05:52			19:26 (3) 06:45		18:36 (1) 07:37		17:34 (2) 07:35		08:22	
	21:41	36 21:01 (5) 20:53	24	20:23 (8) 19:43	19	18:55 (1) 18:31	24	17:58 (2) 16:28		16:00		
13	05:06	20:26 (10) 05:53			19:24 (3) 06:47		18:35 (1) 07:39		17:35 (2) 07:37		08:23	
	21:40	35 21:01 (5) 20:51	27	20:22 (8) 19:41	21	18:56 (1) 18:29	22	17:57 (2) 16:27		16:00		
14	05:07	20:26 (10) 05:55			19:22 (3) 06:48		18:33 (1) 07:41		17:35 (2) 07:39		08:24	
	21:39	35 21:01 (5) 20:49	27	20:20 (8) 19:38	23	18:56 (1) 18:26	19	17:54 (2) 16:25		16:00		
15	05:09	20:26 (10) 05:57			19:20 (3) 06:50		18:32 (1) 07:43		17:37 (2) 07:41		08:25	
	21:38	36 21:02 (5) 20:47	27	20:18 (8) 19:36	24	18:56 (1) 18:24	15	17:52 (2) 16:24		16:00		
16	05:10	20:26 (10) 05:58			19:19 (3) 06:52		18:32 (1) 07:44		17:41 (2) 07:42		08:26	
	21:37	36 21:02 (5) 20:45	24	19:43 (3) 19:33	24	18:56 (1) 18:22	6	17:47 (2) 16:22		16:00		
17	05:11	20:27 (10) 06:00			19:17 (3) 06:53		18:31 (1) 07:46		17:44 (2) 07:44		08:27	
	21:36	35 21:02 (5) 20:43	26	19:43 (3) 19:31	24	18:55 (1) 18:20		16:21		16:00		
18	05:12	20:28 (10) 06:02			19:16 (3) 06:55		18:31 (1) 07:48		17:46 (2) 07:46		08:27	
	21:35	34 21:02 (5) 20:41	28	19:44 (3) 19:28	24	18:55 (1) 18:17		16:19		16:01		
19	05:14	20:28 (10) 06:04			19:16 (3) 06:57		18:31 (1) 07:50		17:48 (2) 07:48		08:28	
	21:34	33 21:01 (5) 20:39	29	19:45 (3) 19:26	24	18:55 (1) 18:15		16:18		16:01		
20	05:15	20:29 (10) 06:05			19:14 (3) 06:59		18:31 (1) 07:52		17:50 (2) 07:50		08:29	
	21:32	30 20:59 (5) 20:36	31	19:45 (3) 19:24	22	18:53 (1) 18:13		16:17		16:01		
21	05:17	20:30 (10) 06:07			19:14 (3) 07:00		18:31 (1) 07:54		17:51 (2) 07:51		08:29	
	21:31	29 20:59 (5) 20:34	31	19:45 (3) 19:21	21	18:52 (1) 18:11		16:15		16:02		
22	05:18	20:31 (10) 06:09			19:14 (3) 07:02		18:33 (1) 07:55		17:53 (2) 07:53		08:30	
	21:30	26 20:57 (5) 20:32	31	19:45 (3) 19:19	18	18:51 (1) 18:09		16:14		16:02		
23	05:19	20:31 (10) 06:10			19:13 (3) 07:04		18:34 (1) 07:57		17:55 (2) 07:55		08:31	
	21:28	25 20:56 (5) 20:30	32	19:45 (3) 19:16	15	18:49 (1) 18:06		16:13		16:03		
24	05:21	20:33 (10) 06:12			19:13 (3) 07:05		18:36 (1) 07:59		17:56 (2) 07:56		08:31	
	21:27	22 20:55 (5) 20:28	32	19:45 (3) 19:14	10	18:46 (1) 18:04		16:12		16:03		
25	05:22	20:34 (10) 06:14			19:12 (3) 07:07		18:37 (1) 07:01		17:58 (2) 07:58		08:31	
	21:25	17 20:53 (5) 20:25	32	19:44 (3) 19:11		17:02		16:11		16:04		
26	05:24	20:34 (6) 06:16			19:13 (3) 07:09		18:38 (1) 07:03		18:00 (2) 08:00		08:32	
	21:24	16 20:50 (6) 20:23	31	19:44 (3) 19:09		17:00		16:10		16:05		
27	05:25	20:35 (6) 06:17			19:13 (3) 07:11		18:39 (1) 07:05		18:01 (2) 08:01		08:32	
	21:22	16 20:51 (6) 20:21	31	19:44 (4) 19:07		16:58		16:09		16:05		
28	05:27	20:35 (6) 06:19			19:13 (3) 07:12		17:44 (2) 07:07		18:03 (2) 08:03		08:32	
	21:21	14 20:49 (6) 20:18	30	19:43 (4) 19:04	12	17:56 (2) 16:56		16:08		16:06		
29	05:29	20:36 (6) 06:21			19:13 (3) 07:14		17:41 (2) 07:09		18:05 (2) 08:05		08:32	
	21:19	12 20:48 (6) 20:16	30	19:43 (4) 19:02	18	17:59 (2) 16:54		16:07		16:07		
30	05:30	20:36 (6) 06:22			19:14 (3) 07:16		17:39 (2) 07:10		18:06 (2) 08:06		08:32	
	21:17	10 20:46 (6) 20:14	29	19:43 (4) 18:59	21	18:00 (2) 16:52		16:06		16:08		
31	05:32	20:37 (6) 06:24			19:15 (3) 07:17		17:02		18:07 (2) 08:07		08:32	
	21:16	8 20:45 (6) 20:11	27	19:42 (4) 18:50		16:50		16:09		16:09		
	Sonnenscheinstunden	508	458	382	330	262	237					
	astr.max.mögl.Beschattung	886	756	434	389							
	Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29							
	Reduktion Betriebsdauer	0.96	0.96	0.96	0.96							
	Reduktion Windrichtung	0.63	0.68	0.71	0.72							
	Gesamte Reduktion	0.23	0.28	0.24	0.20							
	Met.wahrsch.Beschattung	204	209	104	79							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AN - IO40

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni						
1	08:32	08:03	07:07	17:02 (2)	06:54	18:44 (1)	05:46	19:14 (3)	04:58	20:27 (10)		
	16:10	17:00	17:54	21	17:23 (2)	19:51	23	19:07 (1)	20:45	33	20:15 (8)	21:33
2	08:32	08:02	07:05	17:01 (2)	06:52	18:45 (1)	05:44	19:16 (3)	04:57	20:26 (10)		
	16:11	17:02	17:56	23	17:24 (2)	19:53	21	19:06 (1)	20:47	35	20:18 (8)	21:35
3	08:32	08:00	07:03	17:00 (2)	06:49	18:46 (1)	05:42	19:17 (3)	04:57	20:27 (10)		
	16:12	17:04	17:58	26	17:26 (2)	19:55	18	19:04 (1)	20:49	35	20:19 (8)	21:36
4	08:32	07:58	07:00	16:58 (2)	06:47	18:48 (1)	05:40	19:19 (3)	04:56	20:26 (10)		
	16:14	17:06	18:00	28	17:26 (2)	19:57	14	19:02 (1)	20:50	33	20:20 (8)	21:37
5	08:31	07:57	06:58	16:57 (2)	06:44	18:51 (1)	05:38	19:21 (3)	04:55	20:27 (10)		
	16:15	17:08	18:02	30	17:27 (2)	19:58	8	18:59 (1)	20:52	31	20:21 (8)	21:38
6	08:31	07:55	06:56	16:57 (2)	06:42		05:36	19:25 (3)	04:54	20:26 (10)		
	16:16	17:10	18:04	30	17:27 (2)	20:00		20:54	22	20:21 (8)	21:39	32
7	08:31	07:53	06:54	16:56 (2)	06:40		05:35	20:03 (8)	04:54	20:26 (10)		
	16:18	17:12	18:06	31	17:27 (2)	20:02		20:56	19	20:22 (8)	21:40	32
8	08:30	07:51	06:51	16:56 (2)	06:37		05:33	20:03 (8)	04:53	20:26 (10)		
	16:19	17:14	18:08	31	17:27 (2)	20:04		20:57	18	20:21 (8)	21:41	33
9	08:30	07:49	06:49	16:56 (2)	06:35		05:31	20:03 (8)	04:53	20:27 (10)		
	16:20	17:16	18:09	31	17:27 (2)	20:06	7	19:38 (4)	20:59	18	20:21 (8)	21:42
10	08:29	07:47	06:47	16:56 (2)	06:33		05:29	20:03 (8)	04:52	20:26 (10)		
	16:22	17:18	18:11	30	17:26 (2)	20:07	12	19:40 (4)	21:01	17	20:20 (8)	21:43
11	08:28	07:45	06:44	16:56 (2)	06:30		05:27	20:04 (8)	04:52	20:27 (10)		
	16:23	17:20	18:13	30	17:26 (2)	20:09	15	19:42 (4)	21:02	16	20:20 (8)	21:43
12	08:28	07:43	06:42	16:56 (2)	06:28		05:26	20:04 (8)	04:51	20:27 (10)		
	16:25	17:22	18:15	28	17:24 (2)	20:11	18	19:43 (4)	21:04	15	20:19 (8)	21:44
13	08:27	07:42	06:39	16:57 (2)	06:26		05:24	20:05 (8)	04:51	20:26 (10)		
	16:26	17:24	18:17	27	17:24 (2)	20:13	22	19:45 (4)	21:06	14	20:19 (8)	21:45
14	08:26	07:40	06:37	16:58 (2)	06:23		05:22	20:06 (8)	04:51	20:27 (10)		
	16:28	17:26	18:19	25	17:23 (2)	20:15	24	19:45 (4)	21:07	16	20:36 (6)	21:45
15	08:25	07:38	06:35	16:59 (2)	06:21		05:21	20:07 (8)	04:51	20:27 (10)		
	16:29	17:28	18:21	22	17:21 (2)	20:16	27	19:46 (4)	21:09	17	20:38 (6)	21:46
16	08:24	07:35	06:32	17:01 (2)	06:19		05:19	20:09 (8)	04:50	20:27 (10)		
	16:31	17:29	18:22	18	17:19 (2)	20:18	28	19:46 (4)	21:11	14	20:39 (6)	21:47
17	08:23	07:33	06:30	17:03 (2)	06:16		05:17	20:10 (8)	04:50	20:27 (10)		
	16:33	17:31	18:24	13	17:16 (2)	20:20	29	19:45 (4)	21:12	11	20:41 (6)	21:47
18	08:22	07:31	06:28		06:14		05:16	20:29 (6)	04:50	20:27 (10)		
	16:34	17:33	18:26		20:22		30	19:45 (3)	21:14	13	20:42 (6)	21:47
19	08:21	07:29	06:25		06:12		05:14	20:29 (6)	04:50	20:28 (10)		
	16:36	17:35	18:28		20:24		31	19:45 (3)	21:15	14	20:43 (6)	21:48
20	08:20	07:27	06:23		06:10		05:13	20:29 (6)	04:50	20:28 (10)		
	16:38	17:37	18:30		20:25		32	19:46 (3)	21:17	16	20:45 (6)	21:48
21	08:19	07:25	06:20		06:08		05:11	20:28 (6)	04:50	20:29 (10)		
	16:40	17:39	18:31	11	17:54 (1)	20:27	33	19:46 (3)	21:18	16	20:44 (6)	21:48
22	08:18	07:23	06:18	17:50 (1)	06:05		05:10	20:28 (6)	04:51	20:29 (10)		
	16:42	17:41	18:33	17	18:07 (1)	20:29	33	19:46 (3)	21:20	18	20:47 (5)	21:49
23	08:16	07:21	06:16	17:49 (1)	06:03		05:09	20:29 (6)	04:51	20:29 (10)		
	16:43	17:43	18:35	19	18:08 (1)	20:31	33	19:45 (3)	21:21	20	20:49 (5)	21:49
24	08:15	07:18	06:13	17:47 (1)	06:01		05:07	20:29 (6)	04:51	20:28 (10)		
	16:45	17:45	18:37	22	18:09 (1)	20:33	33	19:45 (3)	21:23	21	20:50 (5)	21:49
25	08:14	07:16	06:11	17:46 (1)	05:59		05:06	20:30 (6)	04:52	20:29 (10)		
	16:47	17:47	18:39	24	18:10 (1)	20:34	33	19:45 (3)	21:24	22	20:52 (5)	21:49
26	08:12	07:14	06:08	17:45 (1)	05:57		05:05	20:30 (6)	04:52	20:29 (10)		
	16:49	17:49	18:40	24	18:09 (1)	20:36	32	19:44 (3)	21:26	23	20:53 (5)	21:49
27	08:11	07:12	06:06	17:45 (1)	05:55		05:04	20:30 (10)	04:52	20:30 (10)		
	16:50	17:50	18:41	25	18:10 (1)	20:38	32	19:44 (3)	21:27	24	20:54 (5)	21:49
28	08:10	07:10	06:03	17:44 (1)	05:52		05:02	20:29 (10)	04:53	20:30 (10)		
	16:53	17:53	18:44	26	18:10 (1)	20:40	30	19:43 (3)	21:28	27	20:56 (5)	21:49
29	08:08		07:01	18:44 (1)	05:50		05:01	20:29 (10)	04:53	20:30 (10)		
	16:54		19:46	25	19:09 (1)	20:41	29	19:42 (3)	21:30	28	20:57 (5)	21:49
30	08:06		06:59	18:44 (1)	05:48		05:00	20:28 (10)	04:54	20:30 (10)		
	16:56		19:48	25	19:09 (1)	20:43	27	19:41 (3)	21:31	30	20:58 (5)	21:48
31	08:05		06:56	18:44 (1)			04:59	20:28 (10)				
	16:58		19:49	23	19:07 (1)		21:32	20:27 (5)				
Sonnenscheinstunden	253	275	367		418	674	491	665	506	984		
astr. max.mögl. Beschattung		29	685		0.28	0.37		0.43		0.39		
Red. Sonnenscheinwahrsch.		0.24	0.28		0.37	0.43		0.49		0.39		
Reduktion Betriebsdauer		0.96	0.96		0.96	0.96		0.96		0.96		
Reduktion Windrichtung		0.72	0.72		0.69	0.64		0.64		0.63		
Gesamte Reduktion		0.17	0.19		0.25	0.27		0.27		0.23		
Met. wahrsch. Beschattung		5	132		166	178		178		230		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AN - IO40

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli			August			September			Oktober			November			Dezember		
1	04:55	20:31 (10)	05:33				20:14 (8)	06:26		19:26 (4)	07:18		17:36 (2)	07:14	08:08			
	21:48	33 21:04 (9)	21:14	16	20:30 (8)	20:09	15	19:41 (4)	18:57	28	18:04 (2)	16:48	16:05					
2	04:55	20:31 (10)	05:35				20:14 (8)	06:28		19:27 (4)	07:19		17:34 (2)	07:16	08:09			
	21:48	33 21:04 (9)	21:12	17	20:31 (8)	20:07	12	19:39 (4)	18:55	29	18:03 (2)	16:46	16:04					
3	04:56	20:31 (10)	05:37				20:13 (8)	06:29		19:29 (4)	07:21		17:34 (2)	07:18	08:11			
	21:47	33 21:04 (9)	21:11	18	20:31 (8)	20:04	7	19:36 (4)	18:52	30	18:04 (2)	16:44	16:04					
4	04:57	20:32 (10)	05:38				20:13 (8)	06:31		07:23			17:33 (2)	07:20	08:12			
	21:47	32 21:04 (9)	21:09	18	20:31 (8)	20:02		18:50		31	18:04 (2)	16:42	16:03					
5	04:58	20:32 (10)	05:40				20:12 (8)	06:33		07:25			17:33 (2)	07:22	08:14			
	21:46	32 21:04 (9)	21:07	19	20:31 (8)	20:00		18:47		31	18:04 (2)	16:40	16:03					
6	04:59	20:33 (10)	05:42				20:13 (8)	06:35		07:26			17:33 (2)	07:24	08:15			
	21:46	32 21:05 (9)	21:05	18	20:31 (8)	19:57		18:45		31	18:04 (2)	16:39	16:02					
7	05:00	20:33 (10)	05:43				19:32 (3)	06:36		18:46 (1)	07:28		17:32 (2)	07:26	08:16			
	21:45	32 21:05 (9)	21:03	26	20:30 (8)	19:55	8	18:54 (1)	18:43	30	18:02 (2)	16:37	16:02					
8	05:01	20:34 (10)	05:45				19:30 (3)	06:38		18:42 (1)	07:30		17:32 (2)	07:27	08:17			
	21:44	31 21:05 (9)	21:01	31	20:30 (8)	19:53	14	18:56 (1)	18:40	30	18:02 (2)	16:35	16:01					
9	05:02	20:34 (10)	05:47				19:28 (3)	06:40		18:40 (1)	07:32		17:33 (2)	07:29	08:19			
	21:44	31 21:05 (9)	20:59	34	20:30 (8)	19:50	18	18:58 (1)	18:38	28	18:01 (2)	16:33	16:01					
10	05:03	20:35 (10)	05:48				19:25 (3)	06:41		18:39 (1)	07:34		17:33 (2)	07:31	08:20			
	21:43	30 21:05 (9)	20:57	35	20:27 (8)	19:48	20	18:59 (1)	18:36	27	18:00 (2)	16:32	16:01					
11	05:04	20:35 (10)	05:50				19:24 (3)	06:43		18:37 (1)	07:35		17:34 (2)	07:33	08:21			
	21:42	31 21:06 (5)	20:55	35	20:26 (8)	19:45	22	18:59 (1)	18:33	25	17:59 (2)	16:30	16:00					
12	05:05	20:36 (10)	05:52				19:23 (3)	06:45		18:36 (1)	07:37		17:35 (2)	07:35	08:22			
	21:41	30 21:06 (5)	20:53	32	20:23 (8)	19:43	24	19:00 (1)	18:31	23	17:58 (2)	16:28	16:00					
13	05:06	20:36 (10)	05:53				19:22 (3)	06:47		18:35 (1)	07:39		17:37 (2)	07:37	08:23			
	21:40	30 21:06 (5)	20:51	28	19:50 (3)	19:41	25	19:00 (1)	18:29	19	17:56 (2)	16:27	16:00					
14	05:07	20:37 (10)	05:55				19:21 (3)	06:48		18:34 (1)	07:41		17:38 (2)	07:39	08:24			
	21:39	29 21:06 (5)	20:49	30	19:51 (3)	19:38	25	18:59 (1)	18:26	15	17:53 (2)	16:25	16:00					
15	05:09	20:38 (10)	05:57				19:20 (3)	06:50		18:34 (1)	07:43		17:41 (2)	07:41	08:25			
	21:38	27 21:05 (5)	20:47	31	19:51 (3)	19:36	25	18:59 (1)	18:24	8	17:49 (2)	16:24	16:00					
16	05:10	20:38 (10)	05:58				19:20 (3)	06:52		18:34 (1)	07:44		07:42	08:26				
	21:37	25 21:03 (5)	20:45	31	19:51 (3)	19:33	25	18:59 (1)	18:22			16:22	16:00					
17	05:11	20:39 (10)	06:00				19:18 (3)	06:53		18:33 (1)	07:46		07:44	08:27				
	21:36	23 21:02 (5)	20:43	33	19:51 (3)	19:31	25	18:58 (1)	18:20			16:21	16:00					
18	05:12	20:39 (6)	06:02				19:18 (3)	06:55		18:34 (1)	07:48		07:46	08:27				
	21:35	23 21:02 (5)	20:41	33	19:51 (3)	19:28	23	18:57 (1)	18:17			16:19	16:01					
19	05:14	20:39 (6)	06:04				19:18 (3)	06:57		18:34 (1)	07:50		07:48	08:28				
	21:34	22 21:01 (5)	20:39	34	19:52 (3)	19:26	22	18:56 (1)	18:15			16:18	16:01					
20	05:15	20:38 (6)	06:05				19:17 (3)	06:59		18:34 (1)	07:52		07:50	08:29				
	21:32	21 20:59 (5)	20:36	34	19:51 (3)	19:24	20	18:54 (1)	18:13			16:17	16:01					
21	05:17	20:39 (6)	06:07				19:18 (3)	07:00		18:35 (1)	07:54		07:51	08:29				
	21:31	20 20:59 (5)	20:34	33	19:51 (3)	19:21	18	18:53 (1)	18:11			16:15	16:02					
22	05:18	20:39 (6)	06:09				19:18 (3)	07:02		18:37 (1)	07:55		07:53	08:30				
	21:30	17 20:57 (5)	20:32	33	19:51 (3)	19:19	14	18:51 (1)	18:09			16:14	16:02					
23	05:19	20:39 (6)	06:10				19:17 (3)	07:04		18:41 (1)	07:57		07:55	08:31				
	21:28	16 20:55 (6)	20:30	32	19:49 (3)	19:16	6	18:47 (1)	18:06			16:13	16:03					
24	05:21	20:39 (6)	06:12				19:18 (3)	07:05		07:59			07:56	08:31				
	21:27	16 20:55 (6)	20:28	31	19:49 (3)	19:14		18:04				16:12	16:03					
25	05:22	20:39 (6)	06:14				19:18 (3)	07:07		07:01			07:58	08:31				
	21:25	14 20:53 (6)	20:25	30	19:48 (3)	19:11		17:02				16:11	16:04					
26	05:24	20:39 (6)	06:16				19:19 (3)	07:09		17:47 (2)	07:03		08:00	08:32				
	21:24	12 20:51 (6)	20:23	28	19:47 (3)	19:09	10	17:57 (2)	17:00			16:10	16:05					
27	05:25	20:40 (6)	06:17				19:20 (3)	07:11		17:43 (2)	07:05		08:01	08:32				
	21:22	11 20:51 (6)	20:21	28	19:48 (4)	19:07	17	18:00 (2)	16:58			16:09	16:05					
28	05:27	20:18 (8)	06:19				19:20 (3)	07:12		17:40 (2)	07:07		08:03	08:32				
	21:21	15 20:49 (6)	20:18	27	19:47 (4)	19:04	21	18:01 (2)	16:56			16:08	16:06					
29	05:29	20:17 (8)	06:21				19:22 (3)	07:14		17:39 (2)	07:09		08:05	08:32				
	21:19	17 20:48 (6)	20:16	24	19:46 (4)	19:02	23	18:02 (2)	16:54			16:07	16:07					
30	05:30	20:15 (8)	06:22				19:24 (3)	07:16		17:37 (2)	07:10		08:06	08:32				
	21:17	15 20:46 (6)	20:14	22	19:46 (4)	18:59	26	18:03 (2)	16:52			16:06	16:08					
31	05:32	20:15 (8)	06:24				19:24 (4)			07:12			08:32					
	21:16	15 20:30 (8)	20:11	19	19:43 (4)			16:50					16:09					
	Sonnenscheinstunden	508	458			382		465		330		262	237					
	astr.max.mögl.Beschattung	748		860		465		385										
	Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29										
	Reduktion Betriebsdauer	0.96		0.96		0.96		0.96										
	Reduktion Windrichtung	0.63		0.68		0.72		0.72										
	Gesamte Reduktion	0.23		0.28		0.24		0.20										
	Met.wahrsch.Beschattung	172		237		112		78										

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AO - IO41

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:07	06:54	18:48 (1) 05:46	19:18 (3) 04:58	20:35 (6)	
	16:10	17:00	17:54	19:51	25 19:13 (1) 20:45	32 19:50 (3) 21:33	25 21:00 (5)	
2	08:32	08:02	07:05	17:13 (2) 06:52	18:49 (1) 05:44	19:20 (3) 04:57	20:36 (6)	
	16:11	17:02	17:56	11 17:24 (2) 19:53	24 19:13 (1) 20:47	30 19:50 (3) 21:35	24 21:00 (5)	
3	08:32	08:00	07:03	17:10 (2) 06:49	18:48 (1) 05:42	19:20 (3) 04:57	20:37 (10)	
	16:12	17:04	17:58	17 17:27 (2) 19:55	24 19:12 (1) 20:49	35 20:19 (8) 21:36	24 21:01 (5)	
4	08:32	07:58	07:00	17:07 (2) 06:47	18:49 (1) 05:40	19:20 (3) 04:56	20:36 (10)	
	16:14	17:06	18:00	21 17:28 (2) 19:57	22 19:11 (1) 20:50	38 20:21 (8) 21:37	25 21:01 (5)	
5	08:31	07:57	06:58	17:06 (2) 06:44	18:50 (1) 05:38	19:21 (3) 04:55	20:37 (10)	
	16:15	17:08	18:02	24 17:30 (2) 19:58	20 19:10 (1) 20:52	39 20:22 (8) 21:38	25 21:02 (5)	
6	08:31	07:55	06:56	17:05 (2) 06:42	18:51 (1) 05:36	19:22 (3) 04:54	20:36 (10)	
	16:16	17:10	18:04	26 17:31 (2) 20:00	17 19:08 (1) 20:54	40 20:24 (8) 21:39	26 21:02 (9)	
7	08:31	07:53	06:54	17:03 (2) 06:40	18:53 (1) 05:35	19:24 (3) 04:54	20:35 (10)	
	16:18	17:12	18:06	28 17:31 (2) 20:02	12 19:05 (1) 20:56	38 20:25 (8) 21:40	27 21:02 (9)	
8	08:30	07:51	06:51	17:03 (2) 06:37	18:57 (1) 05:33	19:25 (3) 04:53	20:35 (10)	
	16:19	17:14	18:08	29 17:32 (2) 20:04	4 19:01 (1) 20:57	35 20:25 (8) 21:41	28 21:03 (9)	
9	08:30	07:49	06:49	17:03 (2) 06:35	05:31	19:27 (3) 04:53	20:36 (10)	
	16:20	17:16	18:09	30 17:33 (2) 20:06	20:59	32 20:25 (8) 21:42	27 21:03 (9)	
10	08:29	07:47	06:47	17:01 (2) 06:33	05:29	19:29 (3) 04:52	20:35 (10)	
	16:22	17:18	18:11	31 17:32 (2) 20:07	21:01	26 20:25 (8) 21:43	28 21:03 (9)	
11	08:28	07:45	06:44	17:02 (2) 06:30	19:37 (4) 05:27	20:07 (8) 04:52	20:35 (10)	
	16:23	17:20	18:13	30 17:32 (2) 20:09	5 19:42 (4) 21:02	18 20:25 (8) 21:43	29 21:04 (9)	
12	08:28	07:43	06:42	17:01 (2) 06:28	19:33 (4) 05:26	20:07 (8) 04:51	20:36 (10)	
	16:25	17:22	18:15	31 17:32 (2) 20:11	10 19:43 (4) 21:04	18 20:25 (8) 21:44	28 21:04 (9)	
13	08:27	07:42	06:39	17:01 (2) 06:26	19:31 (4) 05:24	20:08 (8) 04:51	20:35 (10)	
	16:26	17:24	18:17	31 17:32 (2) 20:13	14 19:45 (4) 21:06	17 20:25 (8) 21:45	29 21:04 (9)	
14	08:26	07:40	06:37	17:02 (2) 06:23	19:30 (4) 05:22	20:08 (8) 04:51	20:35 (10)	
	16:28	17:26	18:19	29 17:31 (2) 20:15	17 19:47 (4) 21:07	16 20:24 (8) 21:45	29 21:04 (9)	
15	08:25	07:38	06:35	17:01 (2) 06:21	19:29 (4) 05:21	20:09 (8) 04:51	20:35 (10)	
	16:29	17:28	18:21	29 17:30 (2) 20:16	20 19:49 (4) 21:09	15 20:24 (8) 21:46	30 21:05 (9)	
16	08:24	07:35	06:32	17:02 (2) 06:19	19:28 (4) 05:19	20:09 (8) 04:50	20:35 (10)	
	16:31	17:29	18:22	27 17:29 (2) 20:18	22 19:50 (4) 21:11	16 20:39 (6) 21:47	30 21:05 (9)	
17	08:23	07:33	06:30	17:03 (2) 06:16	19:27 (3) 05:17	20:10 (8) 04:50	20:36 (10)	
	16:33	17:31	18:24	24 17:27 (2) 20:20	22 19:49 (4) 21:12	18 20:41 (6) 21:47	29 21:05 (9)	
18	08:22	07:31	06:28	17:04 (2) 06:14	19:25 (3) 05:16	20:11 (8) 04:50	20:36 (10)	
	16:34	17:33	18:26	22 17:26 (2) 20:22	24 19:49 (4) 21:14	17 20:42 (6) 21:47	29 21:05 (9)	
19	08:21	07:29	06:25	17:05 (2) 06:12	19:24 (3) 05:14	20:14 (8) 04:50	20:36 (10)	
	16:36	17:35	18:28	19 17:24 (2) 20:24	25 19:49 (3) 21:15	14 20:43 (6) 21:48	30 21:06 (9)	
20	08:20	07:27	06:23	17:08 (2) 06:10	19:23 (3) 05:13	20:33 (6) 04:50	20:36 (10)	
	16:38	17:37	18:30	13 17:21 (2) 20:25	27 19:50 (3) 21:17	12 20:45 (6) 21:48	30 21:06 (9)	
21	08:19	07:25	06:20	06:08	19:22 (3) 05:11	20:32 (6) 04:50	20:37 (10)	
	16:40	17:39	18:31	20:27	29 19:51 (3) 21:18	14 20:46 (6) 21:48	30 21:07 (9)	
22	08:18	07:23	06:18	06:05	19:21 (3) 05:10	20:32 (6) 04:51	20:37 (10)	
	16:42	17:41	18:33	20:29	31 19:52 (3) 21:20	15 20:47 (6) 21:49	30 21:07 (9)	
23	08:16	07:21	06:16	18:00 (1) 06:03	19:19 (3) 05:09	20:32 (6) 04:51	20:37 (10)	
	16:43	17:43	18:35	8 18:08 (1) 20:31	32 19:51 (3) 21:21	16 20:48 (6) 21:49	30 21:07 (9)	
24	08:15	07:18	06:13	17:56 (1) 06:01	19:19 (3) 05:07	20:33 (6) 04:51	20:37 (10)	
	16:45	17:45	18:37	14 18:10 (1) 20:33	32 19:51 (3) 21:23	17 20:50 (5) 21:49	29 21:06 (9)	
25	08:14	07:16	06:11	17:54 (1) 05:59	19:19 (3) 05:06	20:33 (6) 04:52	20:38 (10)	
	16:47	17:47	18:39	18 18:12 (1) 20:34	32 19:51 (3) 21:24	19 20:52 (5) 21:49	29 21:07 (9)	
26	08:12	07:14	06:08	17:52 (1) 05:57	19:18 (3) 05:05	20:33 (6) 04:52	20:38 (10)	
	16:49	17:49	18:40	21 18:13 (1) 20:36	33 19:51 (3) 21:26	20 20:53 (5) 21:49	29 21:07 (9)	
27	08:11	07:12	06:06	17:51 (1) 05:55	19:18 (3) 05:04	20:33 (6) 04:52	20:38 (10)	
	16:50	17:51	18:42	23 18:14 (1) 20:38	33 19:51 (3) 21:27	21 20:54 (5) 21:49	30 21:08 (9)	
28	08:10	07:10	06:03	17:50 (1) 05:52	19:18 (3) 05:02	20:34 (6) 04:53	20:38 (10)	
	16:53	17:53	18:44	24 18:14 (1) 20:40	33 19:51 (3) 21:28	22 20:56 (5) 21:49	29 21:07 (9)	
29	08:08	07:01	06:00	18:49 (1) 05:50	19:18 (3) 05:01	20:34 (6) 04:53	20:39 (10)	
	16:54	17:46	18:42	25 19:14 (1) 20:41	33 19:51 (3) 21:30	23 20:57 (5) 21:49	29 21:08 (9)	
30	08:06	06:59	06:00	18:49 (1) 05:48	19:18 (3) 05:00	20:34 (6) 04:54	20:39 (10)	
	16:56	17:48	18:44	25 19:14 (1) 20:43	32 19:50 (3) 21:31	24 20:58 (5) 21:48	28 21:07 (9)	
31	08:05	06:56	06:00	18:48 (1)	04:59	20:35 (6)		
	16:58	17:49	18:44	25 19:13 (1)	21:32	24 20:59 (5)		
Sonnenscheinstunden	253	275	367	418	491	506		
astr.max.mögl.Beschattung			655	654	721	845		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.72	0.68	0.65	0.62		
Gesamte Reduktion			0.19	0.25	0.27	0.23		
Met.wahrsch.Beschattung			126	161	194	196		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AO - IO41

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:55	20:39 (10)	05:33		20:17 (8)	06:26	19:36 (4)	07:18	17:41 (2)	07:14	08:08			
	21:48	29	21:08 (9)	21:14	18	20:35 (8)	20:09	5	19:41 (4)	18:57	30	18:11 (2)	16:48	16:05
2	04:55	20:40 (10)	05:35		20:18 (8)	06:28		07:19		17:39 (2)	07:16	08:09		
	21:48	28	21:08 (9)	21:12	18	20:36 (8)	20:07		18:55	31	18:10 (2)	16:46	16:04	
3	04:56	20:40 (10)	05:37		19:38 (3)	06:29		07:21		17:39 (2)	07:18	08:11		
	21:47	28	21:08 (9)	21:11	29	20:35 (8)	20:04		18:52	31	18:10 (2)	16:44	16:04	
4	04:57	20:41 (10)	05:38		19:36 (3)	06:31		18:54 (1)	07:23		17:39 (2)	07:20	08:12	
	21:47	27	21:08 (9)	21:09	34	20:35 (8)	20:02	4	18:58 (1)	18:50	31	18:10 (2)	16:42	16:03
5	04:58	20:41 (10)	05:40		19:34 (3)	06:33		18:49 (1)	07:25		17:40 (2)	07:22	08:14	
	21:46	27	21:08 (9)	21:07	36	20:34 (8)	20:00	12	19:01 (1)	18:47	29	18:09 (2)	16:40	16:03
6	04:59	20:42 (10)	05:42		19:33 (3)	06:35		18:47 (1)	07:26		17:40 (2)	07:24	08:15	
	21:46	26	21:08 (9)	21:05	38	20:34 (8)	19:57	17	19:04 (1)	18:45	29	18:09 (2)	16:39	16:02
7	05:00	20:43 (10)	05:43		19:31 (3)	06:36		18:45 (1)	07:28		17:40 (2)	07:26	08:16	
	21:45	25	21:08 (5)	21:03	38	20:32 (8)	19:55	20	19:05 (1)	18:43	27	18:07 (2)	16:37	16:02
8	05:01	20:43 (10)	05:45		19:30 (3)	06:38		18:43 (1)	07:30		17:40 (2)	07:27	08:17	
	21:44	25	21:08 (5)	21:01	39	20:31 (8)	19:53	22	19:05 (1)	18:40	26	18:06 (2)	16:35	16:01
9	05:02	20:44 (10)	05:47		19:30 (3)	06:40		18:42 (1)	07:32		17:42 (2)	07:29	08:19	
	21:44	24	21:08 (5)	20:59	37	20:30 (8)	19:50	24	19:06 (1)	18:38	22	18:04 (2)	16:33	16:01
10	05:03	20:44 (6)	05:48		19:28 (3)	06:41		18:42 (1)	07:34		17:43 (2)	07:31	08:20	
	21:43	25	21:09 (5)	20:57	34	20:27 (8)	19:48	24	19:06 (1)	18:36	20	18:03 (2)	16:32	16:01
11	05:04	20:44 (6)	05:50		19:28 (3)	06:43		18:40 (1)	07:35		17:45 (2)	07:33	08:21	
	21:42	24	21:08 (5)	20:55	30	19:58 (3)	19:45	26	19:06 (1)	18:33	15	18:00 (2)	16:30	16:00
12	05:05	20:43 (6)	05:52		19:27 (3)	06:45		18:40 (1)	07:37		17:49 (2)	07:35	08:22	
	21:41	25	21:08 (5)	20:53	31	19:58 (3)	19:43	26	19:06 (1)	18:31	7	17:56 (2)	16:28	16:00
13	05:06	20:43 (6)	05:53		19:27 (3)	06:47		18:40 (1)	07:39		17:47 (2)	07:37	08:23	
	21:40	24	21:07 (5)	20:51	32	19:59 (3)	19:41	26	19:06 (1)	18:29		16:27	16:00	
14	05:07	20:43 (6)	05:55		19:27 (3)	06:48		18:39 (1)	07:41		17:49 (2)	07:39	08:24	
	21:39	23	21:06 (5)	20:49	32	19:59 (3)	19:38	25	19:04 (1)	18:26		16:25	16:00	
15	05:09	20:42 (6)	05:57		19:26 (3)	06:50		18:40 (1)	07:43		17:41 (2)	07:41	08:25	
	21:38	23	21:05 (5)	20:47	33	19:59 (3)	19:36	24	19:04 (1)	18:24		16:24	16:00	
16	05:10	20:42 (6)	05:58		19:26 (3)	06:52		18:40 (1)	07:44		17:42 (2)	07:42	08:26	
	21:37	21	21:03 (5)	20:45	33	19:59 (3)	19:33	23	19:03 (1)	18:22		16:22	16:00	
17	05:11	20:42 (6)	06:00		19:25 (3)	06:53		18:40 (1)	07:46		17:44 (2)	07:44	08:27	
	21:36	20	21:02 (5)	20:43	33	19:58 (3)	19:31	21	19:01 (1)	18:20		16:21	16:00	
18	05:12	20:42 (6)	06:02		19:25 (3)	06:55		18:41 (1)	07:48		17:46 (2)	07:46	08:27	
	21:35	20	21:02 (5)	20:41	33	19:58 (3)	19:28	19	19:00 (1)	18:17		16:19	16:01	
19	05:14	20:42 (6)	06:04		19:26 (3)	06:57		18:43 (1)	07:50		17:48 (2)	07:48	08:28	
	21:34	19	21:01 (5)	20:39	32	19:58 (3)	19:26	15	18:58 (1)	18:15		16:18	16:01	
20	05:15	20:42 (6)	06:05		19:25 (3)	06:59		18:45 (1)	07:52		17:50 (2)	07:50	08:29	
	21:32	16	20:58 (6)	20:36	32	19:57 (3)	19:24	9	18:54 (1)	18:13		16:17	16:01	
	05:17	20:43 (6)	06:07		19:26 (3)	07:00		18:41 (1)	07:54		17:51 (2)	07:51	08:29	
21	05:18	20:43 (6)	06:09		19:26 (3)	07:02		18:41 (1)	07:56		17:53 (2)	07:53	08:30	
	21:30	14	20:57 (6)	20:32	29	19:56 (3)	19:19		18:09		16:14	16:02		
23	05:19	20:43 (6)	06:10		19:27 (3)	07:04		17:53 (2)	07:57		17:55 (2)	07:55	08:31	
	21:28	13	20:56 (6)	20:30	27	19:54 (3)	19:16	12	18:05 (2)	18:06		16:13	16:03	
24	05:21	20:44 (6)	06:12		19:28 (3)	07:05		17:49 (2)	07:59		17:56 (2)	07:56	08:31	
	21:27	11	20:55 (6)	20:28	25	19:53 (3)	19:14	18	18:07 (2)	18:04		16:12	16:03	
25	05:22	20:23 (8)	06:14		19:28 (3)	07:07		17:47 (2)	07:01		17:58 (2)	07:58	08:31	
	21:25	16	20:53 (6)	20:25	24	19:52 (4)	19:11	21	18:08 (2)	17:02		16:11	16:04	
26	05:24	20:21 (8)	06:16		19:29 (4)	07:09		17:46 (2)	07:03		18:00 (2)	08:00	08:32	
	21:24	16	20:51 (6)	20:23	23	19:52 (4)	19:09	24	18:10 (2)	17:00		16:10	16:05	
27	05:25	20:20 (8)	06:17		19:30 (4)	07:11		17:44 (2)	07:05		18:01 (2)	08:01	08:32	
	21:22	18	20:51 (6)	20:21	22	19:52 (4)	19:07	27	18:11 (2)	16:58		16:09	16:05	
28	05:27	20:19 (8)	06:19		19:30 (4)	07:12		17:42 (2)	07:07		18:03 (2)	08:03	08:32	
	21:21	15	20:49 (6)	20:18	20	19:50 (4)	19:04	28	18:10 (2)	16:56		16:08	16:06	
29	05:29	20:19 (8)	06:21		19:31 (4)	07:14		17:42 (2)	07:09		18:05 (2)	08:05	08:32	
	21:19	16	20:35 (8)	20:16	17	19:48 (4)	19:02	29	18:11 (2)	16:54		16:07	16:07	
30	05:30	20:18 (8)	06:22		19:32 (4)	07:16		17:41 (2)	07:10		18:06 (2)	08:06	08:32	
	21:17	17	20:35 (8)	20:14	14	19:46 (4)	18:59	30	18:11 (2)	16:52		16:06	16:08	
31	05:32	20:18 (8)	06:24		19:33 (4)				07:12				08:32	
	21:16	18	20:36 (8)	20:11	10	19:43 (4)			16:50				16:09	
	Sonnenscheinstunden	508	458		382				330		262		237	
	astr.max.mögl.Beschattung	649		883		531			298					
	Red.Sonnenscheinwahrsch.	0.38		0.42		0.35			0.29					
	Reduktion Betriebsdauer	0.96		0.96		0.96			0.96					
	Reduktion Windrichtung	0.63		0.67		0.72			0.72					
	Gesamte Reduktion	0.23		0.27		0.24			0.20					
	Met.wahrsch.Beschattung	149		242		128			60					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AP - IO42

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:07	06:54	18:55 (1) 05:46	19:25 (3) 04:58	20:37 (6)		
	16:10	17:00	17:54	19:51	25 19:20 (1) 20:45	32 19:57 (3) 21:33	21 20:58 (9)		
2	08:32	08:02	07:05	06:52	18:55 (1) 05:44	19:26 (3) 04:57	20:38 (6)		
	16:11	17:02	17:56	19:53	25 19:20 (1) 20:47	32 19:58 (3) 21:35	22 21:00 (9)		
3	08:32	08:00	07:03	06:49	18:54 (1) 05:42	19:26 (3) 04:57	20:39 (6)		
	16:12	17:04	17:58	19:55	25 19:19 (1) 20:49	32 19:58 (3) 21:36	23 21:02 (9)		
4	08:32	07:58	07:00	06:47	18:54 (1) 05:40	19:26 (3) 04:56	20:39 (6)		
	16:14	17:06	18:00	19:57	25 19:19 (1) 20:50	31 19:57 (3) 21:37	23 21:02 (9)		
5	08:31	07:57	06:58	06:44	18:55 (1) 05:38	19:26 (3) 04:55	20:40 (6)		
	16:15	17:08	18:02	19:58	24 19:19 (1) 20:52	35 20:22 (8) 21:38	24 21:04 (9)		
6	08:31	07:55	06:56	17:21 (2) 06:42	18:54 (1) 05:36	19:27 (3) 04:54	20:41 (6)		
	16:16	17:10	18:04	12 17:33 (2) 20:00	23 19:17 (1) 20:54	37 20:24 (8) 21:39	23 21:04 (9)		
7	08:31	07:53	06:54	17:18 (2) 06:40	18:55 (1) 05:35	19:28 (3) 04:54	20:41 (6)		
	16:18	17:12	18:06	17 17:35 (2) 20:02	21 19:16 (1) 20:56	40 20:26 (8) 21:40	23 21:04 (9)		
8	08:30	07:51	06:51	17:16 (2) 06:37	18:56 (1) 05:33	19:28 (3) 04:53	20:42 (6)		
	16:19	17:14	18:08	21 17:37 (2) 20:04	19 19:15 (1) 20:57	40 20:27 (8) 21:41	23 21:05 (9)		
9	08:30	07:49	06:49	17:15 (2) 06:35	18:57 (1) 05:31	19:29 (3) 04:53	20:44 (10)		
	16:20	17:16	18:09	24 17:39 (2) 20:06	16 19:13 (1) 20:59	40 20:28 (8) 21:42	22 21:06 (9)		
10	08:29	07:47	06:47	17:13 (2) 06:33	18:59 (1) 05:29	19:30 (3) 04:52	20:43 (10)		
	16:22	17:18	18:11	26 17:39 (2) 20:07	12 19:11 (1) 21:01	39 20:28 (8) 21:43	23 21:06 (9)		
11	08:28	07:45	06:44	17:12 (2) 06:30	19:32 (3) 05:27	19:32 (3) 04:52	20:43 (10)		
	16:23	17:20	18:13	28 17:40 (2) 20:09	21:02	37 20:29 (8) 21:43	23 21:06 (9)		
12	08:28	07:43	06:42	17:11 (2) 06:28	05:26	19:33 (3) 04:51	20:43 (10)		
	16:25	17:22	18:15	29 17:40 (2) 20:11	21:04	34 20:29 (8) 21:44	24 21:07 (9)		
13	08:27	07:42	06:39	17:10 (2) 06:26	05:24	19:36 (3) 04:51	20:42 (10)		
	16:26	17:24	18:17	30 17:40 (2) 20:13	21:06	30 20:29 (8) 21:45	25 21:07 (9)		
14	08:26	07:40	06:37	17:10 (2) 06:23	19:39 (4) 05:22	19:39 (3) 04:51	20:43 (10)		
	16:28	17:26	18:19	31 17:41 (2) 20:15	8 19:47 (4) 21:07	22 20:29 (8) 21:45	24 21:07 (9)		
15	08:25	07:38	06:35	17:09 (2) 06:21	19:37 (4) 05:21	20:12 (8) 04:51	20:43 (10)		
	16:29	17:28	18:21	31 17:40 (2) 20:16	12 19:49 (4) 21:09	17 20:29 (8) 21:46	24 21:07 (9)		
16	08:24	07:35	06:32	17:09 (2) 06:19	19:34 (4) 05:19	20:12 (8) 04:50	20:43 (10)		
	16:31	17:29	18:22	31 17:40 (2) 20:18	16 19:50 (4) 21:11	16 20:28 (8) 21:47	25 21:08 (9)		
17	08:23	07:33	06:30	17:09 (2) 06:16	19:33 (4) 05:17	20:13 (8) 04:50	20:43 (10)		
	16:33	17:31	18:24	30 17:39 (2) 20:20	19 19:52 (4) 21:12	15 20:28 (8) 21:47	25 21:08 (9)		
18	08:22	07:31	06:28	17:09 (2) 06:14	19:33 (4) 05:16	20:13 (8) 04:50	20:43 (10)		
	16:34	17:33	18:26	29 17:38 (2) 20:22	21 19:54 (4) 21:14	17 20:42 (6) 21:47	25 21:08 (9)		
19	08:21	07:29	06:25	17:09 (2) 06:12	19:32 (4) 05:14	20:14 (8) 04:50	20:43 (10)		
	16:36	17:35	18:28	28 17:37 (2) 20:24	22 19:54 (4) 21:15	17 20:43 (6) 21:48	26 21:09 (9)		
20	08:20	07:27	06:23	17:10 (2) 06:10	19:32 (4) 05:13	20:16 (8) 04:50	20:43 (10)		
	16:38	17:37	18:30	26 17:36 (2) 20:25	22 19:54 (4) 21:17	16 20:45 (6) 21:48	26 21:09 (9)		
21	08:19	07:25	06:20	17:11 (2) 06:08	19:32 (4) 05:11	20:17 (8) 04:51	20:44 (10)		
	16:40	17:39	18:31	24 17:35 (2) 20:27	22 19:54 (3) 21:18	16 20:46 (6) 21:48	26 21:10 (9)		
22	08:18	07:23	06:18	17:12 (2) 06:05	19:32 (3) 05:10	20:36 (6) 04:51	20:44 (10)		
	16:42	17:41	18:33	21 17:33 (2) 20:29	24 19:56 (3) 21:20	11 20:47 (6) 21:49	26 21:10 (9)		
23	08:16	07:21	06:16	17:14 (2) 06:03	19:30 (3) 05:09	20:36 (6) 04:51	20:44 (10)		
	16:43	17:43	18:35	17 17:31 (2) 20:31	26 19:56 (3) 21:21	13 20:49 (6) 21:49	26 21:10 (9)		
24	08:15	07:18	06:13	17:16 (2) 06:01	19:29 (3) 05:07	20:36 (6) 04:51	20:44 (10)		
	16:45	17:45	18:37	11 17:27 (2) 20:33	27 19:56 (3) 21:23	14 20:50 (6) 21:49	25 21:09 (9)		
25	08:14	07:16	06:11	05:59	19:28 (3) 05:06	20:36 (6) 04:52	20:45 (10)		
	16:47	17:47	18:39	20:34	29 19:57 (3) 21:24	16 20:52 (6) 21:49	25 21:10 (9)		
26	08:12	07:14	06:08	18:05 (1) 05:57	19:27 (3) 05:05	20:36 (6) 04:52	20:45 (10)		
	16:49	17:49	18:40	8 18:13 (1) 20:36	30 19:57 (3) 21:26	16 20:52 (6) 21:49	25 21:10 (9)		
27	08:11	07:12	06:06	18:02 (1) 05:55	19:27 (3) 05:04	20:36 (6) 04:52	20:46 (10)		
	16:51	17:51	18:42	14 18:16 (1) 20:38	31 19:58 (3) 21:27	16 20:52 (6) 21:49	25 21:11 (9)		
28	08:10	07:10	06:03	18:00 (1) 05:52	19:26 (3) 05:02	20:36 (6) 04:53	20:46 (10)		
	16:53	17:53	18:44	18 18:18 (1) 20:40	32 19:58 (3) 21:28	16 20:52 (6) 21:49	24 21:10 (9)		
29	08:08	07:01	06:00	18:58 (1) 05:50	19:26 (3) 05:01	20:37 (6) 04:53	20:46 (10)		
	16:54	17:54	18:46	20 19:18 (1) 20:41	32 19:58 (3) 21:30	15 20:52 (6) 21:49	25 21:11 (9)		
30	08:06	06:59	06:00	18:57 (1) 05:48	19:25 (3) 05:00	20:37 (6) 04:54	20:46 (10)		
	16:56	17:56	18:48	22 19:19 (1) 20:43	33 19:58 (3) 21:31	15 20:52 (6) 21:48	24 21:10 (9)		
31	08:05	06:56	06:00	18:55 (1)	04:59	20:37 (6)			
	16:58	17:58	18:50	24 19:19 (1)	21:32	15 20:52 (6)			
Sonnenscheinstunden	253	275	367	418	491	506			
astr.max.mögl.Beschattung			572	621	742	725			
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39			
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96			
Reduktion Windrichtung			0.71	0.68	0.65	0.62			
Gesamte Reduktion			0.19	0.25	0.27	0.23			
Met.wahrsch.Beschattung			109	152	200	167			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AP - IO42

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	20:47 (10)	05:33	19:43 (3)	06:26		07:18	17:50 (2)	07:14	08:08		
	21:48	24 21:11 (9)	21:14	35 20:39 (8)	20:09		18:57	30 18:20 (2)	16:48	16:05		
2	04:55	20:48 (10)	05:35	19:42 (3)	06:28		18:58 (1)	07:19	17:50 (2)	07:16	08:09	
	21:48	23 21:11 (9)	21:12	37 20:39 (8)	20:07	12	19:10 (1)	18:55	28 18:18 (2)	16:46	16:04	
3	04:56	20:48 (10)	05:37	19:40 (3)	06:29		18:55 (1)	07:21	17:50 (2)	07:18	08:11	
	21:47	22 21:10 (9)	21:10	40 20:39 (8)	20:04	16	19:11 (1)	18:52	27 18:17 (2)	16:44	16:04	
4	04:57	20:48 (6)	05:38	40 19:39 (3)	06:31		18:53 (1)	07:23	17:51 (2)	07:20	08:12	
	21:47	22 21:10 (9)	21:09	40 20:38 (8)	20:02	19	19:12 (1)	18:50	25 18:16 (2)	16:42	16:03	
5	04:58	20:48 (6)	05:40	39 19:38 (3)	06:33		18:51 (1)	07:25	17:52 (2)	07:22	08:14	
	21:46	22 21:10 (9)	21:07	39 20:36 (8)	20:00	21	19:12 (1)	18:47	23 18:15 (2)	16:40	16:03	
6	04:59	20:47 (6)	05:42	39 19:37 (3)	06:35		18:50 (1)	07:26	17:54 (2)	07:24	08:15	
	21:46	23 21:10 (9)	21:05	39 20:35 (8)	19:57	23	19:13 (1)	18:45	19 18:13 (2)	16:39	16:02	
7	05:00	20:47 (6)	05:43	36 19:36 (3)	06:36		18:50 (1)	07:28	17:55 (2)	07:26	08:16	
	21:45	23 21:10 (9)	21:03	36 20:32 (8)	19:55	24	19:14 (1)	18:43	15 18:10 (2)	16:37	16:02	
8	05:01	20:47 (6)	05:45	33 19:36 (3)	06:38		18:48 (1)	07:30	15 17:59 (2)	07:27	08:17	
	21:44	23 21:10 (9)	21:01	33 20:31 (8)	19:53	25	19:13 (1)	18:40	6 18:05 (2)	16:35	16:01	
9	05:02	20:46 (6)	05:47	31 19:36 (3)	06:40		18:48 (1)	07:32		07:29	08:19	
	21:44	23 21:09 (9)	20:59	31 20:07 (3)	19:50	25	19:13 (1)	18:38		16:33	16:01	
10	05:03	20:46 (6)	05:48	31 19:35 (3)	06:41		18:48 (1)	07:34		07:31	08:20	
	21:43	23 21:09 (9)	20:57	31 20:06 (3)	19:48	25	19:13 (1)	18:36		16:32	16:01	
11	05:04	20:46 (6)	05:50	31 19:35 (3)	06:43		18:47 (1)	07:35		07:33	08:21	
	21:42	21 21:07 (9)	20:55	32 20:07 (3)	19:45	25	19:12 (1)	18:33		16:30	16:00	
12	05:05	20:46 (6)	05:52	32 19:34 (3)	06:45		18:48 (1)	07:37		07:35	08:22	
	21:41	17 21:05 (9)	20:53	32 20:06 (3)	19:43	24	19:12 (1)	18:31		16:28	16:00	
13	05:06	20:45 (6)	05:53	31 19:34 (3)	06:47		18:48 (1)	07:39		07:37	08:23	
	21:40	15 21:00 (6)	20:51	32 20:06 (3)	19:41	23	19:11 (1)	18:29		16:27	16:00	
14	05:07	20:45 (6)	05:55	31 19:34 (3)	06:48		18:48 (1)	07:41		07:39	08:24	
	21:39	15 21:00 (6)	20:49	32 20:06 (3)	19:38	21	19:09 (1)	18:26		16:25	16:00	
15	05:09	20:45 (6)	05:57	31 19:34 (3)	06:50		18:49 (1)	07:43		07:40	08:25	
	21:38	15 21:00 (6)	20:47	31 20:05 (3)	19:36	19	19:08 (1)	18:24		16:24	16:00	
16	05:10	20:45 (6)	05:58	31 19:34 (3)	06:52		18:51 (1)	07:44		07:42	08:26	
	21:37	16 21:01 (6)	20:45	31 20:05 (3)	19:33	15	19:06 (1)	18:22		16:22	16:00	
17	05:11	20:45 (6)	06:00	31 19:34 (3)	06:53		18:53 (1)	07:46		07:44	08:27	
	21:36	15 21:00 (6)	20:43	30 20:04 (3)	19:31	9	19:02 (1)	18:20		16:21	16:00	
18	05:12	20:46 (6)	06:02	29 19:35 (3)	06:55			07:48		07:46	08:27	
	21:35	15 21:01 (6)	20:41	29 20:04 (3)	19:28			18:17		16:19	16:01	
19	05:14	20:46 (6)	06:04	28 19:35 (3)	06:57		18:05 (2)	07:50		07:48	08:28	
	21:34	15 21:01 (6)	20:39	28 20:03 (3)	19:26	9	18:14 (2)	18:15		16:18	16:01	
20	05:15	20:46 (6)	06:05	27 19:36 (3)	06:59		18:00 (2)	07:52		07:50	08:29	
	21:32	13 20:59 (6)	20:36	25 20:01 (3)	19:24	16	18:16 (2)	18:13		16:17	16:01	
21	05:17	20:47 (6)	06:07	24 19:36 (4)	07:00		17:58 (2)	07:54		07:51	08:29	
	21:31	12 20:59 (6)	20:34	24 20:00 (3)	19:21	20	18:18 (2)	18:11		16:15	16:02	
22	05:18	20:29 (8)	06:09	23 19:36 (4)	07:02		17:56 (2)	07:55		07:53	08:30	
	21:30	13 20:57 (6)	20:32	23 19:59 (3)	19:19	24	18:20 (2)	18:09		16:14	16:02	
23	05:19	20:26 (8)	06:10	23 19:35 (4)	07:04		17:55 (2)	07:57		07:55	08:31	
	21:28	17 20:56 (6)	20:30	23 19:58 (4)	19:16	26	18:21 (2)	18:06		16:13	16:03	
24	05:21	20:25 (8)	06:12	22 19:36 (4)	07:05		17:53 (2)	07:59		07:56	08:31	
	21:27	18 20:55 (6)	20:27	22 19:58 (4)	19:14	27	18:20 (2)	18:04		16:12	16:03	
25	05:22	20:24 (8)	06:14	21 19:35 (4)	07:07		17:52 (2)	07:01		07:58	08:31	
	21:25	17 20:53 (6)	20:25	21 19:56 (4)	19:11	29	18:21 (2)	17:02		16:11	16:04	
26	05:24	20:23 (8)	06:16	20 19:36 (4)	07:09		17:52 (2)	07:03		08:00	08:32	
	21:24	14 20:37 (8)	20:23	19 19:55 (4)	19:09	29	18:21 (2)	17:00		16:10	16:05	
27	05:25	20:23 (8)	06:17	19 19:37 (4)	07:11		17:51 (2)	07:05		08:01	08:32	
	21:22	16 20:39 (8)	20:21	16 19:53 (4)	19:07	31	18:22 (2)	16:58		16:09	16:05	
28	05:27	20:22 (8)	06:19	12 19:38 (4)	07:12		17:50 (2)	07:07		08:03	08:32	
	21:21	17 20:39 (8)	20:18	12 19:50 (4)	19:04	31	18:21 (2)	16:56		16:08	16:06	
29	05:29	20:22 (8)	06:21	8 19:40 (4)	07:14		17:50 (2)	07:09		08:05	08:32	
	21:19	17 20:39 (8)	20:16	8 19:48 (4)	19:02	30	18:20 (2)	16:54		16:07	16:07	
30	05:30	19:47 (3)	06:22		07:16		17:50 (2)	07:10		08:06	08:32	
	21:17	27 20:39 (8)	20:14		18:59	30	18:20 (2)	16:52		16:06	16:08	
31	05:32	19:45 (3)	06:24					07:12			08:32	
	21:16	32 20:40 (8)	20:11					16:50			16:09	
Sonnenscheinstunden	508		458		382		330		262		237	
astr.max.mögl.Beschattung	585		831		628		173					
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96					
Reduktion Windrichtung	0.63		0.66		0.71		0.72					
Gesamte Reduktion	0.23		0.27		0.24		0.20					
Met.wahrsch.Beschattung	134		225		150		35					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AQ - IO43

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:07	06:54	19:03 (1) 05:46	19:34 (3) 04:58			20:41 (6)
	16:10	17:00	17:54	19:51	20	19:23 (1) 20:45	31	20:05 (3) 21:33	16 20:57 (6)
2	08:32	08:02	07:05	06:52	19:02 (1) 05:44	19:34 (3) 04:57			20:41 (6)
	16:11	17:02	17:56	19:53	22	19:24 (1) 20:47	32	20:06 (3) 21:35	16 20:57 (6)
3	08:32	08:00	07:03	06:49	19:00 (1) 05:42	19:34 (3) 04:57			20:42 (6)
	16:12	17:04	17:58	19:55	24	19:24 (1) 20:49	32	20:06 (3) 21:36	15 20:57 (6)
4	08:32	07:58	07:00	06:47	19:00 (1) 05:40	19:33 (3) 04:56			20:42 (6)
	16:14	17:06	18:00	19:57	25	19:25 (1) 20:50	33	20:06 (3) 21:37	15 20:57 (6)
5	08:31	07:57	06:58	06:44	19:00 (1) 05:38	19:33 (3) 04:55			20:43 (6)
	16:15	17:08	18:02	19:58	25	19:25 (1) 20:52	32	20:05 (3) 21:38	15 20:58 (6)
6	08:31	07:55	06:56	06:42	18:59 (1) 05:36	19:33 (3) 04:54			20:43 (6)
	16:16	17:10	18:04	20:00	25	19:24 (1) 20:54	32	20:05 (3) 21:39	14 20:57 (6)
7	08:31	07:53	06:54	06:40	18:59 (1) 05:35	19:33 (3) 04:54			20:43 (6)
	16:18	17:12	18:06	20:02	25	19:24 (1) 20:56	33	20:06 (3) 21:40	14 20:57 (6)
8	08:30	07:51	06:51	06:37	18:59 (1) 05:33	19:33 (3) 04:53			20:44 (6)
	16:19	17:14	18:08	20:04	25	19:24 (1) 20:57	36	20:27 (8) 21:41	13 20:57 (6)
9	08:30	07:49	06:49	17:27 (2) 06:35	18:59 (1) 05:31	19:33 (3) 04:53			20:45 (6)
	16:20	17:16	18:09	11 17:38 (2) 20:06	23	19:22 (1) 20:59	40	20:28 (8) 21:42	17 21:06 (9)
10	08:29	07:47	06:47	17:23 (2) 06:33	18:59 (1) 05:29	19:33 (3) 04:52			20:44 (6)
	16:22	17:18	18:11	17 17:40 (2) 20:07	22	19:21 (1) 21:01	42	20:30 (8) 21:43	20 21:07 (9)
11	08:28	07:45	06:44	17:21 (2) 06:30	19:01 (1) 05:27	19:34 (3) 04:52			20:45 (6)
	16:23	17:20	18:13	21 17:42 (2) 20:09	19	19:20 (1) 21:02	44	20:32 (8) 21:43	20 21:08 (9)
12	08:28	07:43	06:42	17:19 (2) 06:28	19:01 (1) 05:26	19:34 (3) 04:51			20:46 (6)
	16:25	17:22	18:15	24 17:43 (2) 20:11	17	19:18 (1) 21:04	45	20:33 (8) 21:44	21 21:09 (9)
13	08:27	07:42	06:39	17:18 (2) 06:26	19:03 (1) 05:24	19:36 (3) 04:51			20:46 (6)
	16:26	17:24	18:17	26 17:44 (2) 20:13	13	19:16 (1) 21:06	44	20:34 (8) 21:45	22 21:09 (9)
14	08:26	07:40	06:37	17:17 (2) 06:23	19:07 (1) 05:22	19:36 (3) 04:51			20:46 (6)
	16:28	17:26	18:19	28 17:45 (2) 20:15	5	19:12 (1) 21:07	43	20:34 (8) 21:45	23 21:10 (9)
15	08:25	07:38	06:35	17:16 (2) 06:21	19:37 (3) 04:51	19:37 (3) 04:51			20:47 (6)
	16:29	17:28	18:21	29 17:45 (2) 20:16	43	20:35 (8) 21:46	23	21:11 (9)	
16	08:24	07:35	06:32	17:15 (2) 06:19	19:49 (4) 05:19	19:38 (3) 04:50			20:47 (6)
	16:31	17:29	18:22	31 17:46 (2) 20:18	1	19:50 (4) 21:11	40	20:34 (8) 21:47	23 21:11 (9)
17	08:23	07:33	06:30	17:14 (2) 06:16	19:43 (4) 05:17	19:39 (3) 04:50			20:48 (6)
	16:33	17:31	18:24	31 17:45 (2) 20:20	9	19:52 (4) 21:12	38	20:35 (8) 21:47	22 21:11 (9)
18	08:22	07:31	06:28	17:14 (2) 06:14	19:41 (4) 05:16	19:40 (3) 04:50			20:48 (6)
	16:34	17:33	18:26	31 17:45 (2) 20:22	13	19:54 (4) 21:14	36	20:34 (8) 21:47	22 21:12 (9)
19	08:21	07:29	06:25	17:13 (2) 06:12	19:40 (4) 05:14	19:42 (3) 04:50			20:48 (6)
	16:36	17:35	18:28	32 17:45 (2) 20:24	16	19:56 (4) 21:15	31	20:34 (8) 21:48	22 21:12 (9)
20	08:20	07:27	06:23	17:14 (2) 06:10	19:39 (4) 05:13	19:45 (3) 04:50			20:48 (6)
	16:38	17:37	18:30	31 17:45 (2) 20:25	19	19:58 (4) 21:17	25	20:34 (8) 21:48	22 21:12 (9)
21	08:19	07:25	06:20	17:14 (2) 06:08	19:38 (4) 05:11	20:17 (8) 04:51			20:49 (6)
	16:40	17:39	18:31	30 17:44 (2) 20:27	21	19:59 (4) 21:18	17	20:46 (6) 21:48	22 21:13 (9)
22	08:18	07:23	06:18	17:14 (2) 06:05	19:37 (4) 05:10	20:18 (8) 04:51			20:49 (6)
	16:42	17:41	18:33	29 17:43 (2) 20:29	22	19:59 (4) 21:20	18	20:47 (6) 21:49	22 21:13 (9)
23	08:16	07:21	06:16	17:15 (2) 06:03	19:36 (4) 05:09	20:19 (8) 04:51			20:49 (6)
	16:43	17:43	18:35	27 17:42 (2) 20:31	22	19:58 (4) 21:21	19	20:49 (6) 21:49	22 21:13 (9)
24	08:15	07:18	06:13	17:15 (2) 06:01	19:36 (4) 05:07	20:20 (8) 04:51			20:49 (6)
	16:45	17:45	18:37	25 17:40 (2) 20:33	22	19:58 (3) 21:23	20	20:50 (6) 21:49	22 21:13 (9)
25	08:14	07:16	06:11	17:16 (2) 05:59	19:36 (4) 05:06	20:22 (8) 04:52			20:50 (6)
	16:47	17:47	18:39	23 17:39 (2) 20:34	24	20:00 (3) 21:24	19	20:52 (6) 21:49	23 21:14 (9)
26	08:12	07:14	06:08	17:17 (2) 05:57	19:36 (4) 05:05	20:24 (8) 04:52			20:49 (6)
	16:49	17:49	18:40	20 17:37 (2) 20:36	26	20:02 (3) 21:26	16	20:53 (6) 21:49	23 21:13 (9)
27	08:11	07:12	06:06	17:20 (2) 05:55	19:36 (4) 05:04	20:42 (6) 04:52			20:50 (6)
	16:50	17:51	18:42	14 17:34 (2) 20:38	27	20:03 (3) 21:27	12	20:54 (6) 21:49	23 21:14 (9)
28	08:10	07:10	06:03	17:24 (2) 05:52	19:36 (3) 05:02	20:41 (6) 04:53			20:49 (6)
	16:53	17:53	18:44	6 17:30 (2) 20:40	27	20:03 (3) 21:28	15	20:56 (6) 21:49	23 21:13 (9)
29	08:08	07:01	06:50	19:09 (1) 05:50	19:35 (3) 05:01	20:41 (6) 04:53			20:50 (6)
	16:54	19:46	9 19:18 (1) 20:41	29 20:04 (3) 21:30	16 20:57 (6) 21:49	22 21:13 (9)			
30	08:06	06:59	19:07 (1) 05:48	19:34 (3) 05:00	20:41 (6) 04:54	20:49 (6)			
	16:56	19:48	14 19:21 (1) 20:43	30 20:04 (3) 21:31	16 20:57 (6) 21:48	22 21:13 (9)			
31	08:05	06:56	19:04 (1)	04:59	20:41 (6)				
	16:58	19:49	18 19:22 (1)	21:32	16 20:57 (6)				
Sonnenscheinstunden	253	275	367	418	491	506			
astr.max.mögl.Beschattung			527	598	916	599			
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39			
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96			
Reduktion Windrichtung			0.72	0.68	0.65	0.62			
Gesamte Reduktion			0.19	0.25	0.27	0.23			
Met.wahrsch.Beschattung			101	147	246	138			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AQ - IO43

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:55	20:49 (6)	05:33		19:45 (3)	06:26	18:59 (1)	07:18	17:58 (2)	07:14	08:08			
	21:48	22	21:13 (9)	21:14	44	20:43 (8)	20:09	20	19:19 (1)	18:57	25	18:23 (2)	16:48	16:05
2	04:55	20:50 (6)	05:35		19:44 (3)	06:28	18:58 (1)	07:19	17:59 (2)	07:16	08:09			
	21:48	19	21:12 (9)	21:12	44	20:42 (8)	20:07	22	19:20 (1)	18:55	22	18:21 (2)	16:46	16:04
3	04:56	20:49 (6)	05:37		19:43 (3)	06:29	18:57 (1)	07:21	18:00 (2)	07:18	08:11			
	21:47	19	21:11 (9)	21:10	40	20:39 (8)	20:04	23	19:20 (1)	18:52	19	18:19 (2)	16:44	16:04
4	04:57	20:49 (6)	05:38		19:44 (3)	06:31	18:56 (1)	07:23	18:03 (2)	07:20	08:12			
	21:47	14	21:09 (9)	21:09	38	20:38 (8)	20:02	25	19:21 (1)	18:50	14	18:17 (2)	16:42	16:03
5	04:58	20:49 (6)	05:40		19:43 (3)	06:33	18:55 (1)	07:25	18:08 (2)	07:22	08:14			
	21:46	14	21:03 (6)	21:07	34	20:36 (8)	20:00	25	19:20 (1)	18:47	3	18:11 (2)	16:40	16:03
6	04:59	20:49 (6)	05:42		19:43 (3)	06:35	18:55 (1)	07:26		07:24	08:15			
	21:46	15	21:04 (6)	21:05	32	20:15 (3)	19:57	25	19:20 (1)	18:45		16:39	16:02	
7	05:00	20:49 (6)	05:43		19:42 (3)	06:36	18:55 (1)	07:28		07:26	08:16			
	21:45	15	21:04 (6)	21:03	33	20:15 (3)	19:55	25	19:20 (1)	18:43		16:37	16:02	
8	05:01	20:49 (6)	05:45		19:42 (3)	06:38	18:54 (1)	07:30		07:27	08:17			
	21:44	15	21:04 (6)	21:01	33	20:15 (3)	19:53	25	19:19 (1)	18:40		16:35	16:01	
9	05:02	20:50 (6)	05:47		19:43 (3)	06:40	18:54 (1)	07:32		07:29	08:19			
	21:44	15	21:05 (6)	20:59	32	20:15 (3)	19:50	24	19:18 (1)	18:38		16:33	16:01	
10	05:03	20:50 (6)	05:48		19:42 (3)	06:41	18:55 (1)	07:34		07:31	08:20			
	21:43	15	21:05 (6)	20:57	32	20:14 (3)	19:48	23	19:18 (1)	18:36		16:32	16:01	
11	05:04	20:50 (6)	05:50		19:43 (3)	06:43	18:55 (1)	07:35		07:33	08:21			
	21:42	15	21:05 (6)	20:55	31	20:14 (3)	19:45	21	19:16 (1)	18:33		16:30	16:00	
12	05:05	20:50 (6)	05:52		19:42 (3)	06:45	18:56 (1)	07:37		07:35	08:22			
	21:41	15	21:05 (6)	20:53	31	20:13 (3)	19:43	19	19:15 (1)	18:31		16:28	16:00	
13	05:06	20:50 (6)	05:53		19:43 (3)	06:47	18:58 (1)	07:39		07:37	08:23			
	21:40	15	21:05 (6)	20:51	30	20:13 (3)	19:41	15	19:13 (1)	18:29		16:27	16:00	
14	05:07	20:50 (6)	05:55		19:44 (3)	06:48	18:59 (1)	07:41		07:39	08:24			
	21:39	15	21:05 (6)	20:49	28	20:12 (3)	19:38	10	19:09 (1)	18:26		16:25	16:00	
15	05:09	20:50 (6)	05:57		19:44 (3)	06:50	18:16 (2)	07:43		07:40	08:25			
	21:38	15	21:05 (6)	20:47	27	20:11 (3)	19:36	2	18:18 (2)	18:24		16:24	16:00	
16	05:10	20:50 (6)	05:58		19:43 (4)	06:52	18:10 (2)	07:44		07:42	08:26			
	21:37	13	21:03 (6)	20:45	27	20:10 (3)	19:33	13	18:23 (2)	18:22		16:22	16:00	
17	05:11	20:50 (6)	06:00		19:42 (4)	06:53	18:06 (2)	07:46		07:44	08:27			
	21:36	12	21:02 (6)	20:43	26	20:08 (3)	19:31	19	18:25 (2)	18:20		16:21	16:00	
18	05:12	20:32 (8)	06:02		19:42 (4)	06:55	18:04 (2)	07:48		07:46	08:27			
	21:35	18	21:02 (6)	20:41	24	20:06 (3)	19:28	22	18:26 (2)	18:17		16:19	16:01	
19	05:14	20:31 (8)	06:04		19:42 (4)	06:57	18:03 (2)	07:50		07:48	08:28			
	21:34	19	21:01 (6)	20:39	23	20:05 (4)	19:26	25	18:28 (2)	18:15		16:18	16:01	
20	05:15	20:29 (8)	06:05		19:42 (4)	06:59	18:01 (2)	07:52		07:50	08:29			
	21:32	19	20:59 (6)	20:36	22	20:04 (4)	19:24	27	18:28 (2)	18:13		16:17	16:01	
21	05:17	20:29 (8)	06:07		19:42 (4)	07:00	18:00 (2)	07:54		07:51	08:29			
	21:31	19	20:59 (6)	20:34	22	20:04 (4)	19:21	28	19:28 (2)	18:11		16:15	16:02	
22	05:18	20:28 (8)	06:09		19:43 (4)	07:02	17:59 (2)	07:55		07:53	08:30			
	21:30	17	20:57 (6)	20:32	21	20:04 (4)	19:19	30	18:29 (2)	18:09		16:14	16:02	
23	05:19	19:56 (3)	06:10		19:42 (4)	07:04	17:58 (2)	07:57		07:55	08:31			
	21:28	22	20:44 (8)	20:30	19	20:01 (4)	19:16	31	18:29 (2)	18:06		16:13	16:03	
24	05:21	19:54 (3)	06:12		19:43 (4)	07:05	17:57 (2)	07:59		07:56	08:31			
	21:27	29	20:45 (8)	20:27	16	19:59 (4)	19:14	31	18:28 (2)	18:04		16:12	16:03	
25	05:22	19:52 (3)	06:14		19:44 (4)	07:07	17:57 (2)	07:01		07:58	08:31			
	21:25	33	20:45 (8)	20:25	13	19:57 (4)	19:11	31	18:28 (2)	17:02		16:11	16:04	
26	05:24	19:50 (3)	06:16		19:46 (4)	07:09	17:57 (2)	07:03		08:00	08:32			
	21:24	36	20:44 (8)	20:23	9	19:55 (4)	19:09	31	18:28 (2)	17:00		16:10	16:05	
27	05:25	19:49 (3)	06:17			07:11	17:57 (2)	07:05		08:01	08:32			
	21:22	39	20:45 (8)	20:21		19:07	18:28 (2)	16:58		16:09	16:05			
28	05:27	19:48 (3)	06:19			07:12	17:56 (2)	07:07		08:03	08:32			
	21:21	41	20:45 (8)	20:18		19:04	18:26 (2)	16:56		16:08	16:06			
29	05:29	19:47 (3)	06:21		19:07 (1)	07:14	17:57 (2)	07:09		08:05	08:32			
	21:19	43	20:45 (8)	20:16	7	19:14 (1)	19:02	28	18:25 (2)	16:54		16:07	16:07	
30	05:30	19:46 (3)	06:23		19:04 (1)	07:16	17:57 (2)	07:10		08:06	08:32			
	21:17	43	20:44 (8)	20:14	13	19:17 (1)	18:59	28	18:25 (2)	16:52		16:06	16:08	
31	05:32	19:46 (3)	06:24		19:01 (1)			07:12			08:32			
	21:16	44	20:44 (8)	20:11	17	19:18 (1)		16:50			16:09			
Sonnenscheinstunden	508		458			382		330		262	237			
astr.max.mögl.Beschattung	685			768		709			83					
Red.Sonnenscheinwahrsch.	0.38			0.42		0.35			0.29					
Reduktion Betriebsdauer	0.96			0.96		0.96			0.96					
Reduktion Windrichtung	0.64			0.66		0.71			0.72					
Gesamte Reduktion	0.23			0.27		0.24			0.20					
Met.wahrsch.Beschattung	159			207		169			17					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AR - IO44

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:07	06:54	19:09 (1) 05:46	19:38 (3) 04:58	20:42 (6)		
	16:10	17:00	17:54	19:51	16 19:25 (1) 20:45	29 20:07 (3) 21:33	15 20:57 (6)		
2	08:32	08:02	07:05	06:52	19:07 (1) 05:44	19:38 (3) 04:57	20:42 (6)		
	16:11	17:02	17:56	19:53	20 19:27 (1) 20:47	30 20:08 (3) 21:35	15 20:57 (6)		
3	08:32	08:00	07:03	06:49	19:05 (1) 05:42	19:38 (3) 04:57	20:43 (6)		
	16:12	17:04	17:58	19:55	22 19:27 (1) 20:49	30 20:08 (3) 21:36	15 20:58 (6)		
4	08:32	07:58	07:00	06:47	19:04 (1) 05:40	19:37 (3) 04:56	20:43 (6)		
	16:14	17:06	18:00	19:57	23 19:27 (1) 20:50	31 20:08 (3) 21:37	14 20:57 (6)		
5	08:31	07:57	06:58	06:44	19:04 (1) 05:38	19:37 (3) 04:55	20:44 (6)		
	16:15	17:08	18:02	19:58	24 19:28 (1) 20:52	31 20:08 (3) 21:38	14 20:58 (6)		
6	08:31	07:55	06:56	06:42	19:03 (1) 05:36	19:36 (3) 04:54	20:44 (6)		
	16:16	17:10	18:04	20:00	24 19:27 (1) 20:54	32 20:08 (3) 21:39	13 20:57 (6)		
7	08:31	07:53	06:54	06:40	19:03 (1) 05:35	19:37 (3) 04:54	20:44 (6)		
	16:18	17:12	18:06	20:02	24 19:27 (1) 20:56	31 20:08 (3) 21:40	13 20:57 (6)		
8	08:30	07:51	06:51	06:37	19:03 (1) 05:33	19:37 (3) 04:53	20:45 (6)		
	16:19	17:14	18:08	20:04	24 19:27 (1) 20:57	32 20:07 (8) 21:41	17 21:06 (9)		
9	08:30	07:49	06:49	06:35	19:02 (1) 05:31	19:37 (3) 04:53	20:45 (6)		
	16:20	17:16	18:09	20:06	24 19:26 (1) 20:59	36 20:28 (8) 21:42	21 21:08 (9)		
10	08:29	07:47	06:47	06:33	19:03 (1) 05:29	19:37 (3) 04:52	20:45 (6)		
	16:22	17:18	18:11	20:07	23 19:26 (1) 21:01	40 20:30 (8) 21:43	21 21:08 (9)		
11	08:28	07:45	06:44	6 17:35 (2) 06:30	19:03 (1) 05:27	19:38 (3) 04:52	20:46 (6)		
	16:23	17:20	18:13	6 17:41 (2) 20:09	22 19:25 (1) 21:02	41 20:32 (8) 21:43	21 21:09 (9)		
12	08:28	07:43	06:42	17:30 (2) 06:28	19:03 (1) 05:26	19:38 (3) 04:51	20:47 (6)		
	16:25	17:22	18:15	14 17:44 (2) 20:11	20 19:23 (1) 21:04	42 20:33 (8) 21:44	21 21:10 (9)		
13	08:27	07:42	06:39	17:28 (2) 06:26	19:05 (1) 05:24	19:39 (3) 04:51	20:46 (6)		
	16:26	17:24	18:17	19 17:47 (2) 20:13	17 19:22 (1) 21:06	43 20:35 (8) 21:45	22 21:09 (9)		
14	08:26	07:40	06:37	17:26 (2) 06:23	19:07 (1) 05:22	19:39 (3) 04:51	20:47 (6)		
	16:28	17:26	18:19	23 17:49 (2) 20:15	13 19:20 (1) 21:07	43 20:35 (8) 21:45	22 21:10 (9)		
15	08:25	07:38	06:35	17:24 (2) 06:21	19:10 (1) 05:21	19:40 (3) 04:51	20:48 (6)		
	16:29	17:28	18:21	25 17:49 (2) 20:16	7 19:17 (1) 21:09	42 20:36 (8) 21:46	22 21:11 (9)		
16	08:24	07:35	06:32	17:23 (2) 06:19	19:08 (1) 05:19	19:41 (3) 04:50	20:48 (6)		
	16:31	17:29	18:22	27 17:50 (2) 20:18	21:11	39 20:35 (8) 21:47	22 21:11 (9)		
17	08:23	07:33	06:30	17:22 (2) 06:16	19:49 (4) 05:17	19:42 (3) 04:50	20:49 (6)		
	16:33	17:31	18:24	28 17:50 (2) 20:20	3 19:52 (4) 21:12	38 20:36 (8) 21:47	22 21:12 (9)		
18	08:22	07:31	06:28	17:21 (2) 06:14	19:45 (4) 05:16	19:43 (3) 04:50	20:49 (6)		
	16:34	17:33	18:26	30 17:51 (2) 20:22	9 19:54 (4) 21:14	35 20:35 (8) 21:47	22 21:12 (9)		
19	08:21	07:29	06:25	17:20 (2) 06:12	19:43 (4) 05:14	19:45 (3) 04:50	20:49 (6)		
	16:36	17:35	18:28	30 17:50 (2) 20:24	13 19:56 (4) 21:15	32 20:35 (8) 21:48	23 21:13 (9)		
20	08:20	07:27	06:23	17:20 (2) 06:10	19:42 (4) 05:13	19:47 (3) 04:50	20:50 (6)		
	16:38	17:37	18:30	30 17:50 (2) 20:25	16 19:58 (4) 21:17	27 20:35 (8) 21:48	22 21:13 (9)		
21	08:19	07:25	06:20	17:20 (2) 06:08	19:41 (4) 05:11	19:51 (3) 04:51	20:51 (6)		
	16:40	17:39	18:31	31 17:51 (2) 20:27	18 19:59 (4) 21:18	17 20:34 (8) 21:48	22 21:14 (9)		
22	08:18	07:23	06:18	17:20 (2) 06:05	19:40 (4) 05:10	20:20 (8) 04:51	20:51 (6)		
	16:42	17:41	18:33	29 17:49 (2) 20:29	21 20:01 (4) 21:20	17 20:47 (6) 21:49	22 21:14 (9)		
23	08:16	07:21	06:16	17:20 (2) 06:03	19:39 (4) 05:09	20:21 (8) 04:51	20:50 (6)		
	16:43	17:43	18:35	29 17:49 (2) 20:31	21 20:00 (4) 21:21	18 20:49 (6) 21:49	23 21:14 (9)		
24	08:15	07:18	06:13	17:20 (2) 06:01	19:38 (4) 05:07	20:22 (8) 04:51	20:50 (6)		
	16:45	17:45	18:37	28 17:48 (2) 20:33	22 20:00 (4) 21:23	17 20:50 (6) 21:49	22 21:13 (9)		
25	08:14	07:16	06:11	17:21 (2) 05:59	19:38 (4) 05:06	20:23 (8) 04:52	20:51 (6)		
	16:47	17:47	18:39	26 17:47 (2) 20:34	23 20:01 (3) 21:24	17 20:52 (6) 21:49	22 21:14 (9)		
26	08:12	07:14	06:08	17:21 (2) 05:57	19:38 (4) 05:05	20:25 (8) 04:52	20:50 (6)		
	16:49	17:49	18:40	24 17:45 (2) 20:36	25 20:03 (3) 21:26	16 20:53 (6) 21:49	23 21:14 (9)		
27	08:11	07:12	06:06	17:22 (2) 05:55	19:38 (4) 05:04	20:42 (6) 04:52	20:51 (6)		
	16:40	17:39	18:31	22 17:44 (2) 20:38	26 20:04 (3) 21:27	12 20:54 (6) 21:49	22 21:14 (9)		
28	08:10	07:10	06:03	17:24 (2) 05:52	19:38 (4) 05:02	20:42 (6) 04:53	20:50 (6)		
	16:53	17:53	18:44	19 17:43 (2) 20:40	27 20:05 (3) 21:28	14 20:56 (6) 21:49	23 21:14 (9)		
29	08:08	07:01	06:00	18:25 (2) 05:50	19:39 (4) 05:01	20:42 (6) 04:53	20:51 (6)		
	16:54	19:46	14 18:39 (2) 20:41	27 20:06 (3) 21:30	15 20:57 (6) 21:49	22 21:14 (9)			
30	08:06	06:59	18:31 (2) 05:48	19:39 (3) 05:00	20:42 (6) 04:54	20:50 (6)			
	16:56	19:48	5 19:19 (1) 20:43	28 20:07 (3) 21:31	15 20:57 (6) 21:48	21 21:13 (9)			
31	08:05	06:56	19:11 (1)	04:59	20:42 (6)				
	16:58	19:49	12 19:23 (1)	21:32	15 20:57 (6)				
Sonnenscheinstunden	253	275	367	418	491	506			
astr.max.mögl.Beschattung			471	582	877	599			
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39			
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96			
Reduktion Windrichtung			0.72	0.68	0.65	0.62			
Gesamte Reduktion			0.19	0.25	0.27	0.23			
Met.wahrsch.Beschattung			90	143	235	137			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AR - IO44

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:55	20:50 (6)	05:33	19:48 (3)	06:26	19:02 (1)	07:18	18:09 (2)	07:14	08:08				
	21:48	21	21:13 (9)	21:14	42	20:43 (8)	20:09	22	19:24 (1)	18:57	16	18:25 (2)	16:48	16:05
2	04:55	20:51 (6)	05:35	19:48 (3)	06:28	19:02 (1)	07:19	18:11 (2)	07:16	08:09				
	21:48	20	21:13 (9)	21:12	40	20:42 (8)	20:07	23	19:25 (1)	18:55	10	18:21 (2)	16:46	16:04
3	04:56	20:50 (6)	05:37	19:47 (3)	06:29	19:00 (1)	07:21	18:11 (2)	07:18	08:11				
	21:47	20	21:12 (9)	21:10	38	20:39 (8)	20:04	24	19:24 (1)	18:52		16:44	16:04	
4	04:57	20:50 (6)	05:38	19:47 (3)	06:31	19:00 (1)	07:23	18:11 (2)	07:20	08:12				
	21:47	19	21:12 (9)	21:09	36	20:38 (8)	20:02	24	19:24 (1)	18:50		16:42	16:03	
5	04:58	20:50 (6)	05:40	19:46 (3)	06:33	18:59 (1)	07:25	18:11 (2)	07:22	08:14				
	21:46	15	21:10 (9)	21:07	31	20:17 (3)	20:00	25	19:24 (1)	18:47		16:40	16:03	
6	04:59	20:50 (6)	05:42	19:47 (3)	06:35	18:59 (1)	07:26	18:11 (2)	07:24	08:15				
	21:46	14	21:04 (6)	21:05	31	20:18 (3)	19:57	24	19:23 (1)	18:45		16:39	16:02	
7	05:00	20:50 (6)	05:43	19:46 (3)	06:36	18:59 (1)	07:28	18:11 (2)	07:26	08:16				
	21:45	14	21:04 (6)	21:03	31	20:17 (3)	19:55	24	19:23 (1)	18:43		16:37	16:02	
8	05:01	20:50 (6)	05:45	19:46 (3)	06:38	18:59 (1)	07:30	18:11 (2)	07:27	08:17				
	21:44	15	21:05 (6)	21:01	31	20:17 (3)	19:53	23	19:22 (1)	18:40		16:35	16:01	
9	05:02	20:50 (6)	05:47	19:47 (3)	06:40	18:59 (1)	07:32	18:11 (2)	07:29	08:19				
	21:44	15	21:05 (6)	20:59	31	20:18 (3)	19:50	22	19:21 (1)	18:38		16:33	16:01	
10	05:03	20:50 (6)	05:48	19:46 (3)	06:41	19:00 (1)	07:34	18:11 (2)	07:31	08:20				
	21:43	15	21:05 (6)	20:57	31	20:17 (3)	19:48	20	19:20 (1)	18:36		16:32	16:01	
11	05:04	20:50 (6)	05:50	19:47 (3)	06:43	19:01 (1)	07:35	18:11 (2)	07:33	08:21				
	21:42	16	21:06 (6)	20:55	29	20:16 (3)	19:45	16	19:17 (1)	18:33		16:30	16:00	
12	05:05	20:50 (6)	05:52	19:47 (3)	06:45	19:03 (1)	07:37	18:11 (2)	07:35	08:22				
	21:41	16	21:06 (6)	20:53	28	20:15 (3)	19:43	12	19:15 (1)	18:31		16:28	16:00	
13	05:06	20:50 (6)	05:53	19:47 (3)	06:47	19:06 (1)	07:39	18:11 (2)	07:37	08:23				
	21:40	16	21:06 (6)	20:51	28	20:15 (3)	19:41	6	19:12 (1)	18:29		16:27	16:00	
14	05:07	20:50 (6)	05:55	19:47 (4)	06:48	18:16 (2)	07:41	18:11 (2)	07:39	08:24				
	21:39	16	21:06 (6)	20:49	27	20:14 (3)	19:38	13	18:29 (2)	18:26		16:25	16:00	
15	05:09	20:50 (6)	05:57	19:46 (4)	06:50	18:14 (2)	07:43	18:11 (2)	07:40	08:25				
	21:38	15	21:05 (6)	20:47	27	20:13 (3)	19:36	18	18:32 (2)	18:24		16:24	16:00	
16	05:10	20:51 (6)	05:58	19:46 (4)	06:52	18:12 (2)	07:44	18:11 (2)	07:42	08:26				
	21:37	12	21:03 (6)	20:45	26	20:12 (3)	19:33	21	18:33 (2)	18:22		16:22	16:00	
17	05:11	20:51 (6)	06:00	19:45 (4)	06:53	18:09 (2)	07:46	18:11 (2)	07:44	08:27				
	21:36	11	21:02 (6)	20:43	24	20:09 (3)	19:31	25	18:34 (2)	18:20		16:21	16:00	
18	05:12	20:34 (8)	06:02	19:45 (4)	06:55	18:08 (2)	07:48	18:11 (2)	07:46	08:27				
	21:35	16	21:02 (6)	20:41	22	20:07 (3)	19:28	26	18:34 (2)	18:17		16:19	16:01	
19	05:14	20:32 (8)	06:04	19:45 (4)	06:57	18:07 (2)	07:50	18:11 (2)	07:48	08:28				
	21:34	18	21:01 (6)	20:39	22	20:07 (4)	19:26	28	18:35 (2)	18:15		16:18	16:01	
20	05:15	20:31 (8)	06:05	19:44 (4)	06:59	18:06 (2)	07:52	18:11 (2)	07:50	08:29				
	21:32	17	20:59 (6)	20:36	22	20:06 (4)	19:24	29	18:35 (2)	18:13		16:17	16:01	
21	05:17	20:31 (8)	06:07	19:45 (4)	07:00	18:05 (2)	07:54	18:11 (2)	07:51	08:29				
	21:31	18	20:59 (6)	20:34	21	20:06 (4)	19:21	30	18:35 (2)	18:11		16:15	16:02	
22	05:18	20:30 (8)	06:09	19:46 (4)	07:02	18:05 (2)	07:55	18:11 (2)	07:53	08:30				
	21:30	16	20:57 (6)	20:32	18	20:04 (4)	19:19	30	18:35 (2)	18:09		16:14	16:02	
23	05:19	19:59 (3)	06:10	19:46 (4)	07:04	18:05 (2)	07:57	18:11 (2)	07:55	08:31				
	21:28	22	20:44 (8)	20:30	15	20:01 (4)	19:16	30	18:35 (2)	18:06		16:13	16:03	
24	05:21	19:57 (3)	06:12	19:47 (4)	07:05	18:04 (2)	07:59	18:11 (2)	07:56	08:31				
	21:27	29	20:46 (8)	20:27	12	19:59 (4)	19:14	30	18:34 (2)	18:04		16:12	16:03	
25	05:22	19:55 (3)	06:14	19:48 (4)	07:07	18:04 (2)	07:01	18:11 (2)	07:58	08:31				
	21:25	32	20:45 (8)	20:25	9	19:57 (4)	19:11	29	18:33 (2)	17:02		16:11	16:04	
26	05:24	19:53 (3)	06:16	19:53 (4)	07:09	18:04 (2)	07:03	18:11 (2)	08:00	08:32				
	21:24	36	20:45 (8)	20:23	2	19:55 (4)	19:09	29	18:33 (2)	17:00		16:10	16:05	
27	05:25	19:52 (3)	06:17	19:55 (4)	07:11	18:05 (2)	07:05	18:11 (2)	08:01	08:32				
	21:22	39	20:46 (8)	20:21		19:07		27	18:32 (2)	16:58		16:09	16:05	
28	05:27	19:51 (3)	06:19	19:10 (1)	07:12	18:04 (2)	07:07	18:11 (2)	08:03	08:32				
	21:21	40	20:45 (8)	20:18	8	19:18 (1)	19:04	26	18:30 (2)	16:56		16:08	16:06	
29	05:29	19:50 (3)	06:21	19:07 (1)	07:14	18:05 (2)	07:09	18:11 (2)	08:05	08:32				
	21:19	42	20:46 (8)	20:16	14	19:21 (1)	19:02	24	18:29 (2)	16:54		16:07	16:07	
30	05:30	19:49 (3)	06:22	19:06 (1)	07:16	18:07 (2)	07:10	18:11 (2)	08:06	08:32				
	21:17	43	20:45 (8)	20:14	17	19:23 (1)	18:59	20	18:27 (2)	16:52		16:06	16:08	
31	05:32	19:49 (3)	06:24	19:03 (1)						08:32				
	21:16	43	20:45 (8)	20:11	20	19:23 (1)				16:09				
	Sonnenscheinstunden	508		458		382		330		262		237		
	astr.max.mögl.Beschattung	681		733		700		26						
	Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29						
	Reduktion Betriebsdauer	0.96		0.96		0.96		0.96						
	Reduktion Windrichtung	0.64		0.66		0.71		0.72						
	Gesamte Reduktion	0.23		0.27		0.24		0.20						
	Met.wahrsch.Beschattung	158		197		167		5						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AS - IO45

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:07	06:54	19:01 (1)	05:46	19:30 (3)	04:58	20:38 (6)
	16:10	17:00	17:54	19:51	22	19:23 (1)	20:45	30	20:00 (3) 21:33
2	08:32	08:02	07:05	06:52	19:01 (1)	05:44	19:31 (3)	04:57	20:39 (6)
	16:11	17:02	17:56	19:53	23	19:24 (1)	20:47	30	20:01 (3) 21:35
3	08:32	08:00	07:03	06:49	19:00 (1)	05:42	19:31 (3)	04:57	20:40 (6)
	16:12	17:04	17:58	19:55	23	19:23 (1)	20:49	29	20:00 (3) 21:36
4	08:32	07:58	07:00	06:47	19:00 (1)	05:40	19:31 (3)	04:56	20:40 (6)
	16:14	17:06	18:00	19:57	24	19:24 (1)	20:50	29	20:00 (3) 21:37
5	08:31	07:57	06:58	06:44	19:00 (1)	05:38	19:31 (3)	04:55	20:42 (6)
	16:15	17:08	18:02	19:58	23	19:23 (1)	20:52	32	20:22 (8) 21:38
6	08:31	07:55	06:56	06:42	18:59 (1)	05:36	19:31 (3)	04:54	20:42 (10)
	16:16	17:10	18:04	20:00	23	19:22 (1)	20:54	35	20:24 (8) 21:39
7	08:31	07:53	06:54	06:40	19:00 (1)	05:35	19:33 (3)	04:54	20:41 (10)
	16:18	17:12	18:06	20:02	22	19:22 (1)	20:56	36	20:26 (8) 21:40
8	08:30	07:51	06:51	06:37	19:00 (1)	05:33	19:33 (3)	04:53	20:42 (10)
	16:19	17:14	18:08	20:04	21	19:21 (1)	20:57	37	20:27 (8) 21:41
9	08:30	07:49	06:49	06:35	19:00 (1)	05:31	19:34 (3)	04:53	20:42 (10)
	16:20	17:16	18:09	8 17:31 (2)	19	19:19 (1)	20:59	37	20:28 (8) 21:42
10	08:29	07:47	06:47	17:27 (2)	06:33	19:02 (1)	05:29	19:35 (3)	04:52
	16:22	17:18	18:11	15 17:42 (2)	20:07	16	19:18 (1)	21:01	36
11	08:28	07:45	06:44	17:25 (2)	06:30	19:04 (1)	05:27	19:37 (3)	04:52
	16:23	17:20	18:13	19 17:44 (2)	20:09	12	19:16 (1)	21:02	34
12	08:28	07:43	06:42	17:22 (2)	06:28	19:07 (1)	05:26	19:38 (3)	04:51
	16:25	17:22	18:15	23 17:45 (2)	20:11	4	19:11 (1)	21:04	30
13	08:27	07:42	06:39	17:21 (2)	06:26	05:24	19:41 (3)	04:51	20:41 (10)
	16:26	17:24	18:17	25 17:46 (2)	20:13	25	20:30 (8)	21:45	25
14	08:26	07:40	06:37	17:20 (2)	06:23	05:22	20:13 (8)	04:51	20:41 (10)
	16:28	17:26	18:19	26 17:46 (2)	20:15	16	20:29 (8)	21:45	26
15	08:25	07:38	06:35	17:19 (2)	06:21	19:42 (4)	05:21	20:13 (8)	04:51
	16:29	17:28	18:21	28 17:47 (2)	20:16	7	19:49 (4)	21:09	16
16	08:24	07:35	06:32	17:19 (2)	06:19	19:39 (4)	05:19	20:13 (8)	04:50
	16:31	17:29	18:22	28 17:47 (2)	20:18	11	19:50 (4)	21:11	15
17	08:23	07:33	06:30	17:18 (2)	06:16	19:37 (4)	05:17	20:14 (8)	04:50
	16:33	17:31	18:24	29 17:47 (2)	20:20	15	19:52 (4)	21:12	14
18	08:22	07:31	06:28	17:18 (2)	06:14	19:36 (4)	05:16	20:15 (8)	04:50
	16:34	17:33	18:26	29 17:47 (2)	20:22	18	19:54 (4)	21:14	16
19	08:21	07:29	06:25	17:17 (2)	06:12	19:36 (4)	05:14	20:16 (8)	04:50
	16:36	17:35	18:28	29 17:46 (2)	20:24	20	19:56 (4)	21:15	15
20	08:20	07:27	06:23	17:18 (2)	06:10	19:35 (4)	05:13	20:18 (8)	04:50
	16:38	17:37	18:30	28 17:46 (2)	20:25	21	19:56 (4)	21:17	15
21	08:19	07:25	06:20	17:18 (2)	06:08	19:35 (4)	05:11	20:36 (6)	04:50
	16:40	17:39	18:31	27 17:45 (2)	20:27	21	19:56 (3)	21:18	10
22	08:18	07:23	06:18	17:18 (2)	06:05	19:35 (4)	05:10	20:36 (6)	04:51
	16:42	17:41	18:33	26 17:44 (2)	20:29	23	19:58 (3)	21:20	11
23	08:16	07:21	06:16	17:19 (2)	06:03	19:34 (4)	05:09	20:36 (6)	04:51
	16:43	17:43	18:35	24 17:43 (2)	20:31	24	19:58 (3)	21:21	13
24	08:15	07:18	06:13	17:20 (2)	06:01	19:34 (3)	05:07	20:36 (6)	04:51
	16:45	17:45	18:37	21 17:41 (2)	20:33	25	19:59 (3)	21:23	14
25	08:14	07:16	06:11	17:22 (2)	05:59	19:33 (3)	05:06	20:36 (6)	04:52
	16:47	17:47	18:39	17 17:39 (2)	20:34	27	20:00 (3)	21:24	15
26	08:12	07:14	06:08	17:23 (2)	05:57	19:32 (3)	05:05	20:36 (6)	04:52
	16:49	17:49	18:40	13 17:36 (2)	20:36	28	20:00 (3)	21:26	15
27	08:11	07:12	06:06	06:55	05:55	19:31 (3)	05:04	20:37 (6)	04:52
	16:51	17:51	18:42	20:38	29	20:00 (3)	21:27	14	20:51 (6)
28	08:10	07:10	06:03	18:10 (1)	05:52	19:31 (3)	05:02	20:37 (6)	04:53
	16:53	17:53	18:44	8 18:18 (1)	20:40	29	20:00 (3)	21:28	14
29	08:08	07:01	06:50	19:06 (1)	05:50	19:31 (3)	05:01	20:37 (6)	04:53
	16:54	19:46	13 19:19 (1)	20:41	30	20:01 (3)	21:30	14	20:51 (6)
30	08:06	06:59	19:04 (1)	05:48	19:30 (3)	05:00	20:37 (6)	04:54	20:45 (10)
	16:56	19:48	18 19:22 (1)	20:43	30	20:00 (3)	21:31	21	20:58 (9)
31	08:05	06:56	19:02 (1)	05:47	04:59	20:38 (6)	21:32	21	20:59 (9)
	16:58	19:49	20 19:22 (1)	05:47	04:59	21:32	21	20:59 (9)	
Sonnenscheinstunden	253	275	367	418	491	506	740		
astr.max.mögl.Beschattung			474	590	689	740			
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39			
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96			
Reduktion Windrichtung			0.72	0.68	0.65	0.62			
Gesamte Reduktion			0.19	0.24	0.27	0.23			
Met.wahrsch.Beschattung			90	144	185	170			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AS - IO45

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	20:45 (10)	05:33	19:48 (3)	06:26	19:03 (1)	07:18	18:02 (2)	07:14	08:08		
	21:48	25 21:10 (9)	21:14	32 20:40 (8)	20:09	12 19:15 (1)	18:57	23 18:25 (2)	16:48	16:05		
2	04:55	20:46 (10)	05:35	19:46 (3)	06:28	19:01 (1)	07:19	18:02 (2)	07:16	08:09		
	21:48	25 21:11 (9)	21:12	36 20:40 (8)	20:07	16 19:17 (1)	18:55	21 18:23 (2)	16:46	16:04		
3	04:56	20:46 (10)	05:37	19:45 (3)	06:29	18:58 (1)	07:21	18:04 (2)	07:18	08:11		
	21:47	24 21:10 (9)	21:10	36 20:39 (8)	20:04	19 19:17 (1)	18:52	17 18:21 (2)	16:44	16:04		
4	04:57	20:47 (10)	05:38	19:44 (3)	06:31	18:57 (1)	07:23	18:06 (2)	07:20	08:12		
	21:47	23 21:10 (9)	21:09	37 20:38 (8)	20:02	21 19:18 (1)	18:50	12 18:18 (2)	16:42	16:03		
5	04:58	20:47 (10)	05:40	19:42 (3)	06:33	18:56 (1)	07:25	18:07 (2)	07:22	08:14		
	21:46	23 21:10 (9)	21:07	37 20:36 (8)	20:00	22 19:18 (1)	18:47	16:40	16:03			
6	04:59	20:48 (10)	05:42	19:42 (3)	06:35	18:55 (1)	07:26	18:07 (2)	07:24	08:15		
	21:46	22 21:10 (9)	21:05	36 20:35 (8)	19:57	23 19:18 (1)	18:45	16:39	16:02			
7	05:00	20:49 (10)	05:43	19:41 (3)	06:36	18:55 (1)	07:28	18:07 (2)	07:26	08:16		
	21:45	21 21:10 (9)	21:03	33 20:32 (8)	19:55	24 19:19 (1)	18:43	16:37	16:02			
8	05:01	20:48 (6)	05:45	19:40 (3)	06:38	18:54 (1)	07:30	18:07 (2)	07:27	08:17		
	21:44	22 21:10 (9)	21:01	32 20:31 (8)	19:53	24 19:18 (1)	18:40	16:35	16:01			
9	05:02	20:48 (6)	05:47	19:40 (3)	06:40	18:54 (1)	07:32	18:07 (2)	07:29	08:19		
	21:44	22 21:10 (9)	20:59	29 20:09 (3)	19:50	24 19:18 (1)	18:38	16:33	16:01			
10	05:03	20:47 (6)	05:48	19:39 (3)	06:41	18:54 (1)	07:34	18:07 (2)	07:31	08:20		
	21:43	22 21:09 (9)	20:57	30 20:09 (3)	19:48	23 19:17 (1)	18:36	16:32	16:01			
11	05:04	20:47 (6)	05:50	19:39 (3)	06:43	18:54 (1)	07:35	18:07 (2)	07:33	08:21		
	21:42	21 21:08 (9)	20:55	30 20:09 (3)	19:45	22 19:16 (1)	18:33	16:30	16:00			
12	05:05	20:46 (6)	05:52	19:39 (3)	06:45	18:54 (1)	07:37	18:07 (2)	07:35	08:22		
	21:41	22 21:08 (9)	20:53	30 20:09 (3)	19:43	21 19:15 (1)	18:31	16:28	16:00			
13	05:06	20:46 (6)	05:53	19:39 (3)	06:47	18:55 (1)	07:39	18:07 (2)	07:37	08:23		
	21:40	21 21:07 (9)	20:51	30 20:09 (3)	19:41	18 19:13 (1)	18:29	16:27	16:00			
14	05:07	20:46 (6)	05:55	19:39 (3)	06:48	18:56 (1)	07:41	18:07 (2)	07:39	08:24		
	21:39	19 21:05 (9)	20:49	30 20:09 (3)	19:38	14 19:10 (1)	18:26	16:25	16:00			
15	05:09	20:45 (6)	05:57	19:39 (3)	06:50	18:58 (1)	07:43	18:07 (2)	07:40	08:25		
	21:38	15 21:00 (6)	20:47	29 20:08 (3)	19:36	10 19:08 (1)	18:24	16:24	16:00			
16	05:10	20:45 (6)	05:58	19:39 (3)	06:52	18:57 (1)	07:44	18:07 (2)	07:42	08:26		
	21:37	15 21:00 (6)	20:45	29 20:08 (3)	19:33	18:22	16:22	16:00				
17	05:11	20:45 (6)	06:00	19:39 (3)	06:53	18:12 (2)	07:46	18:07 (2)	07:44	08:27		
	21:36	15 21:00 (6)	20:43	27 20:06 (3)	19:31	12 18:24 (2)	18:20	16:21	16:00			
18	05:12	20:46 (6)	06:02	19:40 (3)	06:55	18:09 (2)	07:48	18:07 (2)	07:46	08:27		
	21:35	15 21:01 (6)	20:41	26 20:06 (3)	19:28	17 18:26 (2)	18:17	16:19	16:01			
19	05:14	20:46 (6)	06:04	19:41 (3)	06:57	18:08 (2)	07:50	18:07 (2)	07:48	08:28		
	21:34	15 21:01 (6)	20:39	24 20:05 (3)	19:26	20 18:28 (2)	18:15	16:18	16:01			
20	05:15	20:46 (6)	06:05	19:39 (4)	06:59	18:05 (2)	07:52	18:07 (2)	07:50	08:29		
	21:32	13 20:59 (6)	20:36	24 20:03 (3)	19:24	23 18:28 (2)	18:13	16:17	16:01			
21	05:17	20:46 (6)	06:07	19:39 (4)	07:00	18:04 (2)	07:54	18:07 (2)	07:51	08:29		
	21:31	13 20:59 (6)	20:34	23 20:02 (3)	19:21	25 18:29 (2)	18:11	16:15	16:02			
22	05:18	20:47 (6)	06:09	19:40 (4)	07:02	18:03 (2)	07:55	18:07 (2)	07:53	08:30		
	21:30	10 20:57 (6)	20:32	21 20:01 (4)	19:19	27 18:30 (2)	18:09	16:14	16:02			
23	05:19	20:29 (8)	06:10	19:39 (4)	07:04	18:02 (2)	07:57	18:07 (2)	07:55	08:31		
	21:28	13 20:56 (6)	20:30	21 20:00 (4)	19:16	28 18:30 (2)	18:06	16:13	16:03			
24	05:21	20:28 (8)	06:12	19:39 (4)	07:05	18:01 (2)	07:59	18:07 (2)	07:56	08:31		
	21:27	15 20:55 (6)	20:27	20 19:59 (4)	19:14	29 18:30 (2)	18:04	16:12	16:03			
25	05:22	20:26 (8)	06:14	19:39 (4)	07:07	18:01 (2)	07:01	18:07 (2)	07:58	08:31		
	21:25	16 20:53 (6)	20:25	18 19:57 (4)	19:11	29 18:30 (2)	17:02	16:11	16:04			
26	05:24	20:25 (8)	06:16	19:40 (4)	07:09	18:01 (2)	07:03	18:07 (2)	08:00	08:32		
	21:24	14 20:51 (6)	20:23	15 19:55 (4)	19:09	29 18:30 (2)	17:00	16:10	16:05			
27	05:25	20:24 (8)	06:17	19:42 (4)	07:11	18:01 (2)	07:05	18:07 (2)	08:01	08:32		
	21:22	15 20:39 (8)	20:21	11 19:53 (4)	19:07	28 18:29 (2)	16:58	16:09	16:05			
28	05:27	20:23 (8)	06:19	19:43 (4)	07:12	18:00 (2)	07:07	18:07 (2)	08:03	08:32		
	21:21	16 20:39 (8)	20:18	7 19:50 (4)	19:04	28 18:28 (2)	16:56	16:08	16:06			
29	05:29	20:24 (8)	06:21		07:14	18:00 (2)	07:09	18:07 (2)	08:05	08:32		
	21:19	16 20:40 (8)	20:16		19:02	27 18:27 (2)	16:54	16:07	16:07			
30	05:30	20:23 (8)	06:22		07:16	18:01 (2)	07:10	18:07 (2)	08:06	08:32		
	21:17	17 20:40 (8)	20:14		18:59	25 18:26 (2)	16:52	16:06	16:08			
31	05:32	19:50 (3)	06:24	19:07 (1)			07:12		08:32			
	21:16	28 20:40 (8)	20:11	4 19:11 (1)			16:50		16:09			
Sonnenscheinstunden	508		458		382		330		262		237	
astr.max.mögl.Beschattung	573		757		640		73					
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96					
Reduktion Windrichtung	0.63		0.66		0.71		0.72					
Gesamte Reduktion	0.23		0.27		0.24		0.20					
Met.wahrsch.Beschattung	131		204		153		15					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AT - IO46

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:07	06:54	19:00 (1) 05:46	19:29 (3) 04:58
	16:10	17:00	17:54	19:51	22 19:22 (1) 20:45	25 20:15 (8) 21:33
2	08:32	08:02	07:05	06:51	19:00 (1) 05:44	19:31 (3) 04:57
	16:11	17:02	17:56	19:53	22 19:22 (1) 20:47	27 20:18 (8) 21:35
3	08:32	08:00	07:03	06:49	18:59 (1) 05:42	19:32 (3) 04:57
	16:12	17:04	17:58	19:55	22 19:21 (1) 20:49	26 20:19 (8) 21:36
4	08:32	07:58	07:00	06:47	19:00 (1) 05:40	19:34 (3) 04:56
	16:14	17:06	18:00	19:57	21 19:21 (1) 20:50	25 20:21 (8) 21:37
5	08:31	07:57	06:58	06:44	19:00 (1) 05:38	19:37 (3) 04:55
	16:15	17:08	18:02	19:58	20 19:20 (1) 20:52	20 20:22 (8) 21:38
6	08:31	07:55	06:56	06:42	19:00 (1) 05:36	20:07 (8) 04:54
	16:16	17:10	18:04	20:00	18 19:18 (1) 20:54	16 20:23 (8) 21:39
7	08:31	07:53	06:54	06:40	19:02 (1) 05:35	20:07 (8) 04:54
	16:18	17:12	18:06	20:02	15 19:17 (1) 20:56	16 20:23 (8) 21:40
8	08:30	07:51	06:51	06:37	19:03 (1) 05:33	20:07 (8) 04:53
	16:19	17:14	18:08	20:04	12 19:15 (1) 20:57	16 20:23 (8) 21:41
9	08:30	07:49	06:49	17:33 (2) 06:35	19:06 (1) 05:31	20:07 (8) 04:53
	16:20	17:16	18:09	9 17:42 (2) 20:06	4 19:10 (1) 20:59	15 20:22 (8) 21:42
10	08:29	07:47	06:47	17:29 (2) 06:33	19:06 (1) 05:29	20:07 (8) 04:52
	16:22	17:18	18:11	15 17:44 (2) 20:07	21:01	14 20:24 (8) 21:43
11	08:28	07:45	06:44	17:28 (2) 06:30	19:05 (1) 05:27	20:08 (8) 04:52
	16:23	17:20	18:13	18 17:46 (2) 20:09	21:02	13 20:21 (8) 21:43
12	08:28	07:43	06:42	17:26 (2) 06:28	5 19:38 (4) 05:26	20:09 (8) 04:51
	16:25	17:22	18:15	21 17:47 (2) 20:11	5 19:43 (4) 21:04	11 20:20 (8) 21:44
13	08:27	07:42	06:39	17:25 (2) 06:26	19:36 (4) 05:24	20:11 (8) 04:51
	16:26	17:24	18:17	23 17:48 (2) 20:13	9 19:45 (4) 21:06	11 20:35 (6) 21:45
14	08:26	07:40	06:37	17:23 (2) 06:23	19:35 (4) 05:22	20:30 (6) 04:51
	16:28	17:26	18:19	25 17:48 (2) 20:15	12 19:47 (4) 21:07	6 20:36 (6) 21:45
15	08:25	07:38	06:35	17:23 (2) 06:21	19:34 (4) 05:20	20:30 (6) 04:51
	16:29	17:28	18:21	25 17:48 (2) 20:16	15 19:49 (4) 21:09	8 20:38 (6) 21:46
16	08:24	07:35	06:32	17:23 (2) 06:19	19:32 (4) 05:19	20:29 (6) 04:50
	16:31	17:29	18:22	26 17:49 (2) 20:18	18 19:50 (4) 21:11	10 20:39 (6) 21:47
17	08:23	07:33	06:30	17:22 (2) 06:16	19:32 (4) 05:17	20:29 (6) 04:50
	16:33	17:31	18:24	26 17:48 (2) 20:20	20 19:52 (4) 21:12	12 20:41 (6) 21:47
18	08:22	07:31	06:28	17:22 (2) 06:14	19:32 (3) 05:16	20:29 (6) 04:50
	16:34	17:33	18:26	26 17:48 (2) 20:22	20 19:52 (3) 21:14	13 20:42 (6) 21:47
19	08:21	07:29	06:25	17:22 (2) 06:12	19:31 (3) 05:14	20:29 (6) 04:50
	16:36	17:35	18:28	25 17:47 (2) 20:24	22 19:53 (3) 21:15	14 20:43 (10) 21:48
20	08:20	07:27	06:23	17:22 (2) 06:10	19:30 (3) 05:13	20:29 (6) 04:50
	16:38	17:37	18:30	24 17:46 (2) 20:25	24 19:54 (3) 21:17	16 20:45 (9) 21:48
21	08:19	07:25	06:20	17:23 (2) 06:08	19:29 (3) 05:11	20:29 (10) 04:50
	16:40	17:39	18:31	23 17:46 (2) 20:27	26 19:55 (3) 21:18	17 20:46 (9) 21:48
22	08:18	07:23	06:18	17:23 (2) 06:05	19:29 (3) 05:10	20:28 (10) 04:51
	16:41	17:41	18:33	21 17:44 (2) 20:29	26 19:55 (3) 21:20	19 20:47 (9) 21:49
23	08:16	07:21	06:15	17:25 (2) 06:03	19:27 (3) 05:09	20:28 (10) 04:51
	16:43	17:43	18:35	18 17:43 (2) 20:31	27 19:54 (3) 21:21	21 20:49 (9) 21:49
24	08:15	07:18	06:13	17:26 (2) 06:01	19:27 (3) 05:07	20:28 (10) 04:51
	16:45	17:45	18:37	13 17:39 (2) 20:33	27 19:54 (3) 21:23	22 20:50 (9) 21:49
25	08:14	07:16	06:11	17:31 (2) 05:59	19:27 (3) 05:06	20:27 (10) 04:52
	16:47	17:47	18:39	4 17:35 (2) 20:34	27 19:54 (3) 21:24	25 20:52 (9) 21:49
26	08:12	07:14	06:08	18:10 (1) 05:57	19:27 (3) 05:05	20:27 (10) 04:52
	16:49	17:49	18:40	4 18:14 (1) 20:36	27 19:54 (3) 21:26	26 20:53 (9) 21:49
27	08:11	07:12	06:06	18:07 (1) 05:55	19:27 (3) 05:04	20:27 (10) 04:52
	16:50	17:51	18:42	9 18:16 (1) 20:38	26 19:53 (3) 21:27	26 20:53 (9) 21:49
28	08:10	07:10	06:03	18:05 (1) 05:52	19:27 (3) 05:02	20:27 (10) 04:53
	16:53	17:53	18:44	13 18:18 (1) 20:40	26 19:53 (3) 21:28	27 20:54 (9) 21:49
29	08:08	07:01	05:50	19:03 (1) 05:50	19:28 (3) 05:01	20:26 (10) 04:53
	16:54	19:46	16 19:19 (1) 20:41	24 19:52 (3) 21:30	28 20:54 (9) 21:49	29 21:14 (7)
30	08:06	06:59	19:02 (1) 05:48	19:28 (3) 05:00	20:26 (10) 04:54	20:32 (10)
	16:56	19:48	20 19:22 (1) 20:43	23 19:51 (3) 21:31	28 20:54 (9) 21:48	28 21:13 (7)
31	08:05	06:56	19:00 (1)	04:59	20:26 (10)	
	16:58	19:49	21 19:21 (1)	21:32	28 20:54 (9)	
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			425	560	581	878
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.68	0.64	0.63
Gesamte Reduktion			0.19	0.25	0.27	0.23
Met.wahrsch.Beschattung			81	137	154	205

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AT - IO46

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:55		20:32 (10)	05:33		20:19 (8)	06:26		07:18		18:05 (2)	07:14	08:08	
	21:48	27	20:59 (9)	21:14	11	20:30 (8)	20:09		18:57	22	18:27 (2)	16:48	16:05	
2	04:55		20:33 (10)	05:35		20:19 (8)	06:28		07:19		18:05 (2)	07:16	08:09	
	21:48	27	21:00 (9)	21:12	13	20:32 (8)	20:07		18:55	20	18:25 (2)	16:46	16:04	
3	04:56		20:32 (10)	05:37		20:17 (8)	06:29		19:04 (1)	07:21		18:07 (2)	07:18	08:11
	21:47	28	21:00 (9)	21:10	15	20:32 (8)	20:04	4	19:08 (1)	18:52	16	18:23 (2)	16:44	16:04
4	04:57		20:32 (10)	05:38		20:17 (8)	06:31		19:01 (1)	07:23		18:09 (2)	07:20	08:12
	21:47	28	21:00 (9)	21:09	16	20:33 (8)	20:02	11	19:12 (1)	18:50	12	18:21 (2)	16:42	16:03
5	04:58		20:33 (10)	05:40		20:16 (8)	06:33		18:58 (1)	07:25			07:22	08:14
	21:46	28	21:01 (9)	21:07	16	20:32 (8)	20:00	15	19:13 (1)	18:47			16:40	16:03
6	04:59		20:33 (10)	05:42		20:17 (8)	06:35		18:56 (1)	07:26			07:24	08:15
	21:46	28	21:01 (9)	21:05	16	20:33 (8)	19:57	18	19:14 (1)	18:45			16:39	16:02
7	05:00		20:33 (10)	05:43		20:16 (8)	06:36		18:55 (1)	07:28			07:26	08:16
	21:45	29	21:02 (9)	21:03	16	20:32 (8)	19:55	20	19:15 (1)	18:43			16:37	16:02
8	05:01		20:34 (10)	05:45		19:45 (3)	06:38		18:54 (1)	07:30			07:27	08:17
	21:44	28	21:02 (9)	21:01	22	20:31 (8)	19:53	21	19:15 (1)	18:40			16:35	16:01
9	05:02		20:34 (10)	05:47		19:42 (3)	06:40		18:53 (1)	07:32			07:29	08:19
	21:44	28	21:02 (9)	20:59	27	20:30 (8)	19:50	22	19:15 (1)	18:38			16:33	16:01
10	05:03		20:34 (10)	05:48		19:40 (3)	06:41		18:53 (1)	07:34			07:31	08:20
	21:43	28	21:02 (9)	20:57	27	20:27 (8)	19:48	22	19:15 (1)	18:36			16:32	16:01
11	05:04		20:34 (10)	05:50		19:39 (3)	06:43		18:52 (1)	07:35			07:33	08:21
	21:42	29	21:03 (9)	20:55	27	20:26 (8)	19:45	22	19:14 (1)	18:33			16:30	16:00
12	05:05		20:34 (10)	05:52		19:37 (3)	06:45		18:52 (1)	07:37			07:35	08:22
	21:41	29	21:03 (9)	20:53	25	20:23 (8)	19:43	22	19:14 (1)	18:31			16:28	16:00
13	05:06		20:35 (10)	05:53		19:36 (3)	06:47		18:53 (1)	07:39			07:37	08:23
	21:40	28	21:03 (9)	20:51	24	20:00 (3)	19:41	20	19:13 (1)	18:29			16:27	16:00
14	05:07		20:35 (10)	05:55		19:36 (3)	06:48		18:53 (1)	07:41			07:39	08:24
	21:39	27	21:02 (9)	20:49	25	20:01 (3)	19:38	17	19:10 (1)	18:26			16:25	16:00
15	05:09		20:35 (10)	05:57		19:35 (3)	06:50		18:54 (1)	07:43			07:40	08:25
	21:38	27	21:02 (9)	20:47	25	20:00 (3)	19:36	14	19:08 (1)	18:24			16:24	16:00
16	05:10		20:35 (10)	05:58		19:34 (3)	06:52		18:55 (1)	07:44			07:42	08:26
	21:37	27	21:02 (9)	20:45	27	20:01 (3)	19:33	11	19:06 (1)	18:22			16:22	16:00
17	05:11		20:35 (10)	06:00		19:33 (3)	06:53		18:57 (1)	07:46			07:44	08:27
	21:36	27	21:02 (9)	20:43	27	20:00 (3)	19:31	6	19:03 (1)	18:20			16:21	16:00
18	05:12		20:37 (10)	06:02		19:33 (3)	06:55			07:48			07:46	08:27
	21:35	25	21:02 (9)	20:41	28	20:01 (3)	19:28			18:17			16:19	16:01
19	05:14		20:37 (10)	06:04		19:34 (3)	06:57		18:15 (2)	07:50			07:48	08:28
	21:34	24	21:01 (9)	20:39	27	20:01 (3)	19:26	11	18:26 (2)	18:15			16:18	16:01
20	05:15		20:37 (10)	06:05		19:33 (3)	06:59		18:11 (2)	07:52			07:50	08:29
	21:32	22	20:59 (9)	20:36	27	20:00 (3)	19:24	17	18:28 (2)	18:13			16:17	16:01
21	05:17		20:39 (10)	06:07		19:33 (3)	07:00		18:09 (2)	07:54			07:51	08:29
	21:31	20	20:59 (9)	20:34	27	20:00 (3)	19:21	20	18:29 (2)	18:11			16:15	16:02
22	05:18		20:39 (10)	06:09		19:34 (3)	07:02		18:08 (2)	07:55			07:53	08:30
	21:30	18	20:57 (9)	20:32	25	19:59 (3)	19:19	22	18:30 (2)	18:09			16:14	16:02
23	05:19		20:39 (10)	06:10		19:34 (3)	07:04		18:07 (2)	07:57			07:55	08:31
	21:28	17	20:56 (9)	20:30	24	19:58 (3)	19:16	24	18:31 (2)	18:06			16:13	16:03
24	05:21		20:40 (6)	06:12		19:35 (3)	07:05		18:05 (2)	07:59			07:56	08:31
	21:27	15	20:55 (10)	20:27	22	19:57 (3)	19:14	25	18:30 (2)	18:04			16:12	16:03
25	05:22		20:39 (6)	06:14		19:34 (4)	07:07		18:05 (2)	07:01			07:58	08:31
	21:25	14	20:53 (10)	20:25	21	19:55 (3)	19:11	26	18:31 (2)	17:02			16:11	16:04
26	05:24		20:39 (6)	06:16		19:35 (4)	07:09		18:05 (2)	07:03			08:00	08:32
	21:24	12	20:51 (6)	20:23	19	19:54 (3)	19:09	26	18:31 (2)	17:00			16:10	16:05
27	05:25		20:40 (6)	06:17		19:35 (4)	07:11		18:04 (2)	07:05			08:01	08:32
	21:22	11	20:51 (6)	20:21	18	19:53 (4)	19:07	27	18:31 (2)	16:58			16:09	16:05
28	05:27		20:40 (6)	06:19		19:35 (4)	07:12		18:04 (2)	07:07			08:03	08:32
	21:21	9	20:49 (6)	20:18	15	19:50 (4)	19:04	25	18:29 (2)	16:56			16:08	16:06
29	05:29		20:41 (6)	06:21		19:36 (4)	07:14		18:04 (2)	07:09			08:05	08:32
	21:19	7	20:48 (6)	20:16	12	19:48 (4)	19:02	25	18:29 (2)	16:54			16:07	16:07
30	05:30		20:23 (8)	06:22		19:37 (4)	07:16		18:04 (2)	07:10			08:06	08:32
	21:17	9	20:46 (6)	20:14	9	19:46 (4)	18:59	24	18:28 (2)	16:52			16:06	16:08
31	05:32		20:21 (8)	06:24		19:38 (4)				07:12			08:32	
	21:16	11	20:45 (6)	20:11	5	19:43 (4)				16:50			16:09	
Sonnenscheinstunden		508		458		382		517		330		262		237
astr.max.mögl.Beschattung		687		638		517		70						
Red.Sonnenscheinwahrsch.		0.38		0.42		0.35		0.29						
Reduktion Betriebsdauer		0.96		0.96		0.96		0.96						
Reduktion Windrichtung		0.63		0.67		0.71		0.72						
Gesamte Reduktion		0.23		0.27		0.24		0.20						
Met.wahrsch.Beschattung		158		174		124		14						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AU - IO47

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:07	06:54	18:59 (1) 05:46	19:29 (3) 04:58
	16:10	17:00	17:54	19:51	22 19:21 (1) 20:45	24 20:15 (8) 21:33
2	08:32	08:02	07:05	06:51	18:59 (1) 05:44	19:32 (3) 04:57
	16:11	17:02	17:56	19:53	22 19:21 (1) 20:47	23 20:18 (8) 21:35
3	08:32	08:00	07:03	06:49	18:59 (1) 05:42	19:36 (3) 04:57
	16:12	17:04	17:58	19:55	20 19:19 (1) 20:49	17 20:19 (8) 21:36
4	08:32	07:58	07:00	06:47	18:59 (1) 05:40	20:05 (8) 04:56
	16:14	17:06	18:00	19:57	20 19:19 (1) 20:50	16 20:21 (8) 21:37
5	08:31	07:57	06:58	06:44	19:00 (1) 05:38	20:05 (8) 04:55
	16:15	17:08	18:02	19:58	18 19:18 (1) 20:52	16 20:21 (8) 21:38
6	08:31	07:55	06:56	06:42	19:00 (1) 05:36	20:05 (8) 04:54
	16:16	17:10	18:04	20:00	16 19:16 (1) 20:54	15 20:20 (8) 21:39
7	08:31	07:53	06:54	06:40	19:02 (1) 05:35	20:06 (8) 04:54
	16:18	17:12	18:06	20:02	12 19:14 (1) 20:56	15 20:21 (8) 21:40
8	08:30	07:51	06:51	06:37	19:06 (1) 05:33	20:06 (8) 04:53
	16:19	17:14	18:08	20:04	4 19:10 (1) 20:57	14 20:20 (8) 21:41
9	08:30	07:49	06:49	17:31 (2) 06:35	05:31	20:06 (8) 04:53
	16:20	17:16	18:09	17:43 (2) 20:06	20:59	13 20:19 (8) 21:42
10	08:29	07:47	06:47	17:28 (2) 06:33	05:29	20:07 (8) 04:52
	16:22	17:18	18:11	17:45 (2) 20:07	21:01	11 20:18 (8) 21:43
11	08:28	07:45	06:44	17:27 (2) 06:30	19:38 (4) 05:27	20:09 (8) 04:52
	16:23	17:20	18:13	20 17:47 (2) 20:09	4 19:42 (4) 21:02	10 20:32 (6) 21:43
12	08:28	07:43	06:42	17:25 (2) 06:28	19:35 (4) 05:26	20:11 (8) 04:51
	16:25	17:22	18:15	22 17:47 (2) 20:11	8 19:43 (4) 21:04	7 20:33 (6) 21:44
13	08:27	07:42	06:39	17:24 (2) 06:26	19:33 (4) 05:24	20:28 (6) 04:51
	16:26	17:24	18:17	24 17:48 (2) 20:13	12 19:45 (4) 21:06	7 20:35 (6) 21:45
14	08:26	07:40	06:37	17:23 (2) 06:23	19:32 (4) 05:22	20:27 (6) 04:51
	16:28	17:26	18:19	24 17:47 (2) 20:15	15 19:47 (4) 21:07	9 20:36 (6) 21:45
15	08:25	07:38	06:35	17:22 (2) 06:21	19:32 (4) 05:20	20:28 (6) 04:51
	16:29	17:28	18:21	26 17:46 (2) 20:16	17 19:49 (3) 21:09	10 20:38 (6) 21:46
16	08:24	07:35	06:32	17:22 (2) 06:19	19:30 (4) 05:19	20:27 (6) 04:50
	16:31	17:29	18:22	26 17:48 (2) 20:18	20 19:50 (4) 21:11	12 20:39 (10) 21:47
17	08:23	07:33	06:30	17:22 (2) 06:16	19:29 (3) 05:17	20:27 (6) 04:50
	16:33	17:31	18:24	25 17:47 (2) 20:20	22 19:51 (3) 21:12	14 20:41 (10) 21:47
18	08:22	07:31	06:28	17:22 (2) 06:14	19:28 (3) 05:16	20:26 (10) 04:50
	16:34	17:33	18:26	25 17:47 (2) 20:22	23 19:51 (3) 21:14	16 20:42 (9) 21:47
19	08:21	07:29	06:25	17:22 (2) 06:12	19:28 (3) 05:14	20:25 (10) 04:50
	16:36	17:35	18:28	24 17:46 (2) 20:24	24 19:52 (3) 21:15	18 20:43 (9) 21:48
20	08:20	07:27	06:23	17:23 (2) 06:10	19:27 (3) 05:13	20:25 (10) 04:50
	16:38	17:37	18:30	22 17:45 (2) 20:25	26 19:53 (3) 21:17	20 20:45 (9) 21:48
21	08:19	07:25	06:20	17:24 (2) 06:08	19:27 (3) 05:11	20:24 (10) 04:50
	16:40	17:39	18:31	20 17:44 (2) 20:27	26 19:53 (3) 21:18	22 20:46 (9) 21:48
22	08:18	07:23	06:18	17:24 (2) 06:05	19:26 (3) 05:10	20:23 (10) 04:51
	16:41	17:41	18:33	18 17:42 (2) 20:29	27 19:53 (3) 21:20	24 20:47 (9) 21:49
23	08:16	07:21	06:15	17:26 (2) 06:03	19:25 (3) 05:09	20:23 (10) 04:51
	16:43	17:43	18:35	14 17:40 (2) 20:31	27 19:52 (3) 21:21	26 20:49 (9) 21:49
24	08:15	07:18	06:13	17:29 (2) 06:01	19:25 (3) 05:07	20:23 (10) 04:51
	16:45	17:45	18:37	7 17:36 (2) 20:33	27 19:52 (3) 21:23	27 20:50 (9) 21:49
25	08:14	07:16	06:11	05:59	19:25 (3) 05:06	20:23 (10) 04:52
	16:47	17:47	18:39	20:34	26 19:51 (3) 21:24	27 20:50 (9) 21:49
26	08:12	07:14	06:08	18:06 (1) 05:57	19:26 (3) 05:05	20:23 (10) 04:52
	16:49	17:49	18:40	8 18:14 (1) 20:36	25 19:51 (3) 21:26	28 20:51 (9) 21:49
27	08:11	07:12	06:06	18:04 (1) 05:55	19:26 (3) 05:04	20:23 (10) 04:52
	16:50	17:51	18:42	12 18:16 (1) 20:38	24 19:50 (3) 21:27	28 20:51 (9) 21:49
28	08:10	07:10	06:03	18:03 (1) 05:52	19:26 (3) 05:02	20:23 (10) 04:53
	16:53	17:53	18:44	15 18:18 (1) 20:40	23 19:49 (3) 21:28	28 20:51 (9) 21:49
29	08:08	07:01	05:50	19:01 (1) 05:50	19:27 (3) 05:01	20:23 (10) 04:53
	16:54	19:46	18 19:19 (1) 20:41	22 20:12 (8) 21:30	28 20:51 (9) 21:49	32 21:14 (7)
30	08:06	06:59	19:00 (1) 05:48	19:28 (3) 05:00	20:23 (10) 04:54	20:29 (10)
	16:56	19:48	21 19:21 (1) 20:43	25 20:14 (8) 21:31	28 20:51 (9) 21:48	32 21:13 (7)
31	08:05	06:56	18:59 (1)	04:59	20:23 (10)	
	16:58	19:49	21 19:20 (1)	21:32	28 20:51 (9)	
Sonnenscheinstunden	253	275	367	418	491	506
astr. max.mögl. Beschattung			421	557	581	935
Red. Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.68	0.64	0.63
Gesamte Reduktion			0.19	0.25	0.26	0.23
Met. wahrsch. Beschattung			80	137	154	219

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AU - IO47

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember				
1	04:55	20:30 (10)	05:33		20:20 (8)	06:26	19:37 (4)	07:18	18:04 (2)	07:14	08:08				
	21:48	31	21:13 (7)	21:14	9	20:43 (6)	20:09	4	19:41 (4)	18:57	23	18:27 (2)	16:48	16:05	
2	04:55		20:30 (10)	05:35		20:18 (8)	06:28			07:19		18:04 (2)	07:16	08:09	
	21:48	31	21:13 (7)	21:12	10	20:28 (8)	20:07			18:55	21	18:25 (2)	16:46	16:04	
3	04:56		20:30 (10)	05:37		20:17 (8)	06:29			07:21		18:05 (2)	07:18	08:11	
	21:47	29	21:12 (7)	21:10	12	20:29 (8)	20:04			18:52	19	18:24 (2)	16:44	16:04	
4	04:57		20:30 (10)	05:38		20:16 (8)	06:31		19:03 (1)	07:23		18:07 (2)	07:20	08:12	
	21:47	29	21:12 (7)	21:09	14	20:30 (8)	20:02	4	19:07 (1)	18:50	15	18:22 (2)	16:42	16:03	
5	04:58		20:30 (10)	05:40		20:15 (8)	06:33			18:59 (1)	07:25		18:10 (2)	07:22	08:14
	21:46	29	21:12 (7)	21:07	15	20:30 (8)	20:00	11	19:10 (1)	18:47	8	18:18 (2)	16:40	16:03	
6	04:59		20:30 (10)	05:42		20:15 (8)	06:35			18:57 (1)	07:26		18:18 (2)	07:24	08:15
	21:46	27	20:57 (9)	21:05	15	20:30 (8)	19:57	15	19:12 (1)	18:45			16:39	16:02	
7	05:00		20:30 (10)	05:43		20:14 (8)	06:36			18:55 (1)	07:28		18:18 (2)	07:26	08:16
	21:45	28	20:58 (9)	21:03	16	20:30 (8)	19:55	18	19:13 (1)	18:43			16:37	16:02	
8	05:01		20:31 (10)	05:45		20:14 (8)	06:38			18:53 (1)	07:30		18:18 (2)	07:27	08:17
	21:44	27	20:58 (9)	21:01	16	20:30 (8)	19:53	20	19:13 (1)	18:40			16:35	16:01	
9	05:02		20:31 (10)	05:47		20:15 (8)	06:40			18:53 (1)	07:32		18:18 (2)	07:29	08:19
	21:44	28	20:59 (9)	20:59	15	20:30 (8)	19:50	20	19:13 (1)	18:38			16:33	16:01	
10	05:03		20:31 (10)	05:48		19:43 (3)	06:41			18:52 (1)	07:34		18:18 (2)	07:31	08:20
	21:43	28	20:59 (9)	20:57	19	20:27 (8)	19:48	22	19:14 (1)	18:36			16:32	16:01	
11	05:04		20:31 (10)	05:50		19:40 (3)	06:43			18:51 (1)	07:35		18:18 (2)	07:33	08:21
	21:42	28	20:59 (9)	20:55	24	20:26 (8)	19:45	22	19:13 (1)	18:33			16:30	16:00	
12	05:05		20:31 (10)	05:52		19:37 (3)	06:45			18:51 (1)	07:37		18:18 (2)	07:35	08:22
	21:41	29	21:00 (9)	20:53	24	20:23 (8)	19:43	22	19:13 (1)	18:31			16:28	16:00	
13	05:06		20:31 (10)	05:53		19:36 (3)	06:47			18:52 (1)	07:39		18:18 (2)	07:37	08:23
	21:40	29	21:00 (9)	20:51	25	20:22 (8)	19:41	20	19:12 (1)	18:29			16:27	16:00	
14	05:07		20:31 (10)	05:55		19:35 (3)	06:48			18:51 (1)	07:41		18:18 (2)	07:39	08:24
	21:39	29	21:00 (9)	20:49	22	19:57 (3)	19:38	19	19:10 (1)	18:26			16:25	16:00	
15	05:09		20:31 (10)	05:57		19:34 (3)	06:50			18:52 (1)	07:43		18:18 (2)	07:40	08:25
	21:38	29	21:00 (9)	20:47	23	19:57 (3)	19:36	16	19:08 (1)	18:24			16:24	16:00	
16	05:10		20:31 (10)	05:58		19:33 (3)	06:52			18:53 (1)	07:44		18:18 (2)	07:42	08:26
	21:37	29	21:00 (9)	20:45	25	19:58 (3)	19:33	13	19:06 (1)	18:22			16:22	16:00	
17	05:11		20:31 (10)	06:00		19:32 (3)	06:53			18:54 (1)	07:46		18:18 (2)	07:44	08:27
	21:36	28	20:59 (9)	20:43	25	19:57 (3)	19:31	9	19:03 (1)	18:20			16:21	16:00	
18	05:12		20:32 (10)	06:02		19:32 (3)	06:55			18:58 (1)	07:48		18:18 (2)	07:46	08:27
	21:35	28	21:00 (9)	20:41	26	19:58 (3)	19:28	3	19:01 (1)	18:17			16:19	16:01	
19	05:14		20:32 (10)	06:04		19:32 (3)	06:57			18:19 (2)	07:50		18:18 (2)	07:48	08:28
	21:34	28	21:00 (9)	20:39	26	19:58 (3)	19:26	2	18:21 (2)	18:15			16:18	16:01	
20	05:15		20:33 (10)	06:05		19:31 (3)	06:59			18:13 (2)	07:52		18:18 (2)	07:50	08:29
	21:32	26	20:59 (9)	20:36	27	19:58 (3)	19:24	12	18:25 (2)	18:13			16:17	16:01	
21	05:17		20:34 (10)	06:07		19:31 (3)	07:00			18:10 (2)	07:54		18:18 (2)	07:51	08:29
	21:31	25	20:59 (9)	20:34	27	19:58 (3)	19:21	17	18:27 (2)	18:11			16:15	16:02	
22	05:18		20:34 (10)	06:09		19:31 (3)	07:02			18:09 (2)	07:55		18:18 (2)	07:53	08:30
	21:30	23	20:57 (9)	20:32	26	19:57 (3)	19:19	20	18:29 (2)	18:09			16:14	16:02	
23	05:19		20:34 (10)	06:10		19:31 (3)	07:04			18:07 (2)	07:57		18:18 (2)	07:55	08:31
	21:28	22	20:56 (9)	20:30	25	19:56 (3)	19:16	23	18:30 (2)	18:06			16:13	16:03	
24	05:21		20:36 (10)	06:12		19:32 (3)	07:05			18:06 (2)	07:59		18:18 (2)	07:56	08:31
	21:27	19	20:55 (9)	20:27	24	19:56 (3)	19:14	23	18:29 (2)	18:04			16:12	16:03	
25	05:22		20:36 (10)	06:14		19:31 (3)	07:07			18:05 (2)	07:01		18:18 (2)	07:58	08:31
	21:25	17	20:53 (9)	20:25	23	19:54 (3)	19:11	25	18:30 (2)	17:02			16:11	16:04	
26	05:24		20:37 (10)	06:16		19:32 (3)	07:09			18:04 (2)	07:03		18:18 (2)	08:00	08:32
	21:24	14	20:51 (10)	20:23	21	19:53 (3)	19:09	26	18:30 (2)	17:00			16:10	16:05	
27	05:25		20:38 (6)	06:17		19:33 (4)	07:11			18:04 (2)	07:05		18:18 (2)	08:01	08:32
	21:22	13	20:51 (10)	20:21	20	19:53 (4)	19:07	26	18:30 (2)	16:58			16:09	16:05	
28	05:27		20:37 (6)	06:19		19:33 (4)	07:12			18:03 (2)	07:07		18:18 (2)	08:03	08:32
	21:21	12	20:49 (10)	20:18	17	19:50 (4)	19:04	26	18:29 (2)	16:56			16:08	16:06	
29	05:29		20:38 (6)	06:21		19:33 (4)	07:14			18:03 (2)	07:09		18:18 (2)	08:05	08:32
	21:19	10	20:48 (6)	20:16	15	19:48 (4)	19:02	25	18:28 (2)	16:54			16:07	16:07	
30	05:30		20:38 (6)	06:22		19:34 (4)	07:16			18:04 (2)	07:10		18:18 (2)	08:06	08:32
	21:17	8	20:46 (6)	20:14	12	19:46 (4)	18:59	24	18:28 (2)	16:52			16:06	16:08	
31	05:32		20:39 (6)	06:24		19:35 (4)				07:12			18:18 (2)	08:32	08:32
	21:16	6	20:45 (6)	20:11	8	19:43 (4)				16:50			18:18 (2)	16:09	16:09
Sonnenscheinstunden		508		458		382				330			262		237
astr.max.mögl.Beschattung		739		606		487				86					
Red.Sonnenscheinwahrsch.		0.38		0.42		0.35				0.29					
Reduktion Betriebsdauer		0.96		0.96		0.96				0.96					
Reduktion Windrichtung		0.63		0.67		0.71				0.72					
Gesamte Reduktion		0.23		0.27		0.24				0.20					
Met.wahrsch.Beschattung		170		165		117				17					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AV - IO48

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:07	06:54	19:02 (1) 05:46	19:31 (3) 04:58
	16:10	17:00	17:54	19:51	21 19:23 (1) 20:45	24 20:15 (8) 21:33
2	08:32	08:02	07:05	06:51	19:02 (1) 05:44	19:33 (3) 04:57
	16:11	17:02	17:56	19:53	21 19:23 (1) 20:47	25 20:18 (8) 21:35
3	08:32	08:00	07:03	06:49	19:01 (1) 05:42	19:35 (3) 04:57
	16:12	17:04	17:58	19:55	21 19:22 (1) 20:49	23 20:19 (8) 21:36
4	08:32	07:58	07:00	06:47	19:02 (1) 05:40	19:37 (3) 04:56
	16:14	17:06	18:00	19:57	20 19:22 (1) 20:50	21 20:21 (8) 21:37
5	08:31	07:57	06:58	06:44	19:02 (1) 05:38	20:07 (8) 04:55
	16:15	17:08	18:02	19:58	20 19:22 (1) 20:52	15 20:22 (8) 21:38
6	08:31	07:55	06:56	06:42	19:02 (1) 05:36	20:06 (8) 04:54
	16:16	17:10	18:04	20:00	18 19:20 (1) 20:54	16 20:22 (8) 21:39
7	08:31	07:53	06:54	06:40	19:03 (1) 05:35	20:07 (8) 04:54
	16:18	17:12	18:06	20:02	16 19:19 (1) 20:56	16 20:23 (8) 21:40
8	08:30	07:51	06:51	06:37	19:05 (1) 05:33	20:07 (8) 04:53
	16:19	17:14	18:08	20:04	12 19:17 (1) 20:57	15 20:22 (8) 21:41
9	08:30	07:49	06:49	06:35	19:07 (1) 05:31	20:07 (8) 04:53
	16:20	17:16	18:09	20:06	6 19:13 (1) 20:59	14 20:21 (8) 21:42
10	08:29	07:47	06:47	06:33	17:37 (2) 06:33	20:08 (8) 04:52
	16:22	17:18	18:11	6 17:43 (2) 20:07	21:01	12 20:20 (8) 21:43
11	08:28	07:45	06:44	06:30	17:34 (2) 06:30	20:09 (8) 04:52
	16:23	17:20	18:13	13 17:47 (2) 20:09	21:02	11 20:20 (8) 21:43
12	08:28	07:43	06:42	06:28	17:31 (2) 06:28	19:39 (4) 05:26
	16:25	17:22	18:15	17 17:48 (2) 20:11	4 19:43 (4) 21:04	10 20:33 (6) 21:44
13	08:27	07:42	06:39	06:26	17:30 (2) 06:26	19:37 (4) 05:24
	16:26	17:24	18:17	20 17:50 (2) 20:13	8 19:45 (4) 21:06	5 20:35 (6) 21:45
14	08:26	07:40	06:37	06:23	17:28 (2) 06:23	19:36 (4) 05:22
	16:28	17:26	18:19	22 17:50 (2) 20:15	11 19:47 (4) 21:07	7 20:36 (6) 21:45
15	08:25	07:38	06:35	06:21	17:27 (2) 06:21	19:35 (4) 05:20
	16:29	17:28	18:21	24 17:51 (2) 20:16	14 19:49 (4) 21:09	9 20:38 (6) 21:46
16	08:24	07:35	06:32	06:19	17:27 (2) 06:19	19:33 (4) 05:19
	16:31	17:29	18:22	25 17:52 (2) 20:18	17 19:50 (3) 21:11	11 20:39 (6) 21:47
17	08:23	07:33	06:30	06:16	19:33 (4) 05:17	20:29 (6) 04:50
	16:33	17:31	18:24	25 17:51 (2) 20:20	19 19:52 (3) 21:12	12 20:41 (10) 21:47
18	08:22	07:31	06:27	06:14	19:33 (3) 05:16	20:28 (6) 04:50
	16:34	17:33	18:26	25 17:51 (2) 20:22	20 19:53 (3) 21:14	14 20:42 (10) 21:47
19	08:21	07:29	06:25	06:12	19:32 (3) 05:14	20:28 (6) 04:50
	16:36	17:35	18:28	25 17:50 (2) 20:24	22 19:54 (3) 21:15	15 20:43 (9) 21:48
20	08:20	07:27	06:23	06:10	19:31 (3) 05:13	20:28 (10) 04:50
	16:38	17:37	18:30	24 17:50 (2) 20:25	24 19:55 (3) 21:17	17 20:45 (9) 21:48
21	08:19	07:25	06:20	06:08	19:30 (3) 05:11	20:26 (10) 04:50
	16:40	17:39	18:31	24 17:50 (2) 20:27	25 19:55 (3) 21:18	20 20:46 (9) 21:48
22	08:18	07:23	06:18	06:05	19:30 (3) 05:10	20:26 (10) 04:51
	16:41	17:41	18:33	22 17:48 (2) 20:29	25 19:55 (3) 21:20	21 20:47 (9) 21:49
23	08:16	07:21	06:15	06:03	19:29 (3) 05:09	20:26 (10) 04:51
	16:43	17:43	18:35	19 17:47 (2) 20:31	26 19:55 (3) 21:21	23 20:49 (9) 21:49
24	08:15	07:18	06:13	06:01	19:28 (3) 05:07	20:26 (10) 04:51
	16:45	17:45	18:37	16 17:44 (2) 20:33	27 19:55 (3) 21:23	24 20:50 (9) 21:49
25	08:14	07:16	06:11	05:59	19:28 (3) 05:06	20:25 (10) 04:52
	16:47	17:47	18:39	11 17:42 (2) 20:34	26 19:54 (3) 21:24	27 20:52 (9) 21:49
26	08:12	07:14	06:08	05:57	19:28 (3) 05:05	20:25 (10) 04:52
	16:49	17:49	18:40	20:36	26 19:54 (3) 21:26	27 20:52 (9) 21:49
27	08:11	07:12	06:06	05:55	19:29 (3) 05:04	20:25 (10) 04:52
	16:50	17:50	18:42	6 18:10 (1) 05:55	25 19:54 (3) 21:27	27 20:52 (9) 21:49
28	08:10	07:10	06:03	05:52	19:29 (3) 05:02	20:25 (10) 04:53
	16:53	17:53	18:44	10 18:18 (1) 20:40	24 19:53 (3) 21:28	27 20:52 (9) 21:49
29	08:08	07:01	05:50	05:50	19:29 (3) 05:01	20:25 (10) 04:53
	16:54	19:46	14 19:19 (1) 20:41	23 19:52 (3) 21:30	28 20:53 (9) 21:48	30 21:14 (7)
30	08:06	06:59	19:04 (1) 05:48	19:30 (3) 05:00	20:25 (10) 04:54	20:31 (10)
	16:56	19:48	18 19:22 (1) 20:43	23 20:14 (8) 21:31	28 20:53 (9) 21:48	30 21:13 (7)
31	08:05	06:56	19:03 (1)	04:59	20:25 (10)	
	16:58	19:49	20 19:23 (1)	21:32	28 20:53 (9)	
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			386	544	572	895
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.68	0.64	0.63
Gesamte Reduktion			0.19	0.24	0.26	0.23
Met.wahrsch.Beschattung			74	133	152	209

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AV - IO48

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 817 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:55	20:32 (10)	05:33	20:20 (8)	06:26	07:18	18:10 (2)	07:14	08:08					
	21:48	29	21:13 (7)	21:14	10	20:43 (6)	20:09	18:57	19	18:29 (2)	16:48	16:05		
2	04:55	20:32 (10)	05:35	20:19 (8)	06:28	07:19	18:11 (2)	07:16	08:09					
	21:48	28	21:13 (7)	21:12	11	20:30 (8)	20:07	18:55	15	18:26 (2)	16:46	16:04		
3	04:56	20:32 (10)	05:37	20:18 (8)	06:29	07:21	19:05 (1)	07:21	08:11					
	21:47	27	21:12 (7)	21:10	13	20:31 (8)	20:04	6	19:11 (1)	18:52	10	18:23 (2)	16:44	16:04
4	04:57	20:32 (10)	05:38	20:18 (8)	06:31	07:23	19:02 (1)	07:23	08:12					
	21:47	27	21:12 (7)	21:09	14	20:32 (8)	20:02	12	19:14 (1)	18:50			16:42	16:03
5	04:58	20:32 (10)	05:40	20:16 (8)	06:33	07:25	18:59 (1)	07:25	08:14					
	21:46	26	20:58 (9)	21:07	16	20:32 (8)	20:00	16	19:15 (1)	18:47			16:40	16:03
6	04:59	20:32 (10)	05:42	20:17 (8)	06:35	07:26	18:58 (1)	07:26	08:15					
	21:46	27	20:59 (9)	21:05	15	20:32 (8)	19:57	18	19:16 (1)	18:45			16:39	16:02
7	05:00	20:33 (10)	05:43	20:16 (8)	06:36	07:28	18:57 (1)	07:28	08:16					
	21:45	27	21:00 (9)	21:03	15	20:31 (8)	19:55	20	19:17 (1)	18:43			16:37	16:02
8	05:01	20:33 (10)	05:45	20:16 (8)	06:38	07:30	18:56 (1)	07:30	08:17					
	21:44	27	21:00 (9)	21:01	15	20:31 (8)	19:53	20	19:16 (1)	18:40			16:35	16:01
9	05:02	20:33 (10)	05:47	19:46 (3)	06:40	07:32	18:55 (1)	07:32	08:19					
	21:44	27	21:00 (9)	20:59	21	20:30 (8)	19:50	22	19:17 (1)	18:38			16:33	16:01
10	05:03	20:33 (10)	05:48	19:42 (3)	06:41	07:34	18:55 (1)	07:34	08:20					
	21:43	28	21:01 (9)	20:57	24	20:27 (8)	19:48	22	19:17 (1)	18:36			16:32	16:01
11	05:04	20:33 (10)	05:50	19:41 (3)	06:43	07:35	18:54 (1)	07:35	08:21					
	21:42	28	21:01 (9)	20:55	25	20:26 (8)	19:45	21	19:15 (1)	18:33			16:30	16:00
12	05:05	20:33 (10)	05:52	19:39 (3)	06:45	07:37	18:55 (1)	07:37	08:22					
	21:41	28	21:01 (9)	20:53	24	20:23 (8)	19:43	20	19:15 (1)	18:31			16:28	16:00
13	05:06	20:33 (10)	05:53	19:38 (3)	06:47	07:39	18:55 (1)	07:39	08:23					
	21:40	28	21:01 (9)	20:51	23	20:22 (8)	19:41	18	19:13 (1)	18:29			16:27	16:00
14	05:07	20:33 (10)	05:55	19:38 (3)	06:48	07:41	18:55 (1)	07:41	08:24					
	21:39	28	21:01 (9)	20:49	23	20:01 (3)	19:38	15	19:10 (1)	18:26			16:25	16:00
15	05:09	20:34 (10)	05:57	19:36 (3)	06:50	07:43	18:57 (1)	07:43	08:25					
	21:38	27	21:01 (9)	20:47	25	20:01 (3)	19:36	11	19:08 (1)	18:24			16:24	16:00
16	05:10	20:34 (10)	05:58	19:36 (3)	06:52	07:44	18:59 (1)	07:44	08:26					
	21:37	27	21:01 (9)	20:45	25	20:01 (3)	19:33	7	19:06 (1)	18:22			16:22	16:00
17	05:11	20:34 (10)	06:00	19:35 (3)	06:53	07:46			08:27					
	21:36	27	21:01 (9)	20:43	26	20:01 (3)	19:31		18:20				16:21	16:00
18	05:12	20:35 (10)	06:02	19:35 (3)	06:55	07:48	18:19 (2)	07:48	08:27					
	21:35	26	21:01 (9)	20:41	26	20:01 (3)	19:28	10	18:29 (2)	18:17			16:19	16:01
19	05:14	20:35 (10)	06:04	19:35 (3)	06:57	07:50	18:16 (2)	07:50	08:28					
	21:34	26	21:01 (9)	20:39	26	20:01 (3)	19:26	15	18:31 (2)	18:15			16:18	16:01
20	05:15	20:35 (10)	06:05	19:34 (3)	06:59	07:52	18:14 (2)	07:52	08:29					
	21:32	24	20:59 (9)	20:36	26	20:00 (3)	19:24	18	18:32 (2)	18:13			16:17	16:01
21	05:17	20:36 (10)	06:07	19:35 (3)	07:00	07:54	18:12 (2)	07:54	08:29					
	21:31	23	20:59 (9)	20:34	25	20:00 (3)	19:21	21	18:33 (2)	18:11			16:15	16:02
22	05:18	20:37 (10)	06:09	19:35 (3)	07:02	07:55	18:11 (2)	07:55	08:30					
	21:30	20	20:57 (9)	20:32	25	20:00 (3)	19:19	23	18:34 (2)	18:09			16:14	16:02
23	05:19	20:37 (10)	06:10	19:35 (3)	07:04	07:57	18:10 (2)	07:57	08:31					
	21:28	19	20:56 (9)	20:30	23	19:58 (3)	19:16	25	18:35 (2)	18:06			16:13	16:03
24	05:21	20:39 (10)	06:12	19:36 (3)	07:05	07:59	18:09 (2)	07:59	08:31					
	21:27	16	20:55 (9)	20:27	22	19:58 (3)	19:14	25	18:34 (2)	18:04			16:12	16:03
25	05:22	20:39 (10)	06:14	19:35 (4)	07:07	08:01	18:09 (2)	07:01	08:31					
	21:25	14	20:53 (9)	20:25	21	19:56 (3)	19:11	25	18:34 (2)	17:02			16:11	16:04
26	05:24	20:38 (10)	06:16	19:36 (4)	07:09	08:00	18:09 (2)	07:03	08:32					
	21:24	13	20:51 (10)	20:23	19	19:55 (4)	19:09	25	18:34 (2)	17:00			16:10	16:05
27	05:25	20:39 (10)	06:17	19:36 (4)	07:11	08:01	18:09 (2)	07:05	08:32					
	21:22	12	20:51 (10)	20:21	17	19:53 (4)	19:07	25	18:34 (2)	16:58			16:09	16:05
28	05:27	20:39 (10)	06:19	19:36 (4)	07:12	08:03	18:08 (2)	07:07	08:32					
	21:21	10	20:49 (6)	20:18	14	19:50 (4)	19:04	24	18:32 (2)	16:56			16:08	16:06
29	05:29	20:40 (6)	06:21	19:37 (4)	07:14	08:05	18:08 (2)	07:09	08:32					
	21:19	8	20:48 (6)	20:16	11	19:48 (4)	19:02	23	18:31 (2)	16:54			16:07	16:07
30	05:30	20:40 (6)	06:22	19:38 (4)	07:16	08:06	18:09 (2)	07:10	08:32					
	21:17	6	20:46 (6)	20:14	8	19:46 (4)	18:59	21	18:30 (2)	16:52			16:06	16:08
31	05:32	20:23 (8)	06:24	19:39 (4)		07:12			08:32					
	21:16	8	20:45 (6)	20:11	4	19:43 (4)	16:50		16:09					
Sonnenscheinstunden		508		458		382		330		262		237		
astr.max.mögl.Beschattung		691		592		508		44						
Red.Sonnenscheinwahrsch.		0.38		0.42		0.35		0.29						
Reduktion Betriebsdauer		0.96		0.96		0.96		0.96						
Reduktion Windrichtung		0.63		0.67		0.71		0.72						
Gesamte Reduktion		0.23		0.27		0.24		0.20						
Met.wahrsch.Beschattung		159		161		122		9						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AW - IO49

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	05:47	04:59		05:47 (3)
	16:10	17:00	17:55	19:51	20:45	21:34	25	06:15 (1)
2	08:32	08:02	07:05	06:52	05:44	04:58		05:49 (3)
	16:12	17:02	17:57	19:53	20:47	21:35	21	06:15 (1)
3	08:32	08:00	07:03	06:49	05:43	04:57		05:49 (3)
	16:13	17:04	17:58	19:55	20:49	21:36	15	06:12 (1)
4	08:32	07:58	07:01	06:47	05:41	04:56		05:50 (3)
	16:14	17:06	18:00	19:57	20:50	21:37	9	05:59 (3)
5	08:32	07:57	06:58	06:45	05:39	04:55		05:52 (3)
	16:15	17:08	18:02	19:59	20:52	21:38	6	05:58 (3)
6	08:31	07:55	06:56	06:42	05:37	04:55		05:54 (3)
	16:16	17:10	18:04	20:00	20:54	21:39	6	06:12 (1)
7	08:31	07:53	06:54	06:40	05:35	04:54		06:03 (1)
	16:18	17:12	18:06	20:02	20:56	21:40	12	06:15 (1)
8	08:30	07:51	06:51	06:37	05:33	04:53		06:01 (1)
	16:19	17:14	18:08	20:04	20:57	21:41	16	06:17 (1)
9	08:30	07:49	06:49	06:35	05:31	04:53		06:00 (1)
	16:20	17:16	18:10	20:06	20:59	21:42	18	06:18 (1)
10	08:29	07:48	06:47	06:33	05:29	04:52		05:59 (1)
	16:22	17:18	18:11	20:08	21:01	21:43	20	06:19 (1)
11	08:28	07:46	06:44	06:30	05:28	04:52		05:58 (1)
	16:23	17:20	18:13	20:09	21:03	21:43	21	06:19 (1)
12	08:28	07:44	06:42	06:28	05:26	04:52		05:52 (3)
	16:25	17:22	18:15	20:11	21:04	21:44	7	06:59 (2)
13	08:27	07:42	06:40	06:26	05:24	04:51		06:49 (2)
	16:26	17:24	18:17	20:13	21:06	21:45	12	07:01 (2)
14	08:26	07:40	06:37	06:24	05:22	04:51		06:47 (2)
	16:28	17:26	18:19	20:15	21:07	21:46	15	07:02 (2)
15	08:25	07:38	06:35	06:21	05:21	04:51		06:45 (2)
	16:30	17:28	18:21	20:17	21:09	21:46	18	07:03 (2)
16	08:24	07:36	06:32	06:19	05:19	04:51		07:03 (2)
	16:31	17:30	18:23	20:18	21:11	21:47	20	07:04 (2)
17	08:23	07:34	06:30	06:17	05:18	04:51		06:43 (2)
	16:33	17:32	18:24	20:20	21:12	21:47	20	07:03 (2)
18	08:22	07:32	06:28	06:14	05:16	04:50		06:42 (2)
	16:35	17:34	18:26	20:22	21:14	21:48	22	07:04 (2)
19	08:21	07:29	06:25	06:12	05:14	04:51		06:42 (2)
	16:36	17:35	18:28	20:24	21:16	21:48	22	07:04 (2)
20	08:20	07:27	06:23	06:10	05:13	04:51		06:42 (2)
	16:38	17:37	18:30	20:26	21:17	21:48	21	07:03 (2)
21	08:19	07:25	06:20	06:08	05:12	04:51		06:43 (2)
	16:40	17:39	18:32	20:27	21:19	21:49	20	07:03 (2)
22	08:18	07:23	06:18	06:06	05:10	04:51		06:43 (2)
	16:42	17:41	18:33	20:29	21:20	21:49	19	07:02 (2)
23	08:17	07:21	06:16	06:03	05:09	04:51		06:43 (2)
	16:44	17:43	18:35	20:31	21:22	21:49	19	07:02 (2)
24	08:15	07:19	06:13	06:01	05:07	04:51		06:44 (2)
	16:45	17:45	18:37	20:33	21:23	21:49	17	07:01 (2)
25	08:14	07:16	06:11	05:59	05:06	04:52		06:46 (2)
	16:47	17:47	18:39	20:35	21:24	21:49	13	06:59 (2)
26	08:13	07:14	06:08	05:57	05:05	04:52		06:46 (2)
	16:49	17:49	18:41	20:36	21:26	21:49	10	06:56 (2)
27	08:11	07:12	06:06	05:55	05:04	04:53		06:56 (2)
	16:50	17:51	18:42	20:38	21:27	21:49	34	06:19 (1)
28	08:10	07:10	06:04	05:53	05:03	04:53		05:45 (3)
	16:53	17:53	18:44	20:40	21:29	21:49	34	06:19 (1)
29	08:08	07:01	05:51	05:51	05:02	04:54		05:46 (3)
	16:55	19:46	20:42	20:42	21:30	21:49	32	06:18 (1)
30	08:07	06:59	05:49	05:49	05:01	04:54		05:46 (3)
	16:57	19:48	20:43	20:43	21:31	21:48	31	06:17 (1)
31	08:05	06:56	05:46	05:46	05:00	04:54		05:46 (3)
	16:58	19:50	20:45	20:45	21:32	21:48	28	06:16 (1)
Sonnenscheinstunden	253	275	367	418	491	506		
astr.max.mögl.Beschattung				255	778	78		
Red.Sonnenscheinwahrsch.				0.37	0.43	0.39		
Reduktion Betriebsdauer				0.96	0.96	0.96		
Reduktion Windrichtung				0.72	0.73	0.73		
Gesamte Reduktion				0.26	0.30	0.27		
Met.wahrsch.Beschattung				65	233	21		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AW - IO49

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55		05:34		06:03 (3)	06:26	07:18	07:14	08:08			
	21:48		21:14	23	06:30 (1)	20:09	18:57	16:48	16:05			
2	04:56		05:35		06:09 (1)	06:28	07:20	07:16	08:09			
	21:48		21:12	21	06:30 (1)	20:07	18:55	16:46	16:05			
3	04:56		05:37		06:09 (1)	06:30	07:21	07:18	08:11			
	21:47		21:11	19	06:28 (1)	20:05	18:52	16:44	16:04			
4	04:57		05:38		06:10 (1)	06:31	07:23	07:20	08:12			
	21:47		21:09	18	06:28 (1)	20:02	18:50	16:42	16:03			
5	04:58		05:40		06:12 (1)	06:33	07:25	07:22	08:14			
	21:46		21:07	15	06:27 (1)	20:00	18:48	16:41	16:03			
6	04:59		05:42		06:14 (1)	06:35	07:27	07:24	08:15			
	21:46		21:05	10	06:24 (1)	19:57	18:45	16:39	16:02			
7	05:00		05:59 (3)	05:43		06:36	07:28	07:26	08:16			
	21:45	5	06:04 (3)	21:03		19:55	18:43	16:37	16:02			
8	05:01		05:58 (3)	05:45		06:38	07:30	07:28	08:18			
	21:44	8	06:06 (3)	21:01		19:53	18:41	16:35	16:01			
9	05:02		05:57 (3)	05:47		06:40	07:32	07:30	08:19			
	21:44	10	06:07 (3)	20:59		19:50	18:38	16:33	16:01			
10	05:03		05:56 (3)	05:48		06:42	07:34	07:31	08:20			
	21:43	19	06:21 (1)	20:57		19:48	18:36	16:32	16:01			
11	05:04		05:56 (3)	05:50		06:43	07:36	07:33	08:21			
	21:42	23	06:23 (1)	20:55		19:46	18:34	16:30	16:01			
12	05:05		05:55 (3)	05:52		06:45	07:37	07:35	08:22			
	21:41	26	06:24 (1)	20:53		19:43	18:31	16:28	16:00			
13	05:06		05:55 (3)	05:54		06:47	07:39	07:37	08:23			
	21:40	29	06:25 (1)	20:51		19:41	18:29	16:27	16:00			
14	05:08		05:54 (3)	05:55		06:48	07:41	07:39	08:24			
	21:39	32	06:26 (1)	20:49		19:38	18:27	16:25	16:00			
15	05:09		05:54 (3)	05:57		06:50	07:43	07:41	08:25			
	21:38	33	06:27 (1)	20:47		19:36	18:24	16:24	16:00			
16	05:10		05:53 (3)	05:59		06:52	07:45	07:42	08:26			
	21:37	34	06:27 (1)	20:45	1	06:59 (2)	19:33	18:22	16:22	16:00		
17	05:11		05:54 (3)	06:00		06:54 (2)	06:54	07:46	07:44	08:27		
	21:36	35	06:29 (1)	20:43	10	07:04 (2)	19:31	18:20	16:21	16:01		
18	05:13		05:54 (3)	06:02		06:51 (2)	06:55	07:48	07:46	08:28		
	21:35	35	06:29 (1)	20:41	14	07:05 (2)	19:29	18:18	16:19	16:01		
19	05:14		05:53 (3)	06:04		06:50 (2)	06:57	07:50	07:48	08:28		
	21:34	37	06:30 (1)	20:39	16	07:06 (2)	19:26	18:15	16:18	16:01		
20	05:15		05:53 (3)	06:05		06:48 (2)	06:59	07:52	07:50	08:29		
	21:32	37	06:30 (1)	20:37	18	07:06 (2)	19:24	18:13	16:17	16:01		
21	05:17		05:54 (3)	06:07		06:47 (2)	07:00	07:54	07:51	08:30		
	21:31	37	06:31 (1)	20:34	20	07:07 (2)	19:21	18:11	16:15	16:02		
22	05:18		05:53 (3)	06:09		06:47 (2)	07:02	07:56	07:53	08:30		
	21:30	38	06:31 (1)	20:32	21	07:08 (2)	19:19	18:09	16:14	16:02		
23	05:20		05:53 (3)	06:11		06:46 (2)	07:04	07:58	07:55	08:31		
	21:28	38	06:31 (1)	20:30	21	07:07 (2)	19:16	18:07	16:13	16:03		
24	05:21		05:54 (3)	06:12		06:46 (2)	07:06	07:59	07:57	08:31		
	21:27	38	06:32 (1)	20:28	21	07:07 (2)	19:14	18:05	16:12	16:03		
25	05:23		05:54 (3)	06:14		06:46 (2)	07:07	07:01	07:58	08:31		
	21:25	37	06:31 (1)	20:25	21	07:07 (2)	19:12	17:02	16:11	16:04		
26	05:24		05:55 (3)	06:16		06:46 (2)	07:09	07:03	08:00	08:32		
	21:24	37	06:32 (1)	20:23	20	07:06 (2)	19:09	17:00	16:10	16:05		
27	05:26		05:56 (3)	06:18		06:46 (2)	07:11	07:05	08:02	08:32		
	21:22	36	06:32 (1)	20:21	20	07:06 (2)	19:07	16:58	16:09	16:06		
28	05:27		05:58 (3)	06:19		06:46 (2)	07:13	07:07	08:03	08:32		
	21:21	34	06:32 (1)	20:19	18	07:04 (2)	19:04	16:56	16:08	16:06		
29	05:29		05:59 (3)	06:21		06:48 (2)	07:14	07:09	08:05	08:32		
	21:19	33	06:32 (1)	20:16	15	07:03 (2)	19:02	16:54	16:07	16:07		
30	05:30		06:00 (3)	06:23		06:50 (2)	07:16	07:11	08:06	08:32		
	21:18	31	06:31 (1)	20:14	11	07:01 (2)	19:00	16:52	16:06	16:08		
31	05:32		06:02 (3)	06:24		06:51 (2)		07:13	08:32	08:32		
	21:16	29	06:31 (1)	20:12	7	06:58 (2)		16:50	16:09	16:09		
Sonnenscheinstunden	508		458			382	330	262	237			
astr.max.mögl.Beschattung	751		360									
Red.Sonnenscheinwahrsch.	0.38		0.42									
Reduktion Betriebsdauer	0.96		0.96									
Reduktion Windrichtung	0.73		0.72									
Gesamte Reduktion	0.26		0.29									
Met.wahrsch.Beschattung	198		105									

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schatteneende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AX - IO50

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:32	08:03	07:08	06:54	05:47	04:59	05:49 (3)
	16:10	17:00	17:55	19:51	20:45	21:34	20 06:15 (1)
2	08:32	08:02	07:05	06:52	05:44	04:58	05:50 (3)
	16:12	17:02	17:57	19:53	20:47	21:35	13 06:13 (1)
3	08:32	08:00	07:03	06:49	05:43	04:57	05:51 (3)
	16:13	17:04	17:58	19:55	20:49	21:36	9 06:00 (3)
4	08:32	07:58	07:01	06:47	05:41	04:56	05:52 (3)
	16:14	17:06	18:00	19:57	20:50	21:37	7 05:59 (3)
5	08:32	07:57	06:58	06:45	05:39	06:10 (1)	04:55
	16:15	17:08	18:02	19:59	20:52	1 06:11 (1)	21:38
6	08:31	07:55	06:56	06:42	05:37	06:05 (1)	04:55
	16:16	17:10	18:04	20:00	20:54	10 06:15 (1)	21:39
7	08:31	07:53	06:54	06:40	05:35	06:03 (1)	04:54
	16:18	17:12	18:06	20:02	20:56	15 06:18 (1)	21:40
8	08:30	07:51	06:51	06:37	05:33	06:02 (1)	04:53
	16:19	17:14	18:08	20:04	20:57	17 06:19 (1)	21:41
9	08:30	07:49	06:49	06:35	05:31	06:00 (1)	04:53
	16:20	17:16	18:10	20:06	20:59	20 06:20 (1)	21:42
10	08:29	07:48	06:47	06:33	05:29	06:00 (1)	04:52
	16:22	17:18	18:11	20:08	21:01	21 06:21 (1)	21:43
11	08:28	07:46	06:44	06:30	05:28	05:54 (3)	04:52
	16:23	17:20	18:13	20:09	3 06:58 (2)	21:03	23 06:21 (1)
12	08:28	07:44	06:42	06:28	05:26	05:52 (3)	04:52
	16:25	17:22	18:15	20:11	10 07:02 (2)	21:04	30 06:22 (1)
13	08:27	07:42	06:40	06:26	05:24	05:51 (3)	04:51
	16:26	17:24	18:17	20:13	14 07:03 (2)	21:06	31 06:22 (1)
14	08:26	07:40	06:37	06:24	05:22	05:49 (3)	04:51
	16:28	17:26	18:19	20:15	18 07:05 (2)	21:07	33 06:22 (1)
15	08:25	07:38	06:35	06:21	05:21	05:48 (3)	04:51
	16:30	17:28	18:21	20:17	19 07:05 (2)	21:09	35 06:23 (1)
16	08:24	07:36	06:32	06:19	05:19	05:46 (3)	04:51
	16:31	17:30	18:23	20:18	21 07:06 (2)	21:11	36 06:22 (1)
17	08:23	07:34	06:30	06:17	05:18	05:45 (3)	04:51
	16:33	17:32	18:24	20:20	21 07:05 (2)	21:12	38 06:23 (1)
18	08:22	07:32	06:28	06:14	05:16	05:45 (3)	04:50
	16:35	17:34	18:26	20:22	21 07:05 (2)	21:14	38 06:23 (1)
19	08:21	07:29	06:25	06:12	05:14	05:44 (3)	04:51
	16:36	17:35	18:28	20:24	21 07:05 (2)	21:16	38 06:22 (1)
20	08:20	07:27	06:23	06:10	05:13	05:44 (3)	04:51
	16:38	17:37	18:30	20:26	21 07:05 (2)	21:17	39 06:23 (1)
21	08:19	07:25	06:20	06:08	05:12	05:45 (3)	04:51
	16:40	17:39	18:32	20:27	20 07:04 (2)	21:19	38 06:23 (1)
22	08:18	07:23	06:18	06:06	05:10	05:44 (3)	04:51
	16:42	17:41	18:33	20:29	19 07:04 (2)	21:20	38 06:22 (1)
23	08:17	07:21	06:16	06:03	05:09	05:44 (3)	04:51
	16:44	17:43	18:35	20:31	17 07:03 (2)	21:22	37 06:21 (1)
24	08:15	07:19	06:13	06:01	05:07	05:45 (3)	04:51
	16:45	17:45	18:37	20:33	14 07:01 (2)	21:23	36 06:21 (1)
25	08:14	07:16	06:11	05:59	05:06	05:45 (3)	04:52
	16:47	17:47	18:39	20:35	11 06:59 (2)	21:24	36 06:21 (1)
26	08:13	07:14	06:08	05:57	05:05	05:45 (3)	04:52
	16:49	17:49	18:41	20:36	3 06:54 (2)	21:26	36 06:21 (1)
27	08:11	07:12	06:06	05:55	05:04	05:46 (3)	04:53
	16:50	17:51	18:42	20:38	21:27	34 06:20 (1)	21:49
28	08:10	07:10	06:04	05:53	05:03	05:46 (3)	04:53
	16:53	17:53	18:44	20:40	21:29	33 06:19 (1)	21:49
29	08:08	07:01	05:51	05:51	05:02	05:47 (3)	04:54
	16:55	19:46	20:42	20:42	21:30	31 06:19 (1)	21:49
30	08:07	06:59	05:49	05:49	05:01	05:47 (3)	04:54
	16:57	19:48	20:43	20:43	21:31	28 06:18 (1)	21:48
31	08:05	06:56	05:48	05:48	05:00	05:48 (3)	04:54
	16:58	19:50	20:45	20:45	21:32	24 06:16 (1)	21:48
Sonnenscheinstunden	253	275	367	418	491	506	
astr.max.mögl.Beschattung				253	796	51	
Red.Sonnenscheinwahrsch.				0.37	0.43	0.39	
Reduktion Betriebsdauer				0.96	0.96	0.96	
Reduktion Windrichtung				0.72	0.73	0.73	
Gesamte Reduktion				0.26	0.30	0.27	
Met.wahrsch.Beschattung				65	239	14	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AX - IO50

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55	05:34	06:03 (3)	06:26	06:55 (2)	07:18
	21:48	21:14	28 06:32 (1)	20:09	2 06:57 (2)	18:57
2	04:56	05:35	06:10 (1)	06:28		18:57
	21:48	21:12	22 06:32 (1)	20:07		18:55
3	04:56	05:37	06:10 (1)	06:30		07:21
	21:47	21:11	20 06:30 (1)	20:05		18:52
4	04:57	05:38	06:11 (1)	06:31		07:23
	21:47	21:09	19 06:30 (1)	20:02		18:50
5	04:58	05:40	06:13 (1)	06:33		07:25
	21:46	21:07	16 06:29 (1)	20:00		18:48
6	04:59	05:42	06:13 (1)	06:35		07:27
	21:46	21:05	14 06:27 (1)	19:57		18:45
7	05:00	05:43	06:16 (1)	06:36		07:28
	21:45	21:03	9 06:25 (1)	19:55		18:43
8	05:01	06:00 (3)	05:45	06:38		07:30
	21:44	5 06:05 (3)	21:01	19:53		18:41
9	05:02	05:59 (3)	05:47	06:40		07:32
	21:44	8 06:07 (3)	20:59	19:50		18:38
10	05:03	05:58 (3)	05:48	06:42		07:34
	21:43	10 06:08 (3)	20:57	19:48		18:36
11	05:04	05:57 (3)	05:50	06:43		07:36
	21:42	18 06:22 (1)	20:55	19:46		18:34
12	05:05	05:57 (3)	05:52	06:45		07:37
	21:41	22 06:24 (1)	20:53	19:43		18:31
13	05:06	05:56 (3)	05:54	06:47		07:39
	21:40	27 06:25 (1)	20:51	19:41		18:29
14	05:08	05:56 (3)	05:55	06:48		07:41
	21:39	30 06:27 (1)	20:49	19:38		18:27
15	05:09	05:55 (3)	05:57	06:50		07:43
	21:38	32 06:27 (1)	20:47	19:36		18:24
16	05:10	05:55 (3)	05:59	06:52		07:45
	21:37	33 06:28 (1)	20:45	19:33		18:22
17	05:11	05:55 (3)	06:00	06:57 (2)	06:54	07:46
	21:36	35 06:30 (1)	20:43	6 07:03 (2)	19:31	18:20
18	05:13	05:55 (3)	06:02	06:53 (2)	06:55	07:48
	21:35	35 06:30 (1)	20:41	12 07:05 (2)	19:29	18:18
19	05:14	05:54 (3)	06:04	06:52 (2)	06:57	07:50
	21:34	37 06:31 (1)	20:39	15 07:07 (2)	19:26	18:15
20	05:15	05:54 (3)	06:05	06:50 (2)	06:59	07:52
	21:32	37 06:31 (1)	20:37	17 07:07 (2)	19:24	18:13
21	05:17	05:55 (3)	06:07	06:49 (2)	07:00	07:54
	21:31	37 06:32 (1)	20:34	19 07:08 (2)	19:21	18:11
22	05:18	05:54 (3)	06:09	06:49 (2)	07:02	07:56
	21:30	38 06:32 (1)	20:32	20 07:09 (2)	19:19	18:09
23	05:20	05:54 (3)	06:11	06:48 (2)	07:04	07:58
	21:28	38 06:32 (1)	20:30	21 07:09 (2)	19:16	18:07
24	05:21	05:55 (3)	06:12	06:48 (2)	07:06	07:59
	21:27	38 06:33 (1)	20:28	21 07:09 (2)	19:14	18:05
25	05:23	05:55 (3)	06:14	06:48 (2)	07:07	07:01
	21:25	38 06:33 (1)	20:25	21 07:09 (2)	19:12	17:02
26	05:24	05:55 (3)	06:16	06:47 (2)	07:09	07:03
	21:24	39 06:34 (1)	20:23	21 07:08 (2)	19:09	17:00
27	05:26	05:56 (3)	06:18	06:47 (2)	07:11	07:05
	21:22	37 06:33 (1)	20:21	21 07:08 (2)	19:07	16:58
28	05:27	05:58 (3)	06:19	06:47 (2)	07:13	07:07
	21:21	36 06:34 (1)	20:19	19 07:06 (2)	19:04	16:56
29	05:29	05:59 (3)	06:21	06:48 (2)	07:14	07:09
	21:19	34 06:33 (1)	20:16	17 07:05 (2)	19:02	16:54
30	05:30	06:00 (3)	06:23	06:50 (2)	07:16	07:11
	21:18	33 06:33 (1)	20:14	14 07:04 (2)	19:00	16:52
31	05:32	06:02 (3)	06:24	06:51 (2)		07:13
	21:16	31 06:33 (1)	20:12	10 07:01 (2)		16:50
Sonnenscheinstunden	508	458	382	382	330	262
astr.max.mögl.Beschattung	728	382	2			237
Red.Sonnenscheinwahrsch.	0.38	0.42	0.35			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.73	0.72	0.72			
Gesamte Reduktion	0.26	0.29	0.24			
Met.wahrsch.Beschattung	192	112	0			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AY - IO51

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	06:54	05:47	06:14 (1)	04:59		
	16:10	17:00	17:55	19:51	20:45	12 06:26 (1)	21:34		
2	08:32	08:02	07:05	06:52	05:44	06:12 (1)	04:58		
	16:12	17:02	17:57	19:53	20:47	16 06:28 (1)	21:35		
3	08:32	08:00	07:03	06:49	05:43	06:10 (1)	04:57		
	16:13	17:04	17:58	19:55	20:49	19 06:29 (1)	21:36		
4	08:32	07:58	07:01	06:47	05:41	06:09 (1)	04:56		05:30 (4)
	16:14	17:06	18:00	19:57	20:50	20 06:29 (1)	21:37	3	05:33 (4)
5	08:32	07:57	06:58	06:45	05:39	06:08 (1)	04:55		05:29 (4)
	16:15	17:08	18:02	19:59	20:52	22 06:30 (1)	21:38	7	05:36 (4)
6	08:31	07:55	06:56	06:42	05:37	06:07 (1)	04:55		05:27 (4)
	16:16	17:10	18:04	20:00	20:54	23 06:30 (1)	21:39	10	05:37 (4)
7	08:31	07:53	06:54	06:40	05:35	06:08 (1)	04:54		05:27 (4)
	16:18	17:12	18:06	20:02	20:56	23 06:31 (1)	21:40	11	05:38 (4)
8	08:30	07:51	06:51	06:37	05:33	06:07 (1)	04:53		05:26 (4)
	16:19	17:14	18:08	20:04	6 07:01 (2)	20:57	24 06:31 (1)	21:41	13 05:39 (4)
9	08:30	07:49	06:49	06:35	06:59 (2)	05:31	25 06:06 (1)	04:53	05:26 (4)
	16:20	17:16	18:10	20:06	11 07:10 (2)	20:59	25 06:31 (1)	21:42	14 05:40 (4)
10	08:29	07:48	06:47	06:33	06:56 (2)	05:29	06:07 (1)	04:52	05:25 (4)
	16:22	17:18	18:11	20:08	15 07:11 (2)	21:01	24 06:31 (1)	21:43	15 05:40 (4)
11	08:28	07:46	06:44	06:30	06:54 (2)	05:28	06:07 (1)	04:52	05:25 (4)
	16:23	17:20	18:13	20:09	18 07:12 (2)	21:03	24 06:31 (1)	21:43	16 05:41 (4)
12	08:28	07:44	06:42	06:28	06:53 (2)	05:26	06:06 (1)	04:52	05:25 (4)
	16:25	17:22	18:15	20:11	20 07:13 (2)	21:04	24 06:30 (1)	21:44	17 05:42 (4)
13	08:27	07:42	06:40	06:26	06:52 (2)	05:24	06:07 (1)	04:51	05:25 (4)
	16:26	17:24	18:17	20:13	20 07:12 (2)	21:06	24 06:31 (1)	21:45	18 05:43 (4)
14	08:26	07:40	06:37	06:24	06:51 (2)	05:22	06:07 (1)	04:51	05:24 (4)
	16:28	17:26	18:19	20:15	21 07:12 (2)	21:08	23 06:30 (1)	21:46	18 05:42 (4)
15	08:25	07:38	06:35	06:21	06:51 (2)	05:21	06:08 (1)	04:51	05:24 (4)
	16:30	17:28	18:21	20:17	21 07:12 (2)	21:09	22 06:30 (1)	21:46	19 05:43 (4)
16	08:24	07:36	06:32	06:19	06:52 (2)	05:19	06:08 (1)	04:51	05:24 (4)
	16:31	17:30	18:23	20:18	20 07:12 (2)	21:11	21 06:29 (1)	21:47	19 05:43 (4)
17	08:23	07:34	06:30	06:17	06:51 (2)	05:18	06:09 (1)	04:51	05:25 (4)
	16:33	17:32	18:24	20:20	19 07:10 (2)	21:12	20 06:29 (1)	21:47	18 05:43 (4)
18	08:22	07:32	06:28	06:14	06:51 (2)	05:16	06:10 (1)	04:50	05:25 (4)
	16:35	17:34	18:26	20:22	19 07:10 (2)	21:14	18 06:28 (1)	21:48	19 05:44 (4)
19	08:21	07:29	06:25	06:12	06:52 (2)	05:14	06:10 (1)	04:51	05:25 (4)
	16:36	17:35	18:28	20:24	17 07:09 (2)	21:16	17 06:27 (1)	21:48	19 05:44 (4)
20	08:20	07:27	06:23	06:10	06:53 (2)	05:13	06:12 (1)	04:51	05:26 (4)
	16:38	17:37	18:30	20:26	14 07:07 (2)	21:17	14 06:26 (1)	21:48	19 05:45 (4)
21	08:19	07:25	06:20	06:08	06:55 (2)	05:12	06:13 (1)	04:51	05:26 (4)
	16:40	17:39	18:32	20:27	10 07:05 (2)	21:19	12 06:25 (1)	21:49	19 05:45 (4)
22	08:18	07:23	06:18	06:06	06:54 (2)	05:11	06:15 (1)	04:51	05:26 (4)
	16:42	17:41	18:33	20:29	21:20	7 06:22 (1)	21:49	19 05:45 (4)	
23	08:17	07:21	06:16	06:03	05:09		04:51	05:26 (4)	
	16:44	17:43	18:35	20:31	21:22		21:49	19 05:45 (4)	
24	08:15	07:19	06:13	06:01	05:07		04:51	05:27 (4)	
	16:45	17:45	18:37	20:33	21:23		21:49	19 05:46 (4)	
25	08:14	07:16	06:11	05:59	05:06		04:52	05:27 (4)	
	16:47	17:47	18:39	20:35	21:24		21:49	19 05:46 (4)	
26	08:13	07:14	06:08	05:57	05:05		04:52	05:27 (4)	
	16:49	17:49	18:41	20:36	21:26		21:49	18 05:45 (4)	
27	08:11	07:12	06:06	05:55	05:04		04:53	05:27 (4)	
	16:50	17:51	18:42	20:38	21:27		21:49	19 05:46 (4)	
28	08:10	07:10	06:04	05:53	05:03		04:53	05:27 (4)	
	16:53	17:53	18:44	20:40	21:29		21:49	18 05:45 (4)	
29	08:08		07:01	05:51	05:02		04:54	05:28 (4)	
	16:55		19:46	20:42	21:30		21:49	18 05:46 (4)	
30	08:07		06:59	05:49	06:17 (1)	05:01	04:54	05:29 (4)	
	16:57		19:48	20:43	6 06:23 (1)	21:31	21:48	17 05:46 (4)	
31	08:05		06:56		05:00				
	16:58		19:50		21:32				
Sonnenscheinstunden	253	275	367	418	491		506		
astr.max.mögl.Beschattung				237	434		440		
Red.Sonnenscheinwahrsch.				0.37	0.43		0.39		
Reduktion Betriebsdauer				0.96	0.96		0.96		
Reduktion Windrichtung				0.72	0.73		0.72		
Gesamte Reduktion				0.26	0.30		0.27		
Met.wahrsch.Beschattung				61	130		117		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AY - IO51

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:29 (4)	05:34		06:17 (1)	06:26	06:53 (2)	07:18	07:14	08:08		
	21:48	05:45 (4)	21:14	24	06:41 (1)	20:09	18	07:11 (2)	18:57	16:48	16:05	
2	04:56	05:30 (4)	05:35		06:17 (1)	06:28		06:55 (2)	07:20	07:16	08:09	
	21:48	05:45 (4)	21:12	24	06:41 (1)	20:07	15	07:10 (2)	18:55	16:46	16:05	
3	04:56	05:31 (4)	05:37		06:16 (1)	06:30		06:56 (2)	07:21	07:18	08:11	
	21:47	05:45 (4)	21:11	25	06:41 (1)	20:05	11	07:07 (2)	18:52	16:44	16:04	
4	04:57	05:31 (4)	05:38		06:17 (1)	06:31		06:58 (2)	07:23	07:20	08:12	
	21:47	05:44 (4)	21:09	24	06:41 (1)	20:02	6	07:04 (2)	18:50	16:42	16:03	
5	04:58	05:32 (4)	05:40		06:17 (1)	06:33			07:25	07:22	08:14	
	21:46	05:44 (4)	21:07	24	06:41 (1)	20:00			18:48	16:41	16:03	
6	04:59	05:33 (4)	05:42		06:17 (1)	06:35			07:27	07:24	08:15	
	21:46	05:44 (4)	21:05	23	06:40 (1)	19:57			18:45	16:39	16:02	
7	05:00	05:34 (4)	05:43		06:18 (1)	06:36			07:28	07:26	08:16	
	21:45	05:43 (4)	21:03	22	06:40 (1)	19:55			18:43	16:37	16:02	
8	05:01	05:36 (4)	05:45		06:18 (1)	06:38			07:30	07:28	08:18	
	21:44	05:41 (4)	21:01	21	06:39 (1)	19:53			18:41	16:35	16:01	
9	05:02		05:47		06:19 (1)	06:40			07:32	07:30	08:19	
	21:44		20:59	20	06:39 (1)	19:50			18:38	16:33	16:01	
10	05:03		05:48		06:19 (1)	06:42			07:34	07:31	08:20	
	21:43		20:57	18	06:37 (1)	19:48			18:36	16:32	16:01	
11	05:04		05:50		06:21 (1)	06:43			07:36	07:33	08:21	
	21:42		20:55	15	06:36 (1)	19:46			18:34	16:30	16:01	
12	05:05		05:52		06:23 (1)	06:45			07:37	07:35	08:22	
	21:41		20:53	11	06:34 (1)	19:43			18:31	16:28	16:00	
13	05:06		05:54			06:47			07:39	07:37	08:23	
	21:40		20:51			19:41			18:29	16:27	16:00	
14	05:08		05:55			06:48			07:41	07:39	08:24	
	21:39		20:49			19:38			18:27	16:25	16:00	
15	05:09		05:57			06:50			07:43	07:41	08:25	
	21:38		20:47			19:36			18:24	16:24	16:00	
16	05:10		05:59			06:52			07:45	07:42	08:26	
	21:37		20:45			19:33			18:22	16:22	16:00	
17	05:11		06:00			06:54			07:46	07:44	08:27	
	21:36		20:43			19:31			18:20	16:21	16:01	
18	05:13		06:02			06:55			07:48	07:46	08:28	
	21:35		20:41			19:29			18:18	16:19	16:01	
19	05:14		06:04			06:57			07:50	07:48	08:28	
	21:34		20:39			19:26			18:15	16:18	16:01	
20	05:15		06:05			06:59			07:52	07:50	08:29	
	21:32		20:37			19:24			18:13	16:17	16:01	
21	05:17	06:27 (1)	06:07		07:03 (2)	07:00			07:54	07:51	08:30	
	21:31	06:31 (1)	20:34	4	07:07 (2)	19:21			18:11	16:15	16:02	
22	05:18	06:24 (1)	06:09		07:00 (2)	07:02			07:56	07:53	08:30	
	21:30	06:33 (1)	20:32	10	07:10 (2)	19:19			18:09	16:14	16:02	
23	05:20	06:22 (1)	06:11		06:57 (2)	07:04			07:58	07:55	08:31	
	21:28	06:35 (1)	20:30	14	07:11 (2)	19:16			18:07	16:13	16:03	
24	05:21	06:22 (1)	06:12		06:56 (2)	07:06			07:59	07:57	08:31	
	21:27	06:37 (1)	20:28	17	07:13 (2)	19:14			18:05	16:12	16:03	
25	05:23	06:20 (1)	06:14		06:55 (2)	07:07			07:01	07:58	08:31	
	21:25	06:37 (1)	20:25	19	07:14 (2)	19:12			17:02	16:11	16:04	
26	05:24	06:20 (1)	06:16		06:54 (2)	07:09			07:03	08:00	08:32	
	21:24	06:39 (1)	20:23	19	07:13 (2)	19:09			17:00	16:10	16:05	
27	05:26	06:19 (1)	06:18		06:53 (2)	07:11			07:05	08:02	08:32	
	21:22	06:39 (1)	20:21	21	07:14 (2)	19:07			16:58	16:09	16:06	
28	05:27	06:19 (1)	06:19		06:52 (2)	07:13			07:07	08:03	08:32	
	21:21	06:40 (1)	20:19	21	07:13 (2)	19:04			16:56	16:08	16:06	
29	05:29	06:18 (1)	06:21		06:52 (2)	07:14			07:09	08:05	08:32	
	21:19	06:40 (1)	20:16	21	07:13 (2)	19:02			16:54	16:07	16:07	
30	05:30	06:17 (1)	06:23		06:53 (2)	07:16			07:11	08:06	08:32	
	21:18	06:40 (1)	20:14	20	07:13 (2)	19:00			16:52	16:06	16:08	
31	05:32	06:17 (1)	06:24		06:52 (2)				07:13		08:32	
	21:16	06:41 (1)	20:12	19	07:11 (2)				16:50		16:09	
Sonnenscheinstunden	508		458		382				330	262	237	
astr.max.mögl.Beschattung	282		436		50							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.72							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	74		128		12							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AZ - IO52

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	05:47	06:16 (1)	04:59	05:30 (4)
	16:10	17:00	17:55	19:51	20:45	21	06:37 (1)	21:34 15 05:45 (4)
2	08:32	08:02	07:05	06:52	05:44	06:15 (1)	04:58	05:30 (4)
	16:12	17:02	17:57	19:53	20:47	22	06:37 (1)	21:35 17 05:47 (4)
3	08:32	08:00	07:03	06:49	05:43	06:14 (1)	04:57	05:29 (4)
	16:13	17:04	17:58	19:55	20:49	23	06:37 (1)	21:36 18 05:47 (4)
4	08:32	07:58	07:01	06:47	05:41	06:13 (1)	04:56	05:29 (4)
	16:14	17:06	18:00	19:57	20:50	24	06:37 (1)	21:37 18 05:47 (4)
5	08:32	07:57	06:58	06:45	05:39	06:13 (1)	04:55	05:29 (4)
	16:15	17:08	18:02	19:59	20:52	24	06:37 (1)	21:38 20 05:49 (4)
6	08:31	07:55	06:56	06:42	07:05 (2)	05:37	06:13 (1)	04:55 05:28 (4)
	16:16	17:10	18:04	20:00	07:14 (2)	20:54	24	06:37 (1) 21:39 21 05:49 (4)
7	08:31	07:53	06:54	06:40	07:03 (2)	05:35	06:13 (1)	04:54 05:29 (4)
	16:18	17:12	18:06	20:02	07:16 (2)	20:56	25	06:38 (1) 21:40 21 05:50 (4)
8	08:30	07:51	06:51	06:37	07:01 (2)	05:33	06:13 (1)	04:53 05:28 (4)
	16:19	17:14	18:08	20:04	07:17 (2)	20:57	24	06:37 (1) 21:41 22 05:50 (4)
9	08:30	07:49	06:49	06:35	07:00 (2)	05:31	06:13 (1)	04:53 05:29 (4)
	16:20	17:16	18:10	20:06	07:18 (2)	20:59	23	06:36 (1) 21:42 21 05:50 (4)
10	08:29	07:48	06:47	06:33	06:58 (2)	05:29	06:14 (1)	04:52 05:28 (4)
	16:22	17:18	18:11	20:08	07:18 (2)	21:01	23	06:37 (1) 21:43 22 05:50 (4)
11	08:29	07:46	06:44	06:30	06:58 (2)	05:28	06:14 (1)	04:52 05:28 (4)
	16:23	17:20	18:13	20:09	07:18 (2)	21:03	22	06:36 (1) 21:44 23 05:51 (4)
12	08:28	07:44	06:42	06:28	06:58 (2)	05:26	06:14 (1)	04:52 05:29 (4)
	16:25	17:22	18:15	20:11	07:18 (2)	21:04	21	06:35 (1) 21:44 23 05:52 (4)
13	08:27	07:42	06:40	06:26	06:57 (2)	05:24	06:16 (1)	04:51 05:29 (4)
	16:26	17:24	18:17	20:13	07:17 (2)	21:06	18	06:34 (1) 21:45 23 05:52 (4)
14	08:26	07:40	06:37	06:24	06:57 (2)	05:22	06:16 (1)	04:51 05:28 (4)
	16:28	17:26	18:19	20:15	07:17 (2)	21:08	17	06:33 (1) 21:46 24 05:52 (4)
15	08:25	07:38	06:35	06:21	06:57 (2)	05:21	06:18 (1)	04:51 05:28 (4)
	16:30	17:28	18:21	20:17	07:16 (2)	21:09	14	06:32 (1) 21:46 24 05:52 (4)
16	08:24	07:36	06:32	06:19	06:58 (2)	05:19	06:19 (1)	04:51 05:29 (4)
	16:31	17:30	18:23	20:18	07:15 (2)	21:11	11	06:30 (1) 21:47 23 05:52 (4)
17	08:23	07:34	06:30	06:17	06:58 (2)	05:18	06:22 (1)	04:51 05:29 (4)
	16:33	17:32	18:24	20:20	07:13 (2)	21:12	6	06:28 (1) 21:47 24 05:53 (4)
18	08:22	07:32	06:28	06:14	07:00 (2)	05:16		04:50 05:29 (4)
	16:35	17:34	18:26	20:22	07:11 (2)	21:14		21:48 24 05:53 (4)
19	08:21	07:29	06:25	06:12	07:04 (2)	05:14		04:51 05:29 (4)
	16:36	17:35	18:28	20:24	07:07 (2)	21:16		21:48 24 05:53 (4)
20	08:20	07:27	06:23	06:10		05:13		04:51 05:30 (4)
	16:38	17:37	18:30	20:26		21:17		21:48 24 05:54 (4)
21	08:19	07:25	06:20	06:08		05:12		04:51 05:30 (4)
	16:40	17:39	18:32	20:27		21:19		21:49 24 05:54 (4)
22	08:18	07:23	06:18	06:06		05:10		04:51 05:30 (4)
	16:42	17:41	18:33	20:29		21:20		21:49 24 05:54 (4)
23	08:17	07:21	06:16	06:03		05:09		04:51 05:30 (4)
	16:44	17:43	18:35	20:31		21:22		21:49 24 05:54 (4)
24	08:15	07:19	06:13	06:01		05:07		04:51 05:31 (4)
	16:45	17:45	18:37	20:33		21:23		21:49 24 05:55 (4)
25	08:14	07:16	06:11	05:59		05:06		04:52 05:31 (4)
	16:47	17:47	18:39	20:35		21:24		21:49 24 05:55 (4)
26	08:13	07:14	06:08	05:57		05:05		04:52 05:31 (4)
	16:49	17:49	18:41	20:36		21:26		21:49 23 05:54 (4)
27	08:11	07:12	06:06	05:55	06:21 (1)	05:04		04:53 05:31 (4)
	16:51	17:51	18:42	20:38	06:31 (1)	21:27		21:49 24 05:55 (4)
28	08:10	07:10	06:04	05:53	06:19 (1)	05:03		04:53 05:31 (4)
	16:53	17:53	18:44	20:40	06:33 (1)	21:29		21:49 24 05:55 (4)
29	08:08		07:01	05:51	06:18 (1)	05:02	05:34 (4)	04:54 05:32 (4)
	16:55		19:46	20:42	06:35 (1)	21:30	8	05:42 (4) 21:49 23 05:55 (4)
30	08:07		06:59	05:49	06:17 (1)	05:01	05:32 (4)	04:54 05:33 (4)
	16:57		19:48	20:43	06:36 (1)	21:31	11	05:43 (4) 21:48 23 05:56 (4)
31	08:05		06:56			05:00	05:31 (4)	
	16:58		19:50			21:32	13	05:44 (4)
Sonnenscheinstunden	253	275	367	418	491		506	
astr.max.mögl.Beschattung				281		374		668
Red.Sonnenscheinwahrsch.				0.37		0.43		0.39
Reduktion Betriebsdauer				0.96		0.96		0.96
Reduktion Windrichtung				0.72		0.72		0.72
Gesamte Reduktion				0.26		0.30		0.27
Met.wahrsch.Beschattung				72		112		178

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: AZ - IO52

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:32 (4)	05:34		06:24 (1)	06:26	06:57 (2)	07:18	07:14	08:08		
	21:48	05:55 (4)	21:14	21	06:45 (1)	20:09	20	07:17 (2)	18:57	16:48	16:05	
2	04:56	05:33 (4)	05:35		06:24 (1)	06:28	06:57 (2)	07:20	07:20	07:16	08:09	
	21:48	05:56 (4)	21:12	22	06:46 (1)	20:07	20	07:17 (2)	18:55	16:46	16:05	
3	04:56	05:34 (4)	05:37		06:23 (1)	06:30	06:57 (2)	07:21	07:21	07:18	08:11	
	21:47	05:56 (4)	21:11	23	06:46 (1)	20:05	18	07:15 (2)	18:52	16:44	16:04	
4	04:57	05:33 (4)	05:38		06:23 (1)	06:31	06:58 (2)	07:23	07:23	07:20	08:12	
	21:47	05:55 (4)	21:09	24	06:47 (1)	20:02	16	07:14 (2)	18:50	16:42	16:03	
5	04:58	05:34 (4)	05:40		06:24 (1)	06:33	07:00 (2)	07:25	07:22	07:22	08:14	
	21:46	21 05:55 (4)	21:07	24	06:48 (1)	20:00	13	07:13 (2)	18:48	16:41	16:03	
6	04:59	05:35 (4)	05:42		06:23 (1)	06:35	07:01 (2)	07:27	07:24	07:24	08:15	
	21:46	20 05:55 (4)	21:05	24	06:47 (1)	19:57	9	07:10 (2)	18:45	16:39	16:02	
7	05:00	05:35 (4)	05:43		06:23 (1)	06:36		07:28	07:26	07:26	08:16	
	21:45	20 05:55 (4)	21:03	24	06:47 (1)	19:55		18:43	16:37	16:37	16:02	
8	05:01	05:36 (4)	05:45		06:23 (1)	06:38		07:30	07:28	07:28	08:18	
	21:45	19 05:55 (4)	21:01	24	06:47 (1)	19:53		18:41	16:35	16:35	16:01	
9	05:02	05:36 (4)	05:47		06:23 (1)	06:40		07:32	07:30	07:30	08:19	
	21:44	19 05:55 (4)	20:59	24	06:47 (1)	19:50		18:38	16:33	16:33	16:01	
10	05:03	05:37 (4)	05:48		06:23 (1)	06:42		07:34	07:31	07:31	08:20	
	21:43	17 05:54 (4)	20:57	23	06:46 (1)	19:48		18:36	16:32	16:32	16:01	
11	05:04	05:38 (4)	05:50		06:23 (1)	06:43		07:36	07:33	07:33	08:21	
	21:42	16 05:54 (4)	20:55	22	06:45 (1)	19:46		18:34	16:30	16:30	16:01	
12	05:05	05:39 (4)	05:52		06:24 (1)	06:45		07:37	07:35	07:35	08:22	
	21:41	14 05:53 (4)	20:53	21	06:45 (1)	19:43		18:31	16:28	16:28	16:00	
13	05:06	05:40 (4)	05:54		06:25 (1)	06:47		07:39	07:37	07:37	08:23	
	21:40	12 05:52 (4)	20:51	18	06:43 (1)	19:41		18:29	16:27	16:27	16:00	
14	05:08	05:41 (4)	05:55		06:26 (1)	06:48		07:41	07:39	07:39	08:24	
	21:39	10 05:51 (4)	20:49	16	06:42 (1)	19:38		18:27	16:25	16:25	16:00	
15	05:09	05:43 (4)	05:57		06:27 (1)	06:50		07:43	07:41	07:41	08:25	
	21:38	6 05:49 (4)	20:47	13	06:40 (1)	19:36		18:24	16:24	16:24	16:00	
16	05:10		05:59		06:30 (1)	06:52		07:45	07:42	07:42	08:26	
	21:37		20:45	7	06:37 (1)	19:33		18:22	16:22	16:22	16:00	
17	05:11		06:00			06:54		07:46	07:44	07:44	08:27	
	21:36		20:43			19:31		18:20	16:21	16:21	16:01	
18	05:13		06:02			06:55		07:48	07:46	07:46	08:28	
	21:35		20:41			19:29		18:18	16:19	16:19	16:01	
19	05:14		06:04			06:57		07:50	07:48	07:48	08:28	
	21:34		20:39			19:26		18:15	16:18	16:18	16:01	
20	05:15		06:05			06:59		07:52	07:50	07:50	08:29	
	21:32		20:37			19:24		18:13	16:17	16:17	16:01	
21	05:17		06:07			07:00		07:54	07:51	07:51	08:30	
	21:31		20:34			19:21		18:11	16:15	16:15	16:02	
22	05:18		06:09			07:02		07:56	07:53	07:53	08:30	
	21:30		20:32			19:19		18:09	16:14	16:14	16:02	
23	05:20		06:11			07:04		07:58	07:55	07:55	08:31	
	21:28		20:30			19:16		18:07	16:13	16:13	16:03	
24	05:21		06:12		07:07 (2)	07:06		07:59	07:57	07:57	08:31	
	21:27		20:28	4	07:11 (2)	19:14		18:05	16:12	16:12	16:03	
25	05:23		06:14		07:04 (2)	07:07		07:01	07:58	07:58	08:31	
	21:25		20:25	11	07:15 (2)	19:12		17:02	16:11	16:11	16:04	
26	05:24		06:16		07:01 (2)	07:09		07:03	08:00	08:00	08:32	
	21:24		20:23	15	07:16 (2)	19:09		17:00	16:10	16:10	16:05	
27	05:26		06:18		07:00 (2)	07:11		07:05	08:02	08:02	08:32	
	21:22	9	06:40 (1)	20:21	17	07:17 (2)	19:07	16:58	16:09	16:09	16:06	
28	05:27		06:29 (1)	06:19		06:58 (2)	07:13	07:07	08:03	08:03	08:32	
	21:21	13	06:42 (1)	20:19	19	07:17 (2)	19:04	16:56	16:08	16:08	16:06	
29	05:29		06:28 (1)	06:21		06:58 (2)	07:14	07:09	08:05	08:05	08:32	
	21:19	15	06:43 (1)	20:16	20	07:18 (2)	19:02	16:54	16:07	16:07	16:07	
30	05:30		06:26 (1)	06:23		06:58 (2)	07:16	07:11	08:06	08:06	08:32	
	21:18	18	06:44 (1)	20:14	20	07:18 (2)	19:00	16:52	16:06	16:06	16:08	
31	05:32		06:26 (1)	06:24		06:56 (2)		07:13			08:32	
	21:16	19	06:45 (1)	20:12	21	07:17 (2)		16:50			16:09	
Sonnenscheinstunden	508		458		382		330	262	237			
astr. max.mögl. Beschattung	338		457		96							
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.72							
Gesamte Reduktion	0.26		0.29		0.24							
Met. wahrsch. Beschattung	88		134		23							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BA - IO53

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:32	08:03	07:08	06:54	05:47	06:17 (1) 04:59	05:32 (4)
	16:10	17:00	17:55	19:51	20:45	23 06:40 (1) 21:34	22 05:54 (4)
2	08:32	08:02	07:05	06:52	05:44	06:17 (1) 04:58	05:33 (4)
	16:12	17:02	17:57	19:53	20:47	23 06:40 (1) 21:35	22 05:55 (4)
3	08:32	08:00	07:03	06:49	05:43	06:17 (1) 04:57	05:33 (4)
	16:13	17:04	17:58	19:55	20:49	22 06:39 (1) 21:36	22 05:55 (4)
4	08:32	07:58	07:01	06:47	05:41	06:17 (1) 04:56	05:32 (4)
	16:14	17:06	18:00	19:57	20:50	22 06:39 (1) 21:37	23 05:55 (4)
5	08:32	07:57	06:58	06:45	07:08 (2) 05:39	06:16 (1) 04:55	05:33 (4)
	16:15	17:08	18:02	19:59	5 07:13 (2) 20:52	22 06:38 (1) 21:38	23 05:56 (4)
6	08:31	07:55	06:56	06:42	07:05 (2) 05:37	06:16 (1) 04:55	05:33 (4)
	16:16	17:10	18:04	20:00	10 07:15 (2) 20:54	22 06:38 (1) 21:39	23 05:56 (4)
7	08:31	07:53	06:54	06:40	07:03 (2) 05:35	06:18 (1) 04:54	05:33 (4)
	16:18	17:12	18:06	20:02	13 07:16 (2) 20:56	20 06:38 (1) 21:40	24 05:57 (4)
8	08:30	07:51	06:51	06:37	07:01 (2) 05:33	06:18 (1) 04:53	05:33 (4)
	16:19	17:14	18:08	20:04	16 07:17 (2) 20:57	19 06:37 (1) 21:41	24 05:57 (4)
9	08:30	07:49	06:49	06:35	06:59 (2) 05:31	06:18 (1) 04:53	05:34 (4)
	16:21	17:16	18:10	20:06	19 07:18 (2) 20:59	18 06:36 (1) 21:42	23 05:57 (4)
10	08:29	07:48	06:47	06:33	06:58 (2) 05:29	06:20 (1) 04:52	05:33 (4)
	16:22	17:18	18:12	20:08	19 07:17 (2) 21:01	15 06:35 (1) 21:43	24 05:57 (4)
11	08:29	07:46	06:44	06:30	06:58 (2) 05:28	06:21 (1) 04:52	05:34 (4)
	16:23	17:20	18:13	20:09	19 07:17 (2) 21:03	12 06:33 (1) 21:44	23 05:57 (4)
12	08:28	07:44	06:42	06:28	06:58 (2) 05:26	06:23 (1) 04:52	05:34 (4)
	16:25	17:22	18:15	20:11	19 07:17 (2) 21:04	8 06:31 (1) 21:44	24 05:58 (4)
13	08:27	07:42	06:40	06:26	06:57 (2) 05:24	04:51	05:35 (4)
	16:26	17:24	18:17	20:13	19 07:16 (2) 21:06	21:45	23 05:58 (4)
14	08:26	07:40	06:37	06:24	06:58 (2) 05:22	04:51	05:34 (4)
	16:28	17:26	18:19	20:15	17 07:15 (2) 21:08	21:46	23 05:57 (4)
15	08:25	07:38	06:35	06:21	06:59 (2) 05:21	04:51	05:34 (4)
	16:30	17:28	18:21	20:17	15 07:14 (2) 21:09	21:46	24 05:58 (4)
16	08:24	07:36	06:32	06:19	07:00 (2) 05:19	04:51	05:35 (4)
	16:31	17:30	18:23	20:18	13 07:13 (2) 21:11	21:47	23 05:58 (4)
17	08:23	07:34	06:30	06:17	07:01 (2) 05:18	04:51	05:35 (4)
	16:33	17:32	18:24	20:20	8 07:09 (2) 21:12	21:47	23 05:58 (4)
18	08:22	07:32	06:28	06:14	05:16	04:50	05:35 (4)
	16:35	17:34	18:26	20:22	21:14	21:48	23 05:58 (4)
19	08:21	07:29	06:25	06:12	05:14	04:51	05:35 (4)
	16:36	17:35	18:28	20:24	21:16	21:48	23 05:58 (4)
20	08:20	07:27	06:23	06:10	05:13	04:51	05:36 (4)
	16:38	17:37	18:30	20:26	21:17	21:48	24 06:00 (4)
21	08:19	07:25	06:20	06:08	05:12	04:51	05:36 (4)
	16:40	17:39	18:32	20:27	21:19	21:49	24 06:00 (4)
22	08:18	07:23	06:18	06:06	05:10	04:51	05:36 (4)
	16:42	17:41	18:33	20:29	21:20	6 05:39 (4) 21:49	24 06:00 (4)
23	08:17	07:21	06:16	06:03	05:09	05:37 (4) 04:51	05:36 (4)
	16:44	17:43	18:35	20:31	21:22	11 05:48 (4) 21:49	23 05:59 (4)
24	08:15	07:19	06:13	06:01	05:07	05:36 (4) 04:51	05:37 (4)
	16:45	17:45	18:37	20:33	21:23	13 05:49 (4) 21:49	23 06:00 (4)
25	08:14	07:16	06:11	05:59	06:24 (1) 05:06	05:35 (4) 04:52	05:37 (4)
	16:47	17:47	18:39	20:35	11 06:35 (1) 21:24	16 05:51 (4) 21:49	23 06:00 (4)
26	08:13	07:14	06:08	05:57	06:21 (1) 05:05	05:35 (4) 04:52	05:37 (4)
	16:49	17:49	18:41	20:36	15 06:36 (1) 21:26	17 05:52 (4) 21:49	23 06:00 (4)
27	08:11	07:12	06:06	05:55	06:20 (1) 05:04	05:34 (4) 04:53	05:37 (4)
	16:51	17:51	18:42	20:38	17 06:37 (1) 21:27	18 05:52 (4) 21:49	24 06:01 (4)
28	08:10	07:10	06:04	05:53	06:19 (1) 05:03	05:34 (4) 04:53	05:37 (4)
	16:53	17:53	18:44	20:40	19 06:38 (1) 21:29	19 05:53 (4) 21:49	24 06:01 (4)
29	08:08	07:01	05:51	05:49	06:19 (1) 05:02	05:33 (4) 04:54	05:38 (4)
	16:55	19:46	20:42	20 06:39 (1) 21:30	21 05:54 (4) 21:49	23 06:01 (4)	
30	08:07	06:59	05:49	05:47	06:18 (1) 05:01	05:33 (4) 04:54	05:38 (4)
	16:57	19:48	20:43	22 06:40 (1) 21:31	21 05:54 (4) 21:48	24 06:02 (4)	
31	08:05	06:56	05:46	05:44	05:00	05:33 (4)	
	16:59	19:50	20:45	21:32	21 05:54 (4)		
Sonnenscheinstunden	253	275	367	418	491	506	698
astr.max.mögl.Beschattung				296	389		0.39
Red.Sonnenscheinwahrsch.				0.37	0.43		0.39
Reduktion Betriebsdauer				0.96	0.96		0.96
Reduktion Windrichtung				0.72	0.72		0.72
Gesamte Reduktion				0.26	0.30		0.27
Met.wahrsch.Beschattung				76	116		187

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BA - IO53

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:38 (4)	05:34		06:32 (1)	06:26	06:57 (2)	07:18	07:14	08:08		
	21:48	06:01 (4)	21:14	10	06:42 (1)	20:09	19	07:16 (2)	18:57	16:48	16:05	
2	04:56	05:38 (4)	05:35		06:31 (1)	06:28		06:57 (2)	07:20	07:16	08:09	
	21:48	06:02 (4)	21:12	13	06:44 (1)	20:07	19	07:16 (2)	18:55	16:46	16:05	
3	04:56	05:39 (4)	05:37		06:29 (1)	06:30		06:56 (2)	07:21	07:18	08:11	
	21:47	06:02 (4)	21:11	16	06:45 (1)	20:05	19	07:15 (2)	18:52	16:44	16:04	
4	04:57	05:38 (4)	05:38		06:29 (1)	06:31		06:58 (2)	07:23	07:20	08:12	
	21:47	06:02 (4)	21:09	17	06:46 (1)	20:02	16	07:14 (2)	18:50	16:42	16:03	
5	04:58	05:39 (4)	05:40		06:28 (1)	06:33		07:00 (2)	07:25	07:22	08:14	
	21:46	06:02 (4)	21:07	20	06:48 (1)	20:00	13	07:13 (2)	18:48	16:41	16:03	
6	04:59	05:39 (4)	05:42		06:27 (1)	06:35		07:01 (2)	07:27	07:24	08:15	
	21:46	06:02 (4)	21:05	20	06:47 (1)	19:58	10	07:11 (2)	18:45	16:39	16:02	
7	05:00	05:39 (4)	05:43		06:27 (1)	06:36		07:03 (2)	07:28	07:26	08:16	
	21:45	06:03 (4)	21:03	21	06:48 (1)	19:55	6	07:09 (2)	18:43	16:37	16:02	
8	05:01	05:40 (4)	05:45		06:26 (1)	06:38			07:30	07:28	08:18	
	21:45	06:03 (4)	21:01	22	06:48 (1)	19:53			18:41	16:35	16:01	
9	05:02	05:40 (4)	05:47		06:26 (1)	06:40			07:32	07:30	08:19	
	21:44	06:03 (4)	20:59	22	06:48 (1)	19:50			18:38	16:33	16:01	
10	05:03	05:40 (4)	05:48		06:25 (1)	06:42			07:34	07:31	08:20	
	21:43	06:03 (4)	20:57	23	06:48 (1)	19:48			18:36	16:32	16:01	
11	05:04	05:41 (4)	05:50		06:26 (1)	06:43			07:36	07:33	08:21	
	21:42	06:03 (4)	20:55	22	06:48 (1)	19:46			18:34	16:30	16:01	
12	05:05	05:41 (4)	05:52		06:26 (1)	06:45			07:37	07:35	08:22	
	21:41	06:03 (4)	20:53	22	06:48 (1)	19:43			18:31	16:28	16:00	
13	05:06	05:41 (4)	05:54		06:26 (1)	06:47			07:39	07:37	08:23	
	21:40	06:03 (4)	20:51	21	06:47 (1)	19:41			18:29	16:27	16:00	
14	05:08	05:42 (4)	05:55		06:26 (1)	06:48			07:41	07:39	08:24	
	21:39	06:02 (4)	20:49	21	06:47 (1)	19:38			18:27	16:25	16:00	
15	05:09	05:42 (4)	05:57		06:26 (1)	06:50			07:43	07:41	08:25	
	21:38	06:02 (4)	20:47	19	06:45 (1)	19:36			18:24	16:24	16:00	
16	05:10	05:42 (4)	05:59		06:28 (1)	06:52			07:45	07:42	08:26	
	21:37	06:01 (4)	20:45	16	06:44 (1)	19:33			18:22	16:22	16:00	
17	05:11	05:44 (4)	06:00		06:29 (1)	06:54			07:46	07:44	08:27	
	21:36	06:02 (4)	20:43	14	06:43 (1)	19:31			18:20	16:21	16:01	
18	05:13	05:44 (4)	06:02		06:31 (1)	06:55			07:48	07:46	08:28	
	21:35	06:01 (4)	20:41	9	06:40 (1)	19:29			18:18	16:19	16:01	
19	05:14	05:45 (4)	06:04			06:57			07:50	07:48	08:28	
	21:34	06:00 (4)	20:39			19:26			18:15	16:18	16:01	
20	05:15	05:46 (4)	06:05			06:59			07:52	07:50	08:29	
	21:32	05:58 (4)	20:37			19:24			18:13	16:17	16:01	
21	05:17	05:49 (4)	06:07			07:00			07:54	07:51	08:30	
	21:31	05:57 (4)	20:34			19:21			18:11	16:16	16:02	
22	05:18	05:52 (4)	06:09			07:02			07:56	07:53	08:30	
	21:30	05:53 (4)	20:32			19:19			18:09	16:14	16:02	
23	05:20		06:11			07:04			07:58	07:55	08:31	
	21:28		20:30			19:16			18:07	16:13	16:03	
24	05:21		06:12			07:06			07:59	07:57	08:31	
	21:27		20:28			19:14			18:05	16:12	16:03	
25	05:23		06:14			07:07			07:01	07:58	08:31	
	21:25		20:25			19:12			17:02	16:11	16:04	
26	05:24		06:16			07:09			07:03	08:00	08:32	
	21:24		20:23	8	07:12 (2)	19:09			17:00	16:10	16:05	
27	05:26		06:18			07:02 (2)	07:11		07:05	08:02	08:32	
	21:22		20:21	13	07:15 (2)	19:07			16:58	16:09	16:06	
28	05:27		06:19			07:00 (2)	07:13		07:07	08:03	08:32	
	21:21		20:19	15	07:15 (2)	19:04			16:56	16:08	16:06	
29	05:29		06:21			06:59 (2)	07:14		07:09	08:05	08:32	
	21:19		20:16	17	07:16 (2)	19:02			16:54	16:07	16:07	
30	05:30		06:23			06:58 (2)	07:16		07:11	08:06	08:32	
	21:18		20:14	19	07:17 (2)	19:00			16:52	16:06	16:08	
31	05:32	06:36 (1)	06:24			06:57 (2)			07:13		08:32	
	21:16	06:39 (1)	20:12	19	07:16 (2)				16:50		16:09	
Sonnenscheinstunden	508		458			382			330	262	237	
astr.max.mögl.Beschattung	432		419			102						
Red.Sonnenscheinwahrsch.	0.38		0.42			0.35						
Reduktion Betriebsdauer	0.96		0.96			0.96						
Reduktion Windrichtung	0.72		0.72			0.72						
Gesamte Reduktion	0.26		0.29			0.24						
Met.wahrsch.Beschattung	113		123			24						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BB - IO54

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32 16:10	08:03 17:00	07:08 17:55	06:54 19:51	07:17 (2) 20:45	06:27 (1) 21:34
2	08:32 16:12	08:02 17:02	07:05 17:57	06:52 19:53	07:15 (2) 20:47	06:27 (1) 21:35
3	08:32 16:13	08:00 17:04	07:03 17:58	06:49 19:55	07:13 (2) 20:49	06:28 (1) 21:36
4	08:32 16:14	07:58 17:06	07:01 18:00	06:47 19:57	07:10 (2) 20:50	06:28 (1) 21:37
5	08:32 16:15	07:57 17:08	06:58 18:02	06:45 19:59	07:08 (2) 20:52	06:29 (1) 21:38
6	08:31 16:16	07:55 17:10	06:56 18:04	06:42 20:00	07:07 (2) 20:54	06:31 (1) 21:39
7	08:31 16:18	07:53 17:12	06:54 18:06	06:40 20:02	07:07 (2) 20:56	06:31 (1) 21:40
8	08:30 16:19	07:51 17:14	06:51 18:08	06:37 20:04	07:07 (2) 20:57	06:39 (1) 21:41
9	08:30 16:20	07:49 17:16	06:49 18:10	06:35 20:06	07:07 (2) 20:59	06:39 (1) 21:42
10	08:29 16:22	07:48 17:18	06:47 18:12	06:33 20:08	07:07 (2) 21:01	06:45 (1) 21:43
11	08:29 16:23	07:46 17:20	06:44 18:13	06:30 20:09	07:08 (2) 21:03	06:45 (1) 21:44
12	08:28 16:25	07:44 17:22	06:42 18:15	06:28 20:11	07:09 (2) 21:04	06:44 (1) 21:44
13	08:27 16:26	07:42 17:24	06:40 18:17	06:26 20:13	07:11 (2) 21:06	06:44 (1) 21:45
14	08:26 16:28	07:40 17:26	06:37 18:19	06:24 20:15	07:18 (2) 21:08	06:44 (1) 21:46
15	08:25 16:30	07:38 17:28	06:35 18:21	06:21 20:17	06:44 (1) 21:09	06:44 (1) 21:46
16	08:24 16:31	07:36 17:30	06:32 18:23	06:19 20:18	05:48 (4) 21:11	06:44 (1) 21:47
17	08:23 16:33	07:34 17:32	06:30 18:24	06:17 20:20	05:46 (4) 21:12	06:44 (1) 21:47
18	08:22 16:35	07:32 17:34	06:28 18:26	06:14 20:22	05:45 (4) 21:14	06:44 (1) 21:48
19	08:21 16:36	07:29 17:35	06:25 18:28	06:12 20:24	05:43 (4) 21:16	06:44 (1) 21:48
20	08:20 16:38	07:27 17:37	06:23 18:30	06:10 20:26	05:43 (4) 21:17	06:44 (1) 21:48
21	08:19 16:40	07:25 17:39	06:20 18:32	06:08 20:27	06:33 (1) 21:19	06:44 (1) 21:49
22	08:18 16:42	07:23 17:41	06:18 18:33	06:06 20:29	06:31 (1) 21:20	06:44 (1) 21:49
23	08:17 16:44	07:21 17:43	06:16 18:35	06:03 20:31	06:48 (1) 21:22	06:44 (1) 21:49
24	08:15 16:45	07:19 17:45	06:13 18:37	06:01 20:33	06:29 (1) 21:23	06:44 (1) 21:49
25	08:14 16:47	07:16 17:47	06:11 18:39	05:59 20:35	06:49 (1) 21:24	06:44 (1) 21:49
26	08:13 16:49	07:14 17:49	06:08 18:41	05:57 20:36	06:50 (1) 21:26	06:44 (1) 21:49
27	08:11 16:51	07:12 17:51	06:06 18:42	05:55 20:38	06:26 (1) 21:27	06:44 (1) 21:49
28	08:10 16:53	07:10 17:53	06:04 18:44	05:53 20:40	06:26 (1) 21:29	06:44 (1) 21:49
29	08:08 16:55	07:08 17:55	06:01 18:46	05:51 20:42	06:49 (1) 21:30	06:44 (1) 21:49
30	08:07 16:57	07:06 17:57	05:59 18:48	05:49 20:44	06:27 (1) 21:31	06:44 (1) 21:48
31	08:05 16:59	07:04 17:59	05:56 18:50	05:47 20:46	06:49 (1) 21:32	06:44 (1) 21:48
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung				402	422	629
Red.Sonnenscheinwahrsch.				0.37	0.43	0.39
Reduktion Betriebsdauer				0.96	0.96	0.96
Reduktion Windrichtung				0.72	0.72	0.73
Gesamte Reduktion				0.26	0.30	0.27
Met.wahrsch.Beschattung				103	126	169

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Schattenende (WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BB - IO54

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:48 (4)	05:34		06:26	07:07 (2)	07:18	07:14	08:08			
	21	06:09 (4)	21:14		20:09	15 07:22 (2)	18:57	16:48	16:05			
2	04:56	05:48 (4)	05:35		06:28	07:06 (2)	07:20	07:16	08:09			
	22	06:10 (4)	21:12		20:07	17 07:23 (2)	18:55	16:46	16:05			
3	04:56	05:49 (4)	05:37		06:30	07:04 (2)	07:21	07:18	08:11			
	21	06:10 (4)	21:11		20:05	19 07:23 (2)	18:52	16:44	16:04			
4	04:57	05:48 (4)	05:38		06:31	07:04 (2)	07:23	07:20	08:12			
	22	06:10 (4)	21:09		20:02	19 07:23 (2)	18:50	16:42	16:03			
5	04:58	05:48 (4)	05:40		06:33	07:04 (2)	07:25	07:22	08:14			
	23	06:11 (4)	21:07		20:00	19 07:23 (2)	18:48	16:41	16:03			
6	04:59	05:48 (4)	05:42	06:43 (1)	06:35	07:03 (2)	07:27	07:24	08:15			
	23	06:11 (4)	21:05	7 06:50 (1)	19:58	19 07:22 (2)	18:45	16:39	16:02			
7	05:00	05:48 (4)	05:43	06:41 (1)	06:36	07:03 (2)	07:28	07:26	08:16			
	23	06:11 (4)	21:03	12 06:53 (1)	19:55	19 07:22 (2)	18:43	16:37	16:02			
8	05:01	05:49 (4)	05:45	06:38 (1)	06:38	07:05 (2)	07:30	07:28	08:18			
	23	06:12 (4)	21:01	16 06:54 (1)	19:53	16 07:21 (2)	18:41	16:35	16:01			
9	05:02	05:49 (4)	05:47	06:38 (1)	06:40	07:06 (2)	07:32	07:30	08:19			
	23	06:12 (4)	20:59	17 06:55 (1)	19:50	13 07:19 (2)	18:38	16:33	16:01			
10	05:03	05:49 (4)	05:48	06:36 (1)	06:42	07:08 (2)	07:34	07:31	08:20			
	23	06:12 (4)	20:57	19 06:55 (1)	19:48	10 07:18 (2)	18:36	16:32	16:01			
11	05:04	05:49 (4)	05:50	06:36 (1)	06:43	07:10 (2)	07:36	07:33	08:21			
	24	06:13 (4)	20:55	20 06:56 (1)	19:46	5 07:15 (2)	18:34	16:30	16:01			
12	05:05	05:49 (4)	05:52	06:35 (1)	06:45		07:37	07:35	08:22			
	24	06:13 (4)	20:53	22 06:57 (1)	19:43		18:31	16:28	16:00			
13	05:06	05:49 (4)	05:54	06:34 (1)	06:47		07:39	07:37	08:23			
	24	06:13 (4)	20:51	23 06:57 (1)	19:41		18:29	16:27	16:00			
14	05:08	05:49 (4)	05:55	06:34 (1)	06:48		07:41	07:39	08:24			
	24	06:13 (4)	20:49	23 06:57 (1)	19:38		18:27	16:25	16:00			
15	05:09	05:49 (4)	05:57	06:33 (1)	06:50		07:43	07:41	08:25			
	24	06:13 (4)	20:47	23 06:56 (1)	19:36		18:24	16:24	16:00			
16	05:10	05:49 (4)	05:59	06:34 (1)	06:52		07:45	07:42	08:26			
	24	06:13 (4)	20:45	22 06:56 (1)	19:33		18:22	16:22	16:00			
17	05:11	05:50 (4)	06:00	06:34 (1)	06:54		07:46	07:44	08:27			
	24	06:13 (4)	20:43	22 06:56 (1)	19:31		18:20	16:21	16:01			
18	05:13	05:50 (4)	06:02	06:34 (1)	06:55		07:48	07:46	08:28			
	23	06:13 (4)	20:41	21 06:55 (1)	19:29		18:18	16:19	16:01			
19	05:14	05:50 (4)	06:04	06:35 (1)	06:57		07:50	07:48	08:28			
	23	06:13 (4)	20:39	20 06:55 (1)	19:26		18:15	16:18	16:01			
20	05:15	05:50 (4)	06:05	06:35 (1)	06:59		07:52	07:50	08:29			
	22	06:12 (4)	20:37	18 06:53 (1)	19:24		18:13	16:17	16:01			
21	05:17	05:51 (4)	06:07	06:36 (1)	07:00		07:54	07:51	08:30			
	21	06:12 (4)	20:34	16 06:52 (1)	19:21		18:11	16:15	16:02			
22	05:18	05:52 (4)	06:09	06:38 (1)	07:02		07:56	07:53	08:30			
	20	06:12 (4)	20:32	12 06:50 (1)	19:19		18:09	16:14	16:02			
23	05:20	05:52 (4)	06:11	06:39 (1)	07:04		07:58	07:55	08:31			
	19	06:11 (4)	20:30	8 06:47 (1)	19:16		18:07	16:13	16:03			
24	05:21	05:53 (4)	06:12		07:06		07:59	07:57	08:31			
	18	06:11 (4)	20:28		19:14		18:05	16:12	16:03			
25	05:23	05:54 (4)	06:14		07:07		07:01	07:58	08:31			
	15	06:09 (4)	20:25		19:12		17:02	16:11	16:04			
26	05:24	05:56 (4)	06:16		07:09		07:03	08:00	08:32			
	13	06:09 (4)	20:23		19:09		17:00	16:10	16:05			
27	05:26	05:57 (4)	06:18		07:11		07:05	08:02	08:32			
	9	06:06 (4)	20:21		19:07		16:58	16:09	16:06			
28	05:27		06:19		07:13		07:07	08:03	08:32			
	21	20:19			19:04		16:56	16:08	16:06			
29	05:29		06:21		07:14		07:09	08:05	08:32			
	21	20:16			19:02		16:54	16:07	16:07			
30	05:30		06:23	07:11 (2)	07:16		07:11	08:06	08:32			
	21	20:14	8 07:19 (2)	19:00			16:52	16:06	16:08			
31	05:32		06:24	07:08 (2)			07:13		08:32			
	21	20:12	13 07:21 (2)				16:50		16:09			
Sonnenscheinstunden	508		458		382		330	262	237			
astr.max.mögl.Beschattung	574		342		171							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.72							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	151		100		41							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BC - IO55

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:08	06:54	05:47	06:12 (3) 04:59
	16:10	17:00	17:55	19:51	20:45	32 06:47 (1) 21:34
2	08:32	08:02	07:05	06:52	07:15 (2) 05:44	32 06:10 (3) 04:58
	16:12	17:02	17:57	19:53	20:47	36 06:47 (1) 21:35
3	08:32	08:00	07:03	06:49	07:13 (2) 05:42	36 06:08 (3) 04:57
	16:13	17:04	17:58	19:55	20:49	37 06:46 (1) 21:36
4	08:32	07:58	07:01	06:47	07:10 (2) 05:41	40 06:06 (3) 04:56
	16:14	17:06	18:00	19:57	20:50	40 06:46 (1) 21:37
5	08:32	07:57	06:58	06:45	07:08 (2) 05:39	40 06:04 (3) 04:55
	16:15	17:08	18:02	19:59	20:52	41 06:45 (1) 21:38
6	08:31	07:55	06:56	06:42	07:07 (2) 05:37	41 06:03 (3) 04:55
	16:16	17:10	18:04	20:00	20:54	41 06:44 (1) 21:39
7	08:31	07:53	06:54	06:40	07:06 (2) 05:35	41 06:04 (3) 04:54
	16:18	17:12	18:06	20:02	20:56	39 06:44 (1) 21:40
8	08:30	07:51	06:51	06:37	07:06 (2) 05:33	39 06:03 (3) 04:53
	16:19	17:14	18:08	20:04	20:57	39 06:43 (1) 21:41
9	08:30	07:49	06:49	06:35	07:06 (2) 05:31	37 06:03 (3) 04:53
	16:20	17:16	18:10	20:06	20:59	37 06:42 (1) 21:42
10	08:29	07:48	06:47	06:33	07:05 (2) 05:29	33 06:04 (3) 04:52
	16:22	17:18	18:11	20:08	21:01	33 06:41 (1) 21:43
11	08:29	07:46	06:44	06:30	07:06 (2) 05:28	33 06:04 (3) 04:52
	16:23	17:20	18:13	20:09	21:03	27 06:38 (1) 21:44
12	08:28	07:44	06:42	06:28	07:07 (2) 05:26	27 06:04 (3) 04:52
	16:25	17:22	18:15	20:11	21:04	17 06:21 (3) 21:44
13	08:27	07:42	06:40	06:26	07:07 (2) 05:24	17 06:05 (3) 04:51
	16:26	17:24	18:17	20:13	21:06	16 06:21 (3) 21:45
14	08:26	07:40	06:37	06:24	07:09 (2) 05:22	16 06:05 (3) 04:51
	16:28	17:26	18:19	20:15	21:08	15 06:20 (3) 21:46
15	08:25	07:38	06:35	06:21	07:12 (2) 05:21	14 06:06 (3) 04:51
	16:30	17:28	18:21	20:17	21:09	14 06:20 (3) 21:46
16	08:24	07:36	06:32	06:19	07:17 (2) 05:19	11 06:07 (3) 04:51
	16:31	17:30	18:23	20:18	21:11	11 06:18 (3) 21:47
17	08:23	07:34	06:30	06:17	05:18	7 06:09 (3) 04:51
	16:33	17:32	18:24	20:20	21:12	7 06:16 (3) 21:47
18	08:22	07:32	06:28	06:14	05:16	7 06:16 (3) 21:47
	16:35	17:34	18:26	20:22	21:14	04:50 05:36 (4)
19	08:21	07:29	06:25	06:12	05:14	21:48 05:36 (4)
	16:36	17:35	18:28	20:24	21:16	04:51 05:36 (4)
20	08:20	07:27	06:23	06:10	05:13	21:48 05:37 (4)
	16:38	17:37	18:30	20:26	21:17	21:48 06:03 (4)
21	08:19	07:25	06:20	06:08	05:12	21:48 05:37 (4)
	16:40	17:39	18:32	20:27	21:19	04:51 05:37 (4)
22	08:18	07:23	06:18	06:06	06:35 (1) 05:10	1 05:44 (4) 21:49
	16:42	17:41	18:33	20:29	21:20	1 05:45 (4) 21:49
23	08:17	07:21	06:16	06:03	06:30 (1) 05:09	9 05:40 (4) 21:49
	16:44	17:43	18:35	20:31	21:22	9 05:49 (4) 21:49
24	08:15	07:19	06:13	06:01	06:28 (1) 05:07	12 05:39 (4) 21:49
	16:45	17:45	18:37	20:33	21:23	12 05:51 (4) 21:49
25	08:14	07:16	06:11	05:59	06:27 (1) 05:06	15 05:38 (4) 21:49
	16:47	17:47	18:39	20:35	21:24	15 05:53 (4) 21:49
26	08:13	07:14	06:08	05:57	06:25 (1) 05:05	17 05:37 (4) 21:49
	16:49	17:49	18:41	20:36	21:26	17 05:54 (4) 21:49
27	08:11	07:12	06:06	05:55	06:24 (1) 05:04	19 05:36 (4) 21:49
	16:51	17:51	18:42	20:38	21:27	19 05:55 (4) 21:49
28	08:10	07:10	06:04	05:53	06:23 (1) 05:03	19 05:36 (4) 21:49
	16:53	17:53	18:44	20:40	21:29	19 05:55 (4) 21:49
29	08:08	07:07	06:01	05:51	06:23 (1) 05:02	21 05:35 (4) 21:49
	16:55	17:55	18:46	20:42	21:30	21 05:56 (4) 21:49
30	08:07	07:06	06:59	05:49	06:14 (3) 05:01	22 05:35 (4) 21:49
	16:57	17:57	18:48	20:43	21:31	22 05:57 (4) 21:48
31	08:05	07:04	06:56	05:47	05:00	23 05:34 (4) 21:48
	16:58	17:58	18:49	20:44	21:32	23 05:57 (4) 21:48
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung				389	640	765
Red.Sonnenscheinwahrsch.				0.37	0.43	0.39
Reduktion Betriebsdauer				0.96	0.96	0.96
Reduktion Windrichtung				0.72	0.72	0.72
Gesamte Reduktion				0.26	0.30	0.27
Met.wahrsch.Beschattung				100	191	205

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BC - IO55

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:39 (4)	05:34	06:14 (3)	06:26	07:05 (2)	07:18	07:14	08:08			
	21:48	06:05 (4)	21:14	24	06:46 (1)	20:09	19	07:24 (2)	18:57	16:48	16:05	
2	04:56	05:39 (4)	05:35	06:14 (3)	06:28	07:04 (2)	07:20	07:16	08:09			
	21:48	06:05 (4)	21:12	31	06:50 (1)	20:07	21	07:25 (2)	18:55	16:46	16:05	
3	04:56	05:40 (4)	05:37	06:13 (3)	06:30	07:03 (2)	07:21	07:18	08:11			
	21:47	06:06 (4)	21:11	34	06:51 (1)	20:05	21	07:24 (2)	18:52	16:44	16:04	
4	04:57	05:39 (4)	05:38	06:13 (3)	06:31	07:03 (2)	07:23	07:20	08:12			
	21:47	06:05 (4)	21:09	37	06:52 (1)	20:02	21	07:24 (2)	18:50	16:42	16:03	
5	04:58	05:40 (4)	05:40	06:14 (3)	06:33	07:03 (2)	07:25	07:22	08:14			
	21:46	06:05 (4)	21:07	39	06:54 (1)	20:00	21	07:24 (2)	18:48	16:41	16:03	
6	04:59	05:40 (4)	05:42	06:13 (3)	06:35	07:03 (2)	07:27	07:24	08:15			
	21:46	06:06 (4)	21:05	41	06:54 (1)	19:57	19	07:22 (2)	18:45	16:39	16:02	
7	05:00	05:41 (4)	05:43	06:14 (3)	06:36	07:03 (2)	07:28	07:26	08:16			
	21:45	06:06 (4)	21:03	41	06:55 (1)	19:55	19	07:22 (2)	18:43	16:37	16:02	
8	05:01	05:41 (4)	05:45	06:14 (3)	06:38	07:05 (2)	07:30	07:28	08:18			
	21:45	06:06 (4)	21:01	41	06:55 (1)	19:53	16	07:21 (2)	18:41	16:35	16:01	
9	05:02	05:41 (4)	05:47	06:16 (3)	06:40	07:06 (2)	07:32	07:30	08:19			
	21:44	06:06 (4)	20:59	39	06:55 (1)	19:50	12	07:18 (2)	18:38	16:33	16:01	
10	05:03	05:42 (4)	05:48	06:17 (3)	06:42	07:08 (2)	07:34	07:31	08:20			
	21:43	06:06 (4)	20:57	37	06:55 (1)	19:48	8	07:16 (2)	18:36	16:32	16:01	
11	05:04	05:42 (4)	05:50	06:19 (3)	06:43			07:36	07:33	08:21		
	21:42	06:06 (4)	20:55	34	06:55 (1)	19:46		18:34	16:30	16:01		
12	05:05	05:43 (4)	05:52	06:21 (3)	06:45			07:37	07:35	08:22		
	21:41	06:05 (4)	20:53	31	06:56 (1)	19:43		18:31	16:28	16:00		
13	05:06	05:43 (4)	05:54	06:30 (1)	06:47			07:39	07:37	08:23		
	21:40	06:05 (4)	20:51	25	06:55 (1)	19:41		18:29	16:27	16:00		
14	05:08	05:43 (4)	05:55	06:31 (1)	06:48			07:41	07:39	08:24		
	21:39	06:05 (4)	20:49	24	06:55 (1)	19:38		18:27	16:25	16:00		
15	05:09	05:44 (4)	05:57	06:31 (1)	06:50			07:43	07:41	08:25		
	21:38	06:04 (4)	20:47	23	06:54 (1)	19:36		18:24	16:24	16:00		
16	05:10	05:44 (4)	05:59	06:31 (1)	06:52			07:45	07:42	08:26		
	21:37	06:04 (4)	20:45	22	06:53 (1)	19:33		18:22	16:22	16:00		
17	05:11	05:46 (4)	06:00	06:32 (1)	06:54			07:46	07:44	08:27		
	21:36	06:04 (4)	20:43	20	06:52 (1)	19:31		18:20	16:21	16:01		
18	05:13	05:47 (4)	06:02	06:33 (1)	06:55			07:48	07:46	08:28		
	21:35	06:03 (4)	20:41	18	06:51 (1)	19:29		18:18	16:19	16:01		
19	05:14	05:47 (4)	06:04	06:34 (1)	06:57			07:50	07:48	08:28		
	21:34	06:02 (4)	20:39	15	06:49 (1)	19:26		18:15	16:18	16:01		
20	05:15	05:49 (4)	06:05	06:36 (1)	06:59			07:52	07:50	08:29		
	21:32	06:00 (4)	20:37	10	06:46 (1)	19:24		18:13	16:17	16:01		
21	05:17	05:52 (4)	06:07		07:00			07:54	07:51	08:30		
	21:31	05:59 (4)	20:34		19:21			18:11	16:15	16:02		
22	05:18		06:09		07:02			07:56	07:53	08:30		
	21:30		20:32		19:19			18:09	16:14	16:02		
23	05:20		06:11		07:04			07:58	07:55	08:31		
	21:28		20:30		19:16			18:07	16:13	16:03		
24	05:21		06:12		07:06			07:59	07:57	08:31		
	21:27		20:28		19:14			18:05	16:12	16:03		
25	05:23		06:14		07:07			07:01	07:58	08:31		
	21:25		20:25		19:12			17:02	16:11	16:04		
26	05:24	06:22 (3)	06:16		07:09			07:03	08:00	08:32		
	21:24	3	06:25 (3)	20:23	19:09			17:00	16:10	16:05		
27	05:26	06:19 (3)	06:18		07:11			07:05	08:02	08:32		
	21:22	9	06:28 (3)	20:21	19:07			16:58	16:09	16:06		
28	05:27	06:18 (3)	06:19		07:12 (2)	07:13		07:07	08:03	08:32		
	21:21	12	06:30 (3)	20:19	6	07:18 (2)	19:04	16:56	16:08	16:06		
29	05:29	06:16 (3)	06:21		07:09 (2)	07:14		07:09	08:05	08:32		
	21:19	14	06:30 (3)	20:16	12	07:21 (2)	19:02	16:54	16:07	16:07		
30	05:30	06:15 (3)	06:23		07:08 (2)	07:16		07:11	08:06	08:32		
	21:18	16	06:31 (3)	20:14	15	07:23 (2)	19:00	16:52	16:06	16:08		
31	05:32	06:15 (3)	06:24		07:06 (2)			07:13		08:32		
	21:16	17	06:32 (3)	20:12	17	07:23 (2)		16:50		16:09		
Sonnenscheinstunden	508		458		382			330	262	237		
astr. max.mögl. Beschattung	522		636		177							
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.72							
Gesamte Reduktion	0.26		0.29		0.24							
Met. wahrsch. Beschattung	137		187		42							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BD - IO56

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:08	06:54	07:17 (2)	05:47
	16:10	17:00	17:55	19:51	17 07:34 (2)	20:45
2	08:32	08:02	07:05	06:52	07:16 (2)	05:44
	16:12	17:02	17:57	19:53	19 07:35 (2)	20:47
3	08:32	08:00	07:03	06:49	07:16 (2)	05:42
	16:13	17:04	17:58	19:55	20 07:36 (2)	20:49
4	08:32	07:58	07:01	06:47	07:14 (2)	05:41
	16:14	17:06	18:00	19:57	21 07:35 (2)	20:50
5	08:32	07:57	06:58	06:45	07:15 (2)	05:39
	16:15	17:08	18:02	19:59	20 07:35 (2)	20:52
6	08:31	07:55	06:56	06:42	07:14 (2)	05:37
	16:16	17:10	18:04	20:00	20 07:34 (2)	20:54
7	08:31	07:53	06:54	06:40	07:14 (2)	05:35
	16:18	17:12	18:06	20:02	19 07:33 (2)	20:56
8	08:30	07:51	06:51	06:37	07:15 (2)	05:33
	16:19	17:14	18:08	20:04	17 07:32 (2)	20:57
9	08:30	07:49	06:49	06:35	07:16 (2)	05:31
	16:20	17:16	18:10	20:06	15 07:31 (2)	20:59
10	08:29	07:48	06:47	06:33	07:17 (2)	05:29
	16:22	17:18	18:11	20:08	11 07:28 (2)	21:01
11	08:29	07:46	06:44	06:30	07:22 (2)	05:28
	16:23	17:20	18:13	20:09	2 07:24 (2)	21:03
12	08:28	07:44	06:42	06:28		05:26
	16:25	17:22	18:15	20:11		21:04
13	08:27	07:42	06:40	06:26		05:24
	16:26	17:24	18:17	20:13		21:06
14	08:26	07:40	06:37	06:24		05:22
	16:28	17:26	18:19	20:15		21:08
15	08:25	07:38	06:35	06:21		05:21
	16:30	17:28	18:21	20:17		21:09
16	08:24	07:36	06:32	06:19		05:19
	16:31	17:30	18:23	20:18		21:11
17	08:23	07:34	06:30	06:17	06:44 (1)	05:18
	16:33	17:32	18:24	20:20	4 06:48 (1)	21:12
18	08:22	07:32	06:28	06:14	06:40 (1)	05:16
	16:35	17:34	18:26	20:22	12 06:52 (1)	21:14
19	08:21	07:29	06:25	06:12	06:38 (1)	05:14
	16:36	17:35	18:28	20:24	16 06:54 (1)	21:16
20	08:20	07:27	06:23	06:10	06:37 (1)	05:13
	16:38	17:37	18:30	20:26	18 06:55 (1)	21:17
21	08:19	07:25	06:20	06:08	06:35 (1)	05:12
	16:40	17:39	18:32	20:27	21 06:56 (1)	21:19
22	08:18	07:23	06:18	06:06	06:35 (1)	05:10
	16:42	17:41	18:33	20:29	22 06:57 (1)	21:20
23	08:17	07:21	06:16	06:03	06:34 (1)	05:09
	16:44	17:43	18:35	20:31	23 06:57 (1)	21:22
24	08:15	07:19	06:13	06:01	06:34 (1)	05:07
	16:45	17:45	18:37	20:33	23 06:57 (1)	21:23
25	08:14	07:16	06:11	05:59	06:33 (1)	05:06
	16:47	17:47	18:39	20:35	24 06:57 (1)	21:24
26	08:13	07:14	06:08	05:57	06:21 (3)	05:05
	16:49	17:49	18:41	20:36	28 06:56 (1)	21:26
27	08:11	07:12	06:06	05:55	06:19 (3)	05:04
	16:51	17:51	18:42	20:38	32 06:56 (1)	21:27
28	08:10	07:10	06:04	05:53	06:17 (3)	05:03
	16:53	17:53	18:44	20:40	36 06:56 (1)	21:29
29	08:08		07:01	05:51	06:16 (3)	05:02
	16:55		19:46	5 07:29 (2)	38 06:56 (1)	21:30
30	08:07		06:59	05:49	07:22 (2)	05:49
	16:57		19:48	10 07:32 (2)	38 06:14 (3)	05:01
31	08:05		06:56	05:47	07:20 (2)	05:00
	16:58		19:50	14 07:34 (2)		21:32
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			29	516	623	680
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.72	0.72	0.73
Gesamte Reduktion			0.19	0.26	0.30	0.27
Met.wahrsch.Beschattung			6	132	186	183

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BD - IO56

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:51 (4)	05:34		06:28 (3)	06:26	07:20 (2)	07:18	07:14	08:08		
	21:48	06:14 (4)	21:14	5	06:33 (3)	20:09	3	07:23 (2)	18:57	16:48	16:05	
2	04:56	05:51 (4)	05:35		06:26 (3)	06:28		07:16 (2)	07:20	07:16	08:09	
	21:48	06:14 (4)	21:12	10	06:36 (3)	20:07	11	07:27 (2)	18:55	16:46	16:05	
3	04:56	05:51 (4)	05:37		06:24 (3)	06:30		07:14 (2)	07:21	07:18	08:11	
	21:47	06:15 (4)	21:11	13	06:37 (3)	20:05	14	07:28 (2)	18:52	16:44	16:04	
4	04:57	05:51 (4)	05:38		06:23 (3)	06:31		07:12 (2)	07:23	07:20	08:12	
	21:47	06:15 (4)	21:09	15	06:38 (3)	20:02	17	07:29 (2)	18:50	16:42	16:03	
5	04:58	05:51 (4)	05:40		06:23 (3)	06:33		07:12 (2)	07:25	07:22	08:14	
	21:46	06:15 (4)	21:07	17	06:40 (3)	20:00	18	07:30 (2)	18:48	16:41	16:03	
6	04:59	05:51 (4)	05:42		06:22 (3)	06:35		07:10 (2)	07:27	07:24	08:15	
	21:46	06:16 (4)	21:05	18	06:40 (3)	19:58	20	07:30 (2)	18:45	16:39	16:02	
7	05:00	05:51 (4)	05:43		06:22 (3)	06:36		07:10 (2)	07:28	07:26	08:16	
	21:45	06:16 (4)	21:03	18	06:40 (3)	19:55	20	07:30 (2)	18:43	16:37	16:02	
8	05:01	05:51 (4)	05:45		06:21 (3)	06:38		07:10 (2)	07:30	07:28	08:18	
	21:45	06:16 (4)	21:01	28	06:57 (1)	19:53	20	07:30 (2)	18:41	16:35	16:01	
9	05:02	05:52 (4)	05:47		06:21 (3)	06:40		07:09 (2)	07:32	07:30	08:19	
	21:44	06:17 (4)	20:59	32	06:59 (1)	19:50	20	07:29 (2)	18:38	16:33	16:01	
10	05:03	05:52 (4)	05:48		06:20 (3)	06:42		07:09 (2)	07:34	07:31	08:20	
	21:43	06:17 (4)	20:57	36	07:00 (1)	19:48	19	07:28 (2)	18:36	16:32	16:01	
11	05:04	05:52 (4)	05:50		06:21 (3)	06:43		07:10 (2)	07:36	07:33	08:21	
	21:42	06:17 (4)	20:55	38	07:02 (1)	19:46	18	07:28 (2)	18:34	16:30	16:01	
12	05:05	05:52 (4)	05:52		06:21 (3)	06:45		07:11 (2)	07:37	07:35	08:22	
	21:41	06:17 (4)	20:53	40	07:03 (1)	19:43	15	07:26 (2)	18:31	16:28	16:00	
13	05:06	05:52 (4)	05:54		06:22 (3)	06:47		07:13 (2)	07:39	07:37	08:23	
	21:40	06:17 (4)	20:51	38	07:03 (1)	19:41	11	07:24 (2)	18:29	16:27	16:00	
14	05:08	05:52 (4)	05:55		06:24 (3)	06:48		07:15 (2)	07:41	07:39	08:24	
	21:39	06:17 (4)	20:49	37	07:04 (1)	19:38	6	07:21 (2)	18:27	16:25	16:00	
15	05:09	05:52 (4)	05:57		06:25 (3)	06:50		07:43	07:41	08:25		
	21:38	06:17 (4)	20:47	34	07:03 (1)	19:36		18:24	16:24	16:00		
16	05:10	05:52 (4)	05:59		06:27 (3)	06:52		07:45	07:42	08:26		
	21:37	06:17 (4)	20:45	33	07:04 (1)	19:33		18:22	16:22	16:00		
17	05:11	05:53 (4)	06:00		06:29 (3)	06:54		07:46	07:44	08:27		
	21:36	06:18 (4)	20:43	27	07:04 (1)	19:31		18:20	16:21	16:01		
18	05:13	05:53 (4)	06:02		06:39 (1)	06:55		07:48	07:46	08:28		
	21:35	06:18 (4)	20:41	24	07:03 (1)	19:29		18:18	16:19	16:01		
19	05:14	05:53 (4)	06:04		06:39 (1)	06:57		07:50	07:48	08:28		
	21:34	06:17 (4)	20:39	24	07:03 (1)	19:26		18:15	16:18	16:01		
20	05:15	05:53 (4)	06:05		06:39 (1)	06:59		07:52	07:50	08:29		
	21:32	06:17 (4)	20:37	23	07:02 (1)	19:24		18:13	16:17	16:01		
21	05:17	05:54 (4)	06:07		06:39 (1)	07:00		07:54	07:51	08:30		
	21:31	06:17 (4)	20:34	22	07:01 (1)	19:21		18:11	16:15	16:02		
22	05:18	05:54 (4)	06:09		06:40 (1)	07:02		07:56	07:53	08:30		
	21:30	06:17 (4)	20:32	21	07:01 (1)	19:19		18:09	16:14	16:02		
23	05:20	05:54 (4)	06:11		06:40 (1)	07:04		07:58	07:55	08:31		
	21:28	06:16 (4)	20:30	19	06:59 (1)	19:16		18:07	16:13	16:03		
24	05:21	05:56 (4)	06:12		06:42 (1)	07:06		07:59	07:57	08:31		
	21:27	06:16 (4)	20:28	16	06:58 (1)	19:14		18:05	16:12	16:03		
25	05:23	05:56 (4)	06:14		06:44 (1)	07:07		07:01	07:58	08:31		
	21:25	06:15 (4)	20:25	12	06:56 (1)	19:12		17:02	16:11	16:04		
26	05:24	05:58 (4)	06:16			07:09		07:03	08:00	08:32		
	21:24	06:14 (4)	20:23			19:09		17:00	16:10	16:05		
27	05:26	05:58 (4)	06:18			07:11		07:05	08:02	08:32		
	21:22	06:13 (4)	20:21	15		19:07		16:58	16:09	16:06		
28	05:27	06:01 (4)	06:19			07:13		07:07	08:03	08:32		
	21:21	06:11 (4)	20:19	10		19:04		16:56	16:08	16:06		
29	05:29	06:04 (4)	06:21			07:14		07:09	08:05	08:32		
	21:19	06:08 (4)	20:16	4		19:02		16:54	16:07	16:07		
30	05:30		06:23			07:16		07:11	08:06	08:32		
	21:18		20:14			19:00		16:52	16:06	16:08		
31	05:32		06:24					07:13		08:32		
	21:16		20:12					16:50		16:09		
Sonnenscheinstunden	508		458		382		330	262	237			
astr.max.mögl.Beschattung	643		600		212							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.72							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	169		176		51							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BE - IO57

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	06:54	07:17 (2)	05:47	06:37 (1)	04:59	05:46 (4)
	16:10	17:00	17:55	19:51	17 07:34 (2)	20:45	16 06:53 (1)	21:34	24 06:10 (4)
2	08:32	08:02	07:05	06:52	07:16 (2)	05:44	06:38 (1)	04:58	05:47 (4)
	16:12	17:02	17:57	19:53	19 07:35 (2)	20:47	14 06:52 (1)	21:35	24 06:11 (4)
3	08:32	08:00	07:03	06:49	07:16 (2)	05:43	06:40 (1)	04:57	05:48 (4)
	16:13	17:04	17:58	19:55	19 07:35 (2)	20:49	9 06:49 (1)	21:36	23 06:11 (4)
4	08:32	07:58	07:01	06:47	07:15 (2)	05:41		04:56	05:48 (4)
	16:14	17:06	18:00	19:57	20 07:35 (2)	20:50		21:37	22 06:10 (4)
5	08:32	07:57	06:58	06:45	07:15 (2)	05:39		04:55	05:49 (4)
	16:15	17:08	18:02	19:59	20 07:35 (2)	20:52		21:38	22 06:11 (4)
6	08:31	07:55	06:56	06:42	07:14 (2)	05:37		04:55	05:49 (4)
	16:16	17:10	18:04	20:00	19 07:33 (2)	20:54		21:39	21 06:10 (4)
7	08:31	07:53	06:54	06:40	07:15 (2)	05:35		04:54	05:50 (4)
	16:18	17:12	18:06	20:02	18 07:33 (2)	20:56		21:40	21 06:11 (4)
8	08:30	07:51	06:51	06:37	07:16 (2)	05:33		04:53	05:49 (4)
	16:19	17:14	18:08	20:04	16 07:32 (2)	20:57		21:41	21 06:10 (4)
9	08:30	07:49	06:49	06:35	07:17 (2)	05:31		04:53	05:50 (4)
	16:20	17:16	18:10	20:06	13 07:30 (2)	20:59		21:42	20 06:10 (4)
10	08:29	07:48	06:47	06:33	07:19 (2)	05:29		04:52	05:50 (4)
	16:22	17:18	18:12	20:08	7 07:26 (2)	21:01		21:43	20 06:10 (4)
11	08:29	07:46	06:44	06:30		05:28		04:52	05:51 (4)
	16:23	17:20	18:13	20:09		21:03		21:44	19 06:10 (4)
12	08:28	07:44	06:42	06:28		05:26		04:52	05:52 (4)
	16:25	17:22	18:15	20:11		21:04		21:44	18 06:10 (4)
13	08:27	07:42	06:40	06:26		05:24	05:54 (4)	04:51	05:52 (4)
	16:26	17:24	18:17	20:13		21:06	7 06:01 (4)	21:45	18 06:10 (4)
14	08:26	07:40	06:37	06:24		05:22	05:51 (4)	04:51	05:52 (4)
	16:28	17:26	18:19	20:15		21:08	12 06:03 (4)	21:46	17 06:09 (4)
15	08:25	07:38	06:35	06:21		05:21	05:50 (4)	04:51	05:22 (9)
	16:30	17:28	18:21	20:17		21:09	15 06:05 (4)	21:46	19 06:09 (4)
16	08:24	07:36	06:32	06:19		05:19	05:48 (4)	04:51	05:22 (9)
	16:31	17:30	18:23	20:18		21:11	18 06:06 (4)	21:47	20 06:10 (4)
17	08:23	07:34	06:30	06:17	06:42 (1)	05:18	05:48 (4)	04:51	05:22 (9)
	16:33	17:32	18:24	20:20	11 06:53 (1)	21:12	19 06:07 (4)	21:47	20 06:10 (4)
18	08:22	07:32	06:28	06:14	06:39 (1)	05:16	05:48 (4)	04:50	05:22 (9)
	16:35	17:34	18:26	20:22	16 06:55 (1)	21:14	20 06:08 (4)	21:48	20 06:10 (4)
19	08:21	07:29	06:25	06:12	06:38 (1)	05:14	05:46 (4)	04:51	05:22 (9)
	16:36	17:35	18:28	20:24	18 06:56 (1)	21:16	22 06:08 (4)	21:48	20 06:10 (4)
20	08:20	07:27	06:23	06:10	06:37 (1)	05:13	05:46 (4)	04:51	05:23 (9)
	16:38	17:37	18:30	20:26	20 06:57 (1)	21:17	23 06:09 (4)	21:48	20 06:11 (4)
21	08:19	07:25	06:20	06:08	06:36 (1)	05:12	05:46 (4)	04:51	05:23 (9)
	16:40	17:39	18:32	20:27	22 06:58 (1)	21:19	24 06:10 (4)	21:49	20 06:11 (4)
22	08:18	07:23	06:18	06:06	06:35 (1)	05:10	05:45 (4)	04:51	05:23 (9)
	16:42	17:41	18:33	20:29	23 06:58 (1)	21:20	24 06:09 (4)	21:49	20 06:11 (4)
23	08:17	07:21	06:16	06:03	06:35 (1)	05:09	05:45 (4)	04:51	05:23 (9)
	16:44	17:43	18:35	20:31	23 06:58 (1)	21:22	25 06:10 (4)	21:49	20 06:11 (4)
24	08:15	07:19	06:13	06:01	06:35 (1)	05:07	05:45 (4)	04:51	05:24 (9)
	16:45	17:45	18:37	20:33	23 06:58 (1)	21:23	25 06:10 (4)	21:49	20 06:12 (4)
25	08:14	07:16	06:11	05:59	06:34 (1)	05:06	05:45 (4)	04:52	05:24 (9)
	16:47	17:47	18:39	20:35	24 06:58 (1)	21:24	25 06:10 (4)	21:49	21 06:12 (4)
26	08:13	07:14	06:08	05:57	06:33 (1)	05:05	05:46 (4)	04:52	05:24 (9)
	16:49	17:49	18:41	20:36	24 06:57 (1)	21:26	25 06:11 (4)	21:49	20 06:12 (4)
27	08:11	07:12	06:06	05:55	06:34 (1)	05:04	05:46 (4)	04:53	05:25 (9)
	16:50	17:51	18:42	20:38	22 06:56 (1)	21:27	25 06:11 (4)	21:49	18 06:12 (4)
28	08:10	07:10	06:04	05:53	06:34 (1)	05:03	05:46 (4)	04:53	05:25 (9)
	16:53	17:53	18:44	20:40	22 06:56 (1)	21:29	25 06:11 (4)	21:49	18 06:12 (4)
29	08:08		07:01	05:51	06:35 (1)	05:02	05:46 (4)	04:54	05:26 (4)
	16:55		19:46	6 07:30 (2)	20:42	21 06:56 (1)	21:30	25 06:11 (4)	17 06:13 (4)
30	08:07		06:59	05:49	07:22 (2)	05:49	06:36 (1)	05:01	05:46 (4)
	16:57		19:48	11 07:33 (2)	20:43	19 06:55 (1)	21:31	25 06:11 (4)	18 06:14 (4)
31	08:05		06:56	05:50	07:20 (2)	05:50		05:46 (4)	
	16:58		19:50	14 07:34 (2)		21:32	25 06:11 (4)		
Sonnenscheinstunden	253	275	367	418		491		506	
astr.max.mögl.Beschattung			31	456		448		601	
Red.Sonnenscheinwahrsch.			0.28	0.37		0.43		0.39	
Reduktion Betriebsdauer			0.96	0.96		0.96		0.96	
Reduktion Windrichtung			0.72	0.72		0.73		0.73	
Gesamte Reduktion			0.19	0.26		0.30		0.27	
Met.wahrsch.Beschattung			6	117		134		162	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BE - IO57

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:55 (4)	05:34		06:26		07:18	07:14	08:08			
	21:48	06:14 (4)	21:14		20:09		18:57	16:48	16:05			
2	04:56	05:55 (4)	05:35		06:28		07:18 (2)	07:20	07:16	08:09		
	21:48	06:15 (4)	21:12		20:07	7	07:25 (2)	18:55	16:46	16:05		
3	04:56	05:56 (4)	05:37		06:30		07:14 (2)	07:21	07:18	08:11		
	21:47	06:15 (4)	21:11		20:05	13	07:27 (2)	18:52	16:44	16:04		
4	04:57	05:55 (4)	05:38		06:31		07:13 (2)	07:23	07:20	08:12		
	21:47	06:15 (4)	21:09		20:02	16	07:29 (2)	18:50	16:42	16:03		
5	04:58	05:55 (4)	05:40		06:33		07:12 (2)	07:25	07:22	08:14		
	21:46	06:16 (4)	21:07		20:00	18	07:30 (2)	18:48	16:41	16:03		
6	04:59	05:55 (4)	05:42		06:35		07:10 (2)	07:27	07:24	08:15		
	21:46	06:16 (4)	21:05		19:58	19	07:29 (2)	18:45	16:39	16:02		
7	05:00	05:55 (4)	05:43		06:36		07:10 (2)	07:28	07:26	08:16		
	21:45	06:17 (4)	21:03		19:55	20	07:30 (2)	18:43	16:37	16:02		
8	05:01	05:55 (4)	05:45		06:38		07:10 (2)	07:30	07:28	08:18		
	21:45	06:17 (4)	21:01		19:53	20	07:30 (2)	18:41	16:35	16:01		
9	05:02	05:55 (4)	05:47		06:40		07:09 (2)	07:32	07:30	08:19		
	21:44	06:18 (4)	20:59	3	06:55 (1)	19:50	07:29 (2)	18:38	16:33	16:01		
10	05:03	05:55 (4)	05:48		06:48 (1)	06:42	07:09 (2)	07:34	07:31	08:20		
	21:43	06:18 (4)	20:57	10	06:58 (1)	19:48	07:28 (2)	18:36	16:32	16:01		
11	05:04	05:55 (4)	05:50		06:46 (1)	06:43	07:10 (2)	07:36	07:33	08:21		
	21:42	06:19 (4)	20:55	15	07:01 (1)	19:46	07:28 (2)	18:34	16:30	16:01		
12	05:05	05:55 (4)	05:52		06:45 (1)	06:45	07:11 (2)	07:37	07:35	08:22		
	21:41	06:19 (4)	20:53	17	07:02 (1)	19:43	07:26 (2)	18:31	16:28	16:00		
13	05:06	05:55 (4)	05:54		06:43 (1)	06:47	07:13 (2)	07:39	07:37	08:23		
	21:40	06:19 (4)	20:51	19	07:02 (1)	19:41	07:24 (2)	18:29	16:27	16:00		
14	05:08	05:55 (4)	05:55		06:43 (1)	06:48	07:15 (2)	07:41	07:39	08:24		
	21:39	06:19 (4)	20:49	21	07:04 (1)	19:38	07:22 (2)	18:27	16:25	16:00		
15	05:09	05:54 (4)	05:57		06:41 (1)	06:50		07:43	07:41	08:25		
	21:38	06:19 (4)	20:47	22	07:03 (1)	19:36		18:24	16:24	16:00		
16	05:10	05:54 (4)	05:59		06:41 (1)	06:52		07:45	07:42	08:26		
	21:37	06:19 (4)	20:45	23	07:04 (1)	19:33		18:22	16:22	16:00		
17	05:11	05:55 (4)	06:00		06:41 (1)	06:54		07:46	07:44	08:27		
	21:36	06:20 (4)	20:43	23	07:04 (1)	19:31		18:20	16:21	16:01		
18	05:13	05:55 (4)	06:02		06:40 (1)	06:55		07:48	07:46	08:28		
	21:35	06:20 (4)	20:41	24	07:04 (1)	19:29		18:18	16:19	16:01		
19	05:14	05:55 (4)	06:04		06:40 (1)	06:57		07:50	07:48	08:28		
	21:34	06:20 (4)	20:39	24	07:04 (1)	19:26		18:15	16:18	16:01		
20	05:15	05:55 (4)	06:05		06:40 (1)	06:59		07:52	07:50	08:29		
	21:32	06:20 (4)	20:37	23	07:03 (1)	19:24		18:13	16:17	16:01		
21	05:17	05:56 (4)	06:07		06:40 (1)	07:00		07:54	07:51	08:30		
	21:31	06:20 (4)	20:34	23	07:03 (1)	19:21		18:11	16:15	16:02		
22	05:18	05:56 (4)	06:09		06:41 (1)	07:02		07:56	07:53	08:30		
	21:30	06:20 (4)	20:32	21	07:02 (1)	19:19		18:09	16:14	16:02		
23	05:20	05:56 (4)	06:11		06:41 (1)	07:04		07:58	07:55	08:31		
	21:28	06:19 (4)	20:30	20	07:01 (1)	19:16		18:07	16:13	16:03		
24	05:21	05:57 (4)	06:12		06:42 (1)	07:06		07:59	07:57	08:31		
	21:27	06:19 (4)	20:28	18	07:00 (1)	19:14		18:05	16:12	16:03		
25	05:23	05:57 (4)	06:14		06:43 (1)	07:07		07:01	07:58	08:31		
	21:25	06:18 (4)	20:25	15	06:58 (1)	19:12		17:02	16:11	16:04		
26	05:24	05:58 (4)	06:16		06:45 (1)	07:09		07:03	08:00	08:32		
	21:24	06:18 (4)	20:23	10	06:55 (1)	19:09		17:00	16:10	16:05		
27	05:26	05:59 (4)	06:18			07:11		07:05	08:02	08:32		
	21:22	06:17 (4)	20:21			19:07		16:58	16:09	16:06		
28	05:27	06:00 (4)	06:19			07:13		07:07	08:03	08:32		
	21:21	06:17 (4)	20:19			19:04		16:56	16:08	16:06		
29	05:29	06:01 (4)	06:21			07:14		07:09	08:05	08:32		
	21:19	06:15 (4)	20:16			19:02		16:54	16:07	16:07		
30	05:30	06:02 (4)	06:23			07:16		07:11	08:06	08:32		
	21:18	06:13 (4)	20:14			19:00		16:52	16:06	16:08		
31	05:32	06:06 (4)	06:24					07:13		08:32		
	21:16	06:10 (4)	20:12					16:50		16:09		
Sonnenscheinstunden	508		458		382		330	262	237			
astr.max.mögl.Beschattung	654		331		203							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.72							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	172		96		48							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BF - IO58

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32 16:10	08:03 17:00	07:08 17:55	06:54 19:51	07:18 (2) 05:47 19:51	04:59 05:55 (4) 21:34	17	06:12 (4)
2	08:32 16:12	08:02 17:02	07:05 17:57	06:52 19:53	07:18 (2) 05:44 19:53	04:58 05:57 (4) 21:35	16	06:13 (4)
3	08:32 16:13	08:00 17:04	07:03 17:58	06:49 19:55	07:18 (2) 05:43 19:55	04:57 05:57 (4) 21:36	15	06:12 (4)
4	08:32 16:14	07:58 17:06	07:01 18:00	06:47 19:57	07:17 (2) 05:41 19:57	04:56 05:58 (4) 21:37	13	06:11 (4)
5	08:32 16:15	07:57 17:08	06:58 18:02	06:45 19:59	07:18 (2) 05:39 19:59	04:55 05:26 (9) 21:38	14	06:11 (4)
6	08:31 16:16	07:55 17:10	06:56 18:04	06:42 20:00	07:18 (2) 05:37 20:00	04:55 05:25 (9) 21:39	14	06:09 (4)
7	08:31 16:18	07:53 17:12	06:54 18:06	06:40 20:02	07:19 (2) 05:35 20:02	04:54 05:25 (9) 21:40	13	06:09 (4)
8	08:30 16:19	07:51 17:14	06:51 18:08	06:37 20:04	07:21 (2) 05:33 20:04	04:53 05:24 (9) 21:41	9	06:06 (4)
9	08:30 16:20	07:49 17:16	06:49 18:10	06:35 20:06	07:30 (2) 05:31 20:06	04:53 05:24 (9) 21:42	8	05:32 (9)
10	08:29 16:22	07:48 17:18	06:47 18:12	06:33 20:08	05:29 21:01	05:57 (4) 04:52 05:23 (9)	9	05:32 (9)
11	08:29 16:23	07:46 17:20	06:44 18:13	06:30 20:09	05:28 21:03	05:55 (4) 04:52 05:23 (9)	10	05:33 (9)
12	08:28 16:25	07:44 17:22	06:42 18:15	06:28 20:11	05:26 21:04	05:54 (4) 04:52 05:23 (9)	11	05:34 (9)
13	08:27 16:26	07:42 17:24	06:40 18:17	06:26 20:13	05:24 21:06	06:12 (4) 04:51 05:23 (9)	11	05:34 (9)
14	08:26 16:28	07:40 17:26	06:37 18:19	06:24 20:15	06:49 (1) 05:22 20:15	06:13 (4) 04:51 05:22 (9)	12	05:34 (9)
15	08:25 16:30	07:38 17:28	06:35 18:21	06:21 20:17	06:46 (1) 05:21 20:17	05:52 (4) 04:51 05:22 (9)	12	05:34 (9)
16	08:24 16:31	07:36 17:30	06:32 18:23	06:19 20:18	06:58 (1) 05:19 20:18	06:14 (4) 04:51 05:22 (9)	13	05:35 (9)
17	08:23 16:33	07:34 17:32	06:30 18:24	06:17 20:20	07:00 (1) 05:18 20:20	06:14 (4) 04:51 05:22 (9)	13	05:35 (9)
18	08:22 16:35	07:32 17:34	06:28 18:26	06:14 20:22	06:42 (1) 05:16 20:22	06:15 (4) 04:50 05:22 (9)	13	05:35 (9)
19	08:21 16:36	07:29 17:35	06:25 18:28	06:12 20:24	07:01 (1) 05:14 20:24	05:51 (4) 04:51 05:22 (9)	13	05:35 (9)
20	08:20 16:38	07:27 17:37	06:23 18:30	06:10 20:26	07:01 (1) 05:13 20:26	05:51 (4) 04:51 05:23 (9)	13	05:36 (9)
21	08:19 16:40	07:25 17:39	06:21 18:32	06:08 20:27	07:02 (1) 05:12 20:27	06:15 (4) 04:51 05:23 (9)	13	05:36 (9)
22	08:18 16:42	07:23 17:41	06:18 18:33	06:06 20:29	06:39 (1) 05:10 20:29	05:51 (4) 04:51 05:23 (9)	13	05:36 (9)
23	08:17 16:44	07:21 17:43	06:16 18:35	06:03 20:31	07:02 (1) 05:09 20:31	06:15 (4) 04:51 05:23 (9)	13	05:36 (9)
24	08:15 16:45	07:19 17:45	06:13 18:37	06:01 20:33	07:01 (1) 05:07 20:33	05:52 (4) 04:51 05:24 (9)	13	05:37 (9)
25	08:14 16:47	07:16 17:47	06:11 18:39	05:59 20:35	07:01 (1) 05:06 20:35	05:52 (4) 04:52 05:24 (9)	13	05:37 (9)
26	08:13 16:49	07:14 17:49	06:08 18:41	05:57 20:36	07:00 (1) 05:05 20:36	06:15 (4) 04:52 05:24 (9)	13	05:37 (9)
27	08:11 16:51	07:12 17:51	06:06 18:42	05:55 20:38	06:58 (1) 05:04 20:38	06:15 (4) 04:53 05:25 (9)	12	05:37 (9)
28	08:10 16:53	07:10 17:53	06:04 18:44	05:53 20:40	06:57 (1) 05:03 20:40	06:15 (4) 04:53 05:25 (9)	12	05:37 (9)
29	08:08 16:55	07:07 17:55	06:02 18:46	05:51 20:42	06:41 (1) 05:02 20:42	06:14 (4) 04:54 05:26 (9)	11	05:37 (9)
30	08:07 16:57	07:05 17:57	06:00 18:48	05:49 20:43	06:55 (1) 05:01 20:43	06:14 (4) 04:54 05:27 (9)	11	05:38 (9)
31	08:05 16:58	07:03 17:59	05:58 18:50	05:47 20:44	06:52 (1) 05:00 20:44	05:54 (4) 04:54 05:28 (9)	11	05:38 (9)
Sonnenscheinstunden	253	275	367	418	491	506		
astr.max.mögl.Beschattung			49	426	477	373		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.71	0.72	0.73	0.72		
Gesamte Reduktion			0.19	0.26	0.30	0.27		
Met.wahrsch.Beschattung			9	109	143	99		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BF - IO58

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:27 (9)	05:34	06:05 (4)	06:26		07:18	07:14	08:08			
	21:48	10 05:37 (9)	21:14	17 06:22 (4)	20:09		18:57	16:48	16:05			
2	04:56	05:28 (9)	05:35	06:06 (4)	06:28		07:20	07:16	08:09			
	21:48	9 05:37 (9)	21:12	15 06:21 (4)	20:07		18:55	16:46	16:05			
3	04:56	05:29 (9)	05:37	06:07 (4)	06:30		07:21	07:18	08:11			
	21:47	9 05:38 (9)	21:11	11 06:18 (4)	20:05		18:52	16:44	16:04			
4	04:57	05:29 (9)	05:38	06:11 (4)	06:31		07:23	07:20	08:12			
	21:47	8 05:37 (9)	21:09	5 06:16 (4)	20:02	9	07:27 (2)	18:50	16:42	16:03		
5	04:58	05:30 (9)	05:40	06:33	07:16 (2)	07:25	07:22	08:14				
	21:46	12 06:13 (4)	21:07	20:00	13 07:29 (2)	18:48	16:41	16:03				
6	04:59	05:31 (9)	05:42	06:35	07:14 (2)	07:27	07:24	08:15				
	21:46	13 06:15 (4)	21:05	19:58	16 07:30 (2)	18:45	16:39	16:02				
7	05:00	05:32 (9)	05:43	06:36	07:13 (2)	07:28	07:26	08:16				
	21:45	15 06:17 (4)	21:03	19:55	17 07:30 (2)	18:43	16:37	16:02				
8	05:01	05:33 (9)	05:45	06:38	07:12 (2)	07:30	07:28	08:18				
	21:45	14 06:18 (4)	21:01	19:53	19 07:31 (2)	18:41	16:35	16:01				
9	05:02	06:05 (4)	05:47	06:40	07:11 (2)	07:32	07:30	08:19				
	21:44	14 06:19 (4)	20:59	19:50	19 07:30 (2)	18:38	16:33	16:01				
10	05:03	06:05 (4)	05:48	06:42	07:11 (2)	07:34	07:31	08:20				
	21:43	15 06:20 (4)	20:57	19:48	19 07:30 (2)	18:36	16:32	16:01				
11	05:04	06:04 (4)	05:50	06:43	07:11 (2)	07:36	07:33	08:21				
	21:42	16 06:20 (4)	20:55	19:46	19 07:30 (2)	18:34	16:30	16:01				
12	05:05	06:04 (4)	05:52	06:45	07:11 (2)	07:37	07:35	08:22				
	21:41	17 06:21 (4)	20:53	19:43	18 07:29 (2)	18:31	16:28	16:00				
13	05:06	06:03 (4)	05:54	06:52 (1)	06:47	07:13 (2)	07:39	07:37	08:23			
	21:40	19 06:22 (4)	20:51	9 07:01 (1)	19:41	15 07:28 (2)	18:29	16:27	16:00			
14	05:08	06:03 (4)	05:55	06:50 (1)	06:48	07:15 (2)	07:41	07:39	08:24			
	21:39	19 06:22 (4)	20:49	13 07:03 (1)	19:38	12 07:27 (2)	18:27	16:25	16:00			
15	05:09	06:02 (4)	05:57	06:48 (1)	06:50	07:16 (2)	07:43	07:41	08:25			
	21:38	21 06:23 (4)	20:47	16 07:04 (1)	19:36	8 07:24 (2)	18:24	16:24	16:00			
16	05:10	06:02 (4)	05:59	06:47 (1)	06:52	07:17 (2)	07:45	07:43	08:26			
	21:37	21 06:23 (4)	20:45	18 07:05 (1)	19:33	18:22	16:22	16:00				
17	05:11	06:02 (4)	06:00	06:46 (1)	06:54	07:46	07:44	08:27				
	21:36	22 06:24 (4)	20:43	20 07:06 (1)	19:31	18:20	16:21	16:01				
18	05:13	06:02 (4)	06:02	06:45 (1)	06:55	07:48	07:46	08:28				
	21:35	22 06:24 (4)	20:41	21 07:06 (1)	19:29	18:18	16:19	16:01				
19	05:14	06:01 (4)	06:04	06:45 (1)	06:57	07:50	07:48	08:28				
	21:34	24 06:25 (4)	20:39	22 07:07 (1)	19:26	18:15	16:18	16:01				
20	05:15	06:01 (4)	06:05	06:43 (1)	06:59	07:52	07:50	08:29				
	21:32	24 06:25 (4)	20:37	23 07:06 (1)	19:24	18:13	16:17	16:01				
21	05:17	06:02 (4)	06:07	06:44 (1)	07:00	07:54	07:51	08:30				
	21:31	23 06:25 (4)	20:34	22 07:06 (1)	19:21	18:11	16:15	16:02				
22	05:18	06:01 (4)	06:09	06:44 (1)	07:02	07:56	07:53	08:30				
	21:30	24 06:25 (4)	20:32	22 07:06 (1)	19:19	18:09	16:14	16:02				
23	05:20	06:01 (4)	06:11	06:43 (1)	07:04	07:58	07:55	08:31				
	21:28	24 06:25 (4)	20:30	22 07:05 (1)	19:16	18:07	16:13	16:03				
24	05:21	06:02 (4)	06:12	06:44 (1)	07:06	07:59	07:57	08:31				
	21:27	24 06:26 (4)	20:28	21 07:05 (1)	19:14	18:05	16:12	16:03				
25	05:23	06:01 (4)	06:14	06:44 (1)	07:07	07:01	07:58	08:31				
	21:25	24 06:25 (4)	20:25	20 07:04 (1)	19:12	17:02	16:11	16:04				
26	05:24	06:02 (4)	06:16	06:44 (1)	07:09	07:03	08:00	08:32				
	21:24	24 06:26 (4)	20:23	19 07:03 (1)	19:09	17:00	16:10	16:05				
27	05:26	06:02 (4)	06:18	06:46 (1)	07:11	07:05	08:02	08:32				
	21:22	23 06:25 (4)	20:21	15 07:01 (1)	19:07	16:58	16:09	16:06				
28	05:27	06:03 (4)	06:19	06:47 (1)	07:13	07:07	08:03	08:32				
	21:21	22 06:25 (4)	20:19	11 06:58 (1)	19:04	16:56	16:08	16:06				
29	05:29	06:03 (4)	06:21	06:51 (1)	07:14	07:09	08:05	08:32				
	21:19	21 06:24 (4)	20:16	4 06:55 (1)	19:02	16:54	16:07	16:07				
30	05:30	06:03 (4)	06:23		07:16	07:11	08:06	08:32				
	21:18	20 06:23 (4)	20:14		19:00	16:52	16:06	16:08				
31	05:32	06:04 (4)	06:24			07:13		08:32				
	21:16	19 06:23 (4)	20:12			16:50		16:09				
Sonnenscheinstunden	508		458		382		330	262	237			
astr.max.mögl.Beschattung	572		346		184							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	151		101		44							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BG - IO59

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:08	06:54	07:17 (2)	05:47
	16:10	17:00	17:55	19:51	17 07:34 (2)	20:45
2	08:32	08:02	07:05	06:52	07:16 (2)	05:44
	16:12	17:02	17:57	19:53	19 07:35 (2)	20:47
3	08:32	08:00	07:03	06:49	07:15 (2)	05:42
	16:13	17:04	17:58	19:55	20 07:35 (2)	20:49
4	08:32	07:58	07:01	06:47	07:14 (2)	05:41
	16:14	17:06	18:00	19:57	21 07:35 (2)	20:50
5	08:32	07:57	06:58	06:45	07:14 (2)	05:39
	16:15	17:08	18:02	19:59	21 07:35 (2)	20:52
6	08:31	07:55	06:56	06:42	07:14 (2)	05:37
	16:16	17:10	18:04	20:00	19 07:33 (2)	20:54
7	08:31	07:53	06:54	06:40	07:14 (2)	05:35
	16:18	17:12	18:06	20:02	19 07:33 (2)	20:56
8	08:30	07:51	06:51	06:37	07:15 (2)	05:33
	16:19	17:14	18:08	20:04	17 07:32 (2)	20:57
9	08:30	07:49	06:49	06:35	07:16 (2)	05:31
	16:20	17:16	18:10	20:06	15 07:31 (2)	20:59
10	08:29	07:48	06:47	06:33	07:17 (2)	05:29
	16:22	17:18	18:11	20:08	11 07:28 (2)	21:01
11	08:29	07:46	06:44	06:30	07:20 (2)	05:28
	16:23	17:20	18:13	20:09	5 07:25 (2)	21:03
12	08:28	07:44	06:42	06:28	05:26	
	16:25	17:22	18:15	20:11	21:04	2 06:21 (3)
13	08:27	07:42	06:40	06:26	05:24	
	16:26	17:24	18:17	20:13	21:06	
14	08:26	07:40	06:37	06:24	05:22	
	16:28	17:26	18:19	20:15	21:08	
15	08:25	07:38	06:35	06:21	05:21	
	16:30	17:28	18:21	20:17	21:09	6 05:52 (4)
16	08:24	07:36	06:32	06:19	05:19	
	16:31	17:30	18:23	20:18	21:11	11 06:00 (4)
17	08:23	07:34	06:30	06:17	05:18	
	16:33	17:32	18:24	20:20	21:12	15 06:02 (4)
18	08:22	07:32	06:28	06:14	06:40 (1)	05:16
	16:35	17:34	18:26	20:22	11 06:51 (1)	21:14
19	08:21	07:29	06:25	06:12	06:38 (1)	05:14
	16:36	17:35	18:28	20:24	15 06:53 (1)	21:16
20	08:20	07:27	06:23	06:10	06:36 (1)	05:13
	16:38	17:37	18:30	20:26	19 06:55 (1)	21:17
21	08:19	07:25	06:20	06:08	06:35 (1)	05:12
	16:40	17:39	18:32	20:27	21 06:56 (1)	21:19
22	08:18	07:23	06:18	06:06	06:34 (1)	05:10
	16:42	17:41	18:33	20:29	22 06:56 (1)	21:20
23	08:17	07:21	06:16	06:03	06:34 (1)	05:09
	16:44	17:43	18:35	20:31	23 06:57 (1)	21:22
24	08:15	07:19	06:13	06:01	06:33 (1)	05:07
	16:45	17:45	18:37	20:33	24 06:57 (1)	21:23
25	08:14	07:16	06:11	05:59	06:33 (1)	05:06
	16:47	17:47	18:39	20:35	24 06:57 (1)	21:24
26	08:13	07:14	06:08	05:57	06:21 (3)	05:05
	16:49	17:49	18:41	20:36	27 06:56 (1)	21:26
27	08:11	07:12	06:06	05:55	06:19 (3)	05:04
	16:51	17:51	18:42	20:38	32 06:56 (1)	21:27
28	08:10	07:10	06:04	05:53	06:17 (3)	05:03
	16:53	17:53	18:44	20:40	34 06:55 (1)	21:29
29	08:08		07:01	05:51	06:16 (3)	05:02
	16:55		19:46	5 07:29 (2)	37 06:56 (1)	21:30
30	08:07		06:59	05:49	07:22 (2)	05:49
	16:57		19:48	10 07:32 (2)	39 06:55 (1)	21:31
31	08:05		06:56	05:47	07:20 (2)	05:47
	16:58		19:50	14 07:34 (2)	05:00	21:32
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			29	512	623	687
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.72	0.72	0.72	0.73
Gesamte Reduktion			0.19	0.26	0.30	0.27
Met.wahrsch.Beschattung			6	131	186	185

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BG - IO59

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 816 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:50 (4)	05:34		06:27 (3)	06:26	07:19 (2)	07:18	07:14	08:08		
	21:48	06:13 (4)	21:14	6	06:33 (3)	20:09	5	07:24 (2)	18:57	16:48	16:05	
2	04:56	05:51 (4)	05:35		06:26 (3)	06:28		07:16 (2)	07:20	07:16	08:09	
	21:48	06:14 (4)	21:12	10	06:36 (3)	20:07	11	07:27 (2)	18:55	16:46	16:05	
3	04:56	05:51 (4)	05:37		06:24 (3)	06:30		07:13 (2)	07:21	07:18	08:11	
	21:47	06:15 (4)	21:11	13	06:37 (3)	20:05	15	07:28 (2)	18:52	16:44	16:04	
4	04:57	05:50 (4)	05:38		06:23 (3)	06:31		07:12 (2)	07:23	07:20	08:12	
	21:47	06:14 (4)	21:09	15	06:38 (3)	20:02	17	07:29 (2)	18:50	16:42	16:03	
5	04:58	05:51 (4)	05:40		06:23 (3)	06:33		07:11 (2)	07:25	07:22	08:14	
	21:46	06:15 (4)	21:07	17	06:40 (3)	20:00	19	07:30 (2)	18:48	16:41	16:03	
6	04:59	05:51 (4)	05:42		06:21 (3)	06:35		07:10 (2)	07:27	07:24	08:15	
	21:46	06:15 (4)	21:05	18	06:39 (3)	19:58	19	07:29 (2)	18:45	16:39	16:02	
7	05:00	05:51 (4)	05:43		06:21 (3)	06:36		07:09 (2)	07:28	07:26	08:16	
	21:45	06:16 (4)	21:03	19	06:40 (3)	19:55	21	07:30 (2)	18:43	16:37	16:02	
8	05:01	05:51 (4)	05:45		06:20 (3)	06:38		07:09 (2)	07:30	07:28	08:18	
	21:45	06:16 (4)	21:01	29	06:57 (1)	19:53	21	07:30 (2)	18:41	16:35	16:01	
9	05:02	05:51 (4)	05:47		06:21 (3)	06:40		07:09 (2)	07:32	07:30	08:19	
	21:44	06:16 (4)	20:59	32	06:59 (1)	19:50	20	07:29 (2)	18:38	16:33	16:01	
10	05:03	05:51 (4)	05:48		06:20 (3)	06:42		07:09 (2)	07:34	07:31	08:20	
	21:43	06:17 (4)	20:57	36	07:00 (1)	19:48	19	07:28 (2)	18:36	16:32	16:01	
11	05:04	05:51 (4)	05:50		06:20 (3)	06:43		07:10 (2)	07:36	07:33	08:21	
	21:42	06:17 (4)	20:55	39	07:02 (1)	19:46	17	07:27 (2)	18:34	16:30	16:01	
12	05:05	05:51 (4)	05:52		06:21 (3)	06:45		07:11 (2)	07:37	07:35	08:22	
	21:41	06:17 (4)	20:53	39	07:03 (1)	19:43	14	07:25 (2)	18:31	16:28	16:00	
13	05:06	05:51 (4)	05:54		06:22 (3)	06:47		07:13 (2)	07:39	07:37	08:23	
	21:40	06:17 (4)	20:51	38	07:03 (1)	19:41	11	07:24 (2)	18:29	16:27	16:00	
14	05:08	05:51 (4)	05:55		06:24 (3)	06:48		07:15 (2)	07:41	07:39	08:24	
	21:39	06:17 (4)	20:49	37	07:03 (1)	19:38	6	07:21 (2)	18:27	16:25	16:00	
15	05:09	05:51 (4)	05:57		06:25 (3)	06:50		07:43	07:41	08:25		
	21:38	06:17 (4)	20:47	35	07:03 (1)	19:36		18:24	16:24	16:00		
16	05:10	05:51 (4)	05:59		06:27 (3)	06:52		07:45	07:42	08:26		
	21:37	06:17 (4)	20:45	31	07:03 (1)	19:33		18:22	16:22	16:00		
17	05:11	05:52 (4)	06:00		06:29 (3)	06:54		07:46	07:44	08:27		
	21:36	06:18 (4)	20:43	26	07:04 (1)	19:31		18:20	16:21	16:01		
18	05:13	05:52 (4)	06:02		06:39 (1)	06:55		07:48	07:46	08:28		
	21:35	06:17 (4)	20:41	24	07:03 (1)	19:29		18:18	16:19	16:01		
19	05:14	05:52 (4)	06:04		06:39 (1)	06:57		07:50	07:48	08:28		
	21:34	06:17 (4)	20:39	24	07:03 (1)	19:26		18:15	16:18	16:01		
20	05:15	05:53 (4)	06:05		06:39 (1)	06:59		07:52	07:50	08:29		
	21:32	06:17 (4)	20:37	22	07:01 (1)	19:24		18:13	16:17	16:01		
21	05:17	05:54 (4)	06:07		06:39 (1)	07:00		07:54	07:51	08:30		
	21:31	06:17 (4)	20:34	22	07:01 (1)	19:21		18:11	16:15	16:02		
22	05:18	05:54 (4)	06:09		06:40 (1)	07:02		07:56	07:53	08:30		
	21:30	06:16 (4)	20:32	20	07:00 (1)	19:19		18:09	16:14	16:02		
23	05:20	05:54 (4)	06:11		06:40 (1)	07:04		07:58	07:55	08:31		
	21:28	06:15 (4)	20:30	18	06:58 (1)	19:16		18:07	16:13	16:03		
24	05:21	05:55 (4)	06:12		06:42 (1)	07:06		07:59	07:57	08:31		
	21:27	06:15 (4)	20:28	15	06:57 (1)	19:14		18:05	16:12	16:03		
25	05:23	05:56 (4)	06:14		06:44 (1)	07:07		07:01	07:58	08:31		
	21:25	06:14 (4)	20:25	11	06:55 (1)	19:12		17:02	16:11	16:04		
26	05:24	05:58 (4)	06:16			07:09		07:03	08:00	08:32		
	21:24	06:14 (4)	20:23			19:09		17:00	16:10	16:05		
27	05:26	05:58 (4)	06:18			07:11		07:05	08:02	08:32		
	21:22	06:12 (4)	20:21			19:07		16:58	16:09	16:06		
28	05:27	06:01 (4)	06:19			07:13		07:07	08:03	08:32		
	21:21	06:11 (4)	20:19			19:04		16:56	16:08	16:06		
29	05:29		06:21			07:14		07:09	08:05	08:32		
	21:19		20:16			19:02		16:54	16:07	16:07		
30	05:30		06:23			07:16		07:11	08:06	08:32		
	21:18		20:14			19:00		16:52	16:06	16:08		
31	05:32		06:24					07:13		08:32		
	21:16		20:12					16:50		16:09		
Sonnenscheinstunden	508		458		382			330	262	237		
astr.max.mögl.Beschattung	643		596		215							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.72							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	169		174		51							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BH - IO60

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:19 (2)	05:46	06:15 (3)	04:59
	16:10	17:00	17:55	19:51	20	07:39 (2)	20:45	36
2	08:32	08:02	07:05	06:52	07:19 (2)	05:44	06:15 (3)	04:58
	16:12	17:02	17:57	19:53	21	07:40 (2)	20:47	32
3	08:32	08:00	07:03	06:49	07:19 (2)	05:42	06:15 (3)	04:57
	16:13	17:04	17:58	19:55	21	07:40 (2)	20:49	26
4	08:32	07:58	07:01	06:47	07:18 (2)	05:41	06:15 (3)	04:56
	16:14	17:06	18:00	19:57	20	07:38 (2)	20:50	19
5	08:32	07:57	06:58	06:45	07:19 (2)	05:39	06:15 (3)	04:55
	16:15	17:08	18:02	19:59	19	07:38 (2)	20:52	18
6	08:31	07:55	06:56	06:42	07:19 (2)	05:37	06:15 (3)	04:55
	16:16	17:10	18:04	20:00	17	07:36 (2)	20:54	17
7	08:31	07:53	06:54	06:40	07:20 (2)	05:35	06:16 (3)	04:54
	16:18	17:12	18:06	20:02	15	07:35 (2)	20:56	16
8	08:30	07:51	06:51	06:37	07:21 (2)	05:33	06:17 (3)	04:53
	16:19	17:14	18:08	20:04	13	07:34 (2)	20:57	13
9	08:30	07:49	06:49	06:35	07:24 (2)	05:31	06:18 (3)	04:53
	16:20	17:16	18:10	20:06	7	07:31 (2)	20:59	11
10	08:29	07:48	06:47	06:33	07:31 (2)	05:29	06:22 (3)	04:52
	16:22	17:18	18:11	20:08		21:01	5	06:27 (3)
11	08:29	07:46	06:44	06:30		05:28		22
	16:23	17:20	18:13	20:09		21:03		21
12	08:28	07:44	06:42	06:28		05:26		04:52
	16:25	17:22	18:15	20:11		21:04		21
13	08:27	07:42	06:40	06:26		05:24	05:55 (4)	04:51
	16:26	17:24	18:17	20:13		21:06	7	06:02 (4)
14	08:26	07:40	06:37	06:24		05:22		05:52 (4)
	16:28	17:26	18:19	20:15		21:08	12	06:04 (4)
15	08:25	07:38	06:35	06:21		05:21		05:51 (4)
	16:30	17:28	18:21	20:17		21:09	16	06:07 (4)
16	08:24	07:36	06:32	06:19	06:45 (1)	05:19		05:49 (4)
	16:31	17:30	18:23	20:18	12	06:57 (1)	21:11	18
17	08:23	07:34	06:30	06:17	06:42 (1)	05:17		05:49 (4)
	16:33	17:32	18:24	20:20	16	06:58 (1)	21:12	20
18	08:22	07:32	06:28	06:14	06:41 (1)	05:16		05:48 (4)
	16:35	17:34	18:26	20:22	18	06:59 (1)	21:14	22
19	08:21	07:29	06:25	06:12	06:40 (1)	05:14		05:47 (4)
	16:36	17:35	18:28	20:24	20	07:00 (1)	21:16	23
20	08:20	07:27	06:23	06:10	06:39 (1)	05:13		05:47 (4)
	16:38	17:37	18:30	20:26	22	07:01 (1)	21:17	24
21	08:19	07:25	06:20	06:08	06:38 (1)	05:12		05:47 (4)
	16:40	17:39	18:32	20:27	24	07:02 (1)	21:19	24
22	08:18	07:23	06:18	06:06	06:38 (1)	05:10		05:46 (4)
	16:42	17:41	18:33	20:29	24	07:02 (1)	21:20	25
23	08:17	07:21	06:16	06:03	06:37 (1)	05:09		05:46 (4)
	16:44	17:43	18:35	20:31	25	07:02 (1)	21:22	25
24	08:15	07:19	06:13	06:01	06:37 (1)	05:07		05:46 (4)
	16:45	17:45	18:37	20:33	25	07:02 (1)	21:23	26
25	08:14	07:16	06:11	05:59	06:24 (3)	05:06		05:46 (4)
	16:47	17:47	18:39	20:35	32	07:02 (1)	21:24	26
26	08:13	07:14	06:08	05:57	06:21 (3)	05:05		05:46 (4)
	16:49	17:49	18:41	20:36	34	07:00 (1)	21:26	26
27	08:11	07:12	06:06	05:55	06:19 (3)	05:04		05:46 (4)
	16:51	17:51	18:42	1	06:31 (2)	20:38	38	07:00 (1)
28	08:10	07:10	06:04	05:53	06:27 (2)	05:03		05:46 (4)
	16:53	17:53	18:44	9	06:36 (2)	20:40	38	06:59 (1)
29	08:08		07:01	05:51	07:24 (2)	05:02		05:46 (4)
	16:55		19:46	13	07:37 (2)	20:42	40	06:59 (1)
30	08:07		06:59	05:49	07:22 (2)	05:01		05:47 (4)
	16:57		19:48	17	07:39 (2)	20:43	39	06:58 (1)
31	08:05		06:56	05:47	07:21 (2)	05:00		05:47 (4)
	16:58		19:50	19	07:40 (2)	21:32	25	06:12 (4)
Sonnenscheinstunden	253	275	367	418		491		506
astr.max.mögl.Beschattung			59	560		619		631
Red.Sonnenscheinwahrsch.			0.28	0.37		0.43		0.39
Reduktion Betriebsdauer			0.96	0.96		0.96		0.96
Reduktion Windrichtung			0.71	0.72		0.73		0.73
Gesamte Reduktion			0.19	0.26		0.30		0.27
Met.wahrsch.Beschattung			11	143		185		170

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BH - IO60

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:55 (4)	05:34		06:26		07:18	07:14	08:08			
	21	06:16 (4)	21:14		20:09		18:57	16:48	16:05			
2	04:56	05:55 (4)	05:35		06:28		07:20	07:16	08:09			
	22	06:17 (4)	21:12		20:07		18:55	16:46	16:05			
3	04:56	05:56 (4)	05:37		06:30 (3)	06:30	07:21 (2)	07:21	07:18	08:11		
	22	06:18 (4)	21:11	7	06:37 (3)	20:05	7	07:28 (2)	18:52	16:44	16:04	
4	04:57	05:55 (4)	05:38		06:28 (3)	06:31	07:18 (2)	07:23	07:20	08:12		
	22	06:17 (4)	21:09	12	06:40 (3)	20:02	13	07:31 (2)	18:50	16:42	16:03	
5	04:58	05:55 (4)	05:40		06:27 (3)	06:33	07:17 (2)	07:25	07:22	08:14		
	23	06:18 (4)	21:07	14	06:41 (3)	20:00	15	07:32 (2)	18:48	16:41	16:03	
6	04:59	05:55 (4)	05:42		06:26 (3)	06:35	07:15 (2)	07:27	07:24	08:15		
	24	06:19 (4)	21:05	16	06:42 (3)	19:58	17	07:32 (2)	18:45	16:39	16:02	
7	05:00	05:55 (4)	05:43		06:25 (3)	06:36	07:14 (2)	07:28	07:26	08:16		
	24	06:19 (4)	21:03	18	06:43 (3)	19:55	19	07:33 (2)	18:43	16:37	16:02	
8	05:01	05:55 (4)	05:45		06:24 (3)	06:38	07:14 (2)	07:30	07:28	08:18		
	24	06:19 (4)	21:01	19	06:43 (3)	19:53	20	07:34 (2)	18:41	16:35	16:01	
9	05:02	05:55 (4)	05:47		06:24 (3)	06:40	07:12 (2)	07:32	07:30	08:19		
	25	06:20 (4)	20:59	19	06:43 (3)	19:50	21	07:33 (2)	18:38	16:33	16:01	
10	05:03	05:55 (4)	05:48		06:23 (3)	06:42	07:12 (2)	07:34	07:31	08:20		
	25	06:20 (4)	20:57	28	07:00 (1)	19:48	21	07:33 (2)	18:36	16:32	16:01	
11	05:04	05:55 (4)	05:50		06:23 (3)	06:43	07:12 (2)	07:36	07:33	08:21		
	26	06:21 (4)	20:55	33	07:03 (1)	19:46	21	07:33 (2)	18:34	16:30	16:01	
12	05:05	05:55 (4)	05:52		06:24 (3)	06:45	07:12 (2)	07:37	07:35	08:22		
	26	06:21 (4)	20:53	36	07:05 (1)	19:43	19	07:31 (2)	18:31	16:28	16:00	
13	05:06	05:55 (4)	05:54		06:23 (3)	06:47	07:13 (2)	07:39	07:37	08:23		
	26	06:21 (4)	20:51	38	07:05 (1)	19:41	17	07:30 (2)	18:29	16:27	16:00	
14	05:08	05:55 (4)	05:55		06:24 (3)	06:48	07:15 (2)	07:41	07:39	08:24		
	26	06:21 (4)	20:49	39	07:07 (1)	19:38	14	07:29 (2)	18:27	16:25	16:00	
15	05:09	05:55 (4)	05:57		06:25 (3)	06:50	07:16 (2)	07:43	07:41	08:25		
	26	06:21 (4)	20:47	38	07:06 (1)	19:36	10	07:26 (2)	18:24	16:24	16:00	
16	05:10	05:55 (4)	05:59		06:27 (3)	06:52	07:18 (2)	07:45	07:42	08:26		
	27	06:21 (4)	20:45	36	07:07 (1)	19:33	5	07:23 (2)	18:22	16:22	16:00	
17	05:11	05:56 (4)	06:00		06:29 (3)	06:54		07:46	07:44	08:27		
	26	06:22 (4)	20:43	34	07:08 (1)	19:31		18:20	16:21	16:01		
18	05:13	05:56 (4)	06:02		06:30 (3)	06:55		07:48	07:46	08:28		
	26	06:22 (4)	20:41	30	07:07 (1)	19:29		18:18	16:19	16:01		
19	05:14	05:56 (4)	06:04		06:43 (1)	06:57		07:50	07:48	08:28		
	25	06:21 (4)	20:39	24	07:07 (1)	19:26		18:15	16:18	16:01		
20	05:15	05:56 (4)	06:05		06:42 (1)	06:59		07:52	07:50	08:29		
	25	06:21 (4)	20:37	25	07:07 (1)	19:24		18:13	16:17	16:01		
21	05:17	05:56 (4)	06:07		06:42 (1)	07:00		07:54	07:51	08:30		
	26	06:22 (4)	20:34	24	07:06 (1)	19:21		18:11	16:15	16:02		
22	05:18	05:56 (4)	06:09		06:43 (1)	07:02		07:56	07:53	08:30		
	25	06:21 (4)	20:32	23	07:06 (1)	19:19		18:09	16:14	16:02		
23	05:20	05:57 (4)	06:11		06:43 (1)	07:04		07:58	07:55	08:31		
	24	06:21 (4)	20:30	22	07:05 (1)	19:16		18:07	16:13	16:03		
24	05:21	05:58 (4)	06:12		06:44 (1)	07:06		07:59	07:57	08:31		
	23	06:21 (4)	20:28	20	07:04 (1)	19:14		18:05	16:12	16:03		
25	05:23	05:58 (4)	06:14		06:45 (1)	07:07		07:01	07:58	08:31		
	22	06:20 (4)	20:25	18	07:03 (1)	19:12		17:02	16:11	16:04		
26	05:24	05:59 (4)	06:16		06:45 (1)	07:09		07:03	08:00	08:32		
	21	06:20 (4)	20:23	16	07:01 (1)	19:09		17:00	16:10	16:05		
27	05:26	06:00 (4)	06:18		06:48 (1)	07:11		07:05	08:02	08:32		
	19	06:19 (4)	20:21	11	06:59 (1)	19:07		16:58	16:09	16:06		
28	05:27	06:01 (4)	06:19			07:13		07:07	08:03	08:32		
	17	06:18 (4)	20:19			19:04		16:56	16:08	16:06		
29	05:29	06:02 (4)	06:21			07:14		07:09	08:05	08:32		
	14	06:16 (4)	20:16			19:02		16:54	16:07	16:07		
30	05:30	06:03 (4)	06:23			07:16		07:11	08:06	08:32		
	11	06:14 (4)	20:14			19:00		16:52	16:06	16:08		
31	05:32	06:07 (4)	06:24					07:13		08:32		
	4	06:11 (4)	20:12					16:50		16:09		
Sonnenscheinstunden	508		458		382		330	262	237			
astr. max.mögl. Beschattung	696		600		219							
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met. wahrsch. Beschattung	184		175		52							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BI - IO61

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:19 (2)	05:46	06:15 (3)	04:59
	16:10	17:00	17:55	19:51	19 07:38 (2)	20:45	36 06:56 (1)	21:34
2	08:32	08:02	07:05	06:52	07:18 (2)	05:44	06:14 (3)	04:58
	16:12	17:02	17:57	19:53	21 07:39 (2)	20:47	34 06:54 (1)	21:35
3	08:32	08:00	07:03	06:49	07:18 (2)	05:42	06:14 (3)	04:57
	16:13	17:04	17:58	19:55	21 07:39 (2)	20:49	28 06:51 (1)	21:36
4	08:32	07:58	07:01	06:47	07:17 (2)	05:41	06:14 (3)	04:56
	16:14	17:06	18:00	19:57	21 07:38 (2)	20:50	19 06:33 (3)	21:37
5	08:32	07:57	06:58	06:45	07:18 (2)	05:39	06:14 (3)	04:55
	16:15	17:08	18:02	19:59	19 07:37 (2)	20:52	19 06:33 (3)	21:38
6	08:31	07:55	06:56	06:42	07:18 (2)	05:37	06:14 (3)	04:55
	16:16	17:10	18:04	20:00	18 07:36 (2)	20:54	18 06:32 (3)	21:39
7	08:31	07:53	06:54	06:40	07:19 (2)	05:35	06:16 (3)	04:54
	16:18	17:12	18:06	20:02	16 07:35 (2)	20:56	16 06:32 (3)	21:40
8	08:30	07:51	06:51	06:37	07:20 (2)	05:33	06:16 (3)	04:53
	16:19	17:14	18:08	20:04	13 07:33 (2)	20:57	14 06:30 (3)	21:41
9	08:30	07:49	06:49	06:35	07:22 (2)	05:31	06:17 (3)	04:53
	16:20	17:16	18:10	20:06	9 07:31 (2)	20:59	11 06:28 (3)	21:42
10	08:29	07:48	06:47	06:33	07:23 (2)	05:29	06:20 (3)	04:52
	16:22	17:18	18:11	20:08		21:01	7 06:27 (3)	21:43
11	08:29	07:46	06:44	06:30	07:24 (2)	05:28		04:52
	16:23	17:20	18:13	20:09		21:03		21:44
12	08:28	07:44	06:42	06:28	07:25 (2)	05:26		04:52
	16:25	17:22	18:15	20:11		21:04		21:44
13	08:27	07:42	06:40	06:26	07:26 (2)	05:24	05:55 (4)	04:51
	16:26	17:24	18:17	20:13		21:06	6 06:01 (4)	21:45
14	08:26	07:40	06:37	06:24	07:27 (2)	05:22	05:52 (4)	04:51
	16:28	17:26	18:19	20:15		21:08	11 06:03 (4)	21:46
15	08:25	07:38	06:35	06:21	07:28 (2)	05:21	05:51 (4)	04:51
	16:30	17:28	18:21	20:17		21:09	15 06:06 (4)	21:46
16	08:24	07:36	06:32	06:19	06:46 (1)	05:19	05:49 (4)	04:51
	16:31	17:30	18:23	20:18	9 06:55 (1)	21:11	17 06:06 (4)	21:47
17	08:23	07:34	06:30	06:17	06:42 (1)	05:18	05:48 (4)	04:51
	16:33	17:32	18:24	20:20	15 06:57 (1)	21:12	20 06:08 (4)	21:47
18	08:22	07:32	06:28	06:14	06:40 (1)	05:16	05:48 (4)	04:50
	16:35	17:34	18:26	20:22	18 06:58 (1)	21:14	21 06:09 (4)	21:48
19	08:21	07:29	06:25	06:12	06:39 (1)	05:14	05:47 (4)	04:50
	16:36	17:35	18:28	20:24	20 06:59 (1)	21:16	22 06:09 (4)	21:48
20	08:20	07:27	06:23	06:10	06:38 (1)	05:13	05:47 (4)	04:51
	16:38	17:37	18:30	20:26	22 07:00 (1)	21:17	23 06:10 (4)	21:48
21	08:19	07:25	06:20	06:08	06:38 (1)	05:12	05:47 (4)	04:51
	16:40	17:39	18:32	20:27	23 07:01 (1)	21:19	24 06:11 (4)	21:49
22	08:18	07:23	06:18	06:06	06:37 (1)	05:10	05:46 (4)	04:51
	16:42	17:41	18:33	20:29	24 07:01 (1)	21:20	24 06:10 (4)	21:49
23	08:17	07:21	06:16	06:03	06:37 (1)	05:09	05:46 (4)	04:51
	16:44	17:43	18:35	20:31	24 07:01 (1)	21:22	25 06:11 (4)	21:49
24	08:15	07:19	06:13	06:01	06:36 (1)	05:07	05:46 (4)	04:51
	16:45	17:45	18:37	20:33	25 07:01 (1)	21:23	25 06:11 (4)	21:49
25	08:14	07:16	06:11	05:59	06:24 (3)	05:06	05:46 (4)	04:52
	16:47	17:47	18:39	20:35	30 07:01 (1)	21:24	25 06:11 (4)	21:49
26	08:13	07:14	06:08	05:57	06:21 (3)	05:05	05:46 (4)	04:52
	16:49	17:49	18:41	20:36	34 06:59 (1)	21:26	26 06:12 (4)	21:49
27	08:11	07:12	06:06	05:55	06:19 (3)	05:04	05:46 (4)	04:53
	16:50	17:51	18:42	20:38	36 06:59 (1)	21:27	26 06:12 (4)	21:49
28	08:10	07:10	06:04	05:53	06:17 (3)	05:03	05:46 (4)	04:53
	16:53	17:53	18:44	8 06:35 (2)	20:40	37 06:58 (1)	21:29	26 06:12 (4)
29	08:08	07:01	06:00	05:51	06:16 (3)	05:02	05:46 (4)	04:54
	16:55	19:46	12 07:36 (2)	20:42	39 06:58 (1)	21:30	26 06:12 (4)	21:49
30	08:07	06:59	07:22 (2)	05:49	06:15 (3)	05:01	05:46 (4)	04:54
	16:57	19:48	16 07:38 (2)	20:43	38 06:57 (1)	21:31	26 06:12 (4)	21:48
31	08:05	06:56	07:20 (2)	05:47		05:00	05:46 (4)	
	16:58	19:50	19 07:39 (2)	20:44		21:32	26 06:12 (4)	
Sonnenscheinstunden	253	275	367	418		491		506
astr.max.mögl.Beschattung			55		551		616	632
Red.Sonnenscheinwahrsch.			0.28		0.37		0.43	0.39
Reduktion Betriebsdauer			0.96		0.96		0.96	0.96
Reduktion Windrichtung			0.71		0.72		0.73	0.73
Gesamte Reduktion			0.19		0.26		0.30	0.27
Met.wahrsch.Beschattung			10		141		184	170

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BI - IO61

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:55 (4)	05:34		06:26		07:18	07:14	08:08			
	21	06:16 (4)	21:14		20:09		18:57	16:48	16:05			
2	04:56	05:55 (4)	05:35		06:28		07:20	07:16	08:09			
	21	06:16 (4)	21:12		20:07		18:55	16:46	16:05			
3	04:56	05:55 (4)	05:37		06:30		07:19 (2)	07:21	07:18	08:11		
	21	06:17 (4)	21:11	8	06:37 (3)	20:05	9	07:28 (2)	18:52	16:44	16:04	
4	04:57	05:54 (4)	05:38		06:27 (3)	06:31		07:17 (2)	07:23	07:20	08:12	
	21	06:17 (4)	21:09	12	06:39 (3)	20:02	13	07:30 (2)	18:50	16:42	16:03	
5	04:58	05:54 (4)	05:40		06:26 (3)	06:33		07:16 (2)	07:25	07:22	08:14	
	21	06:17 (4)	21:07	15	06:41 (3)	20:00	16	07:32 (2)	18:48	16:41	16:03	
6	04:59	05:55 (4)	05:42		06:25 (3)	06:35		07:14 (2)	07:27	07:24	08:15	
	21	06:18 (4)	21:05	16	06:41 (3)	19:58	18	07:32 (2)	18:45	16:39	16:02	
7	05:00	05:55 (4)	05:43		06:25 (3)	06:36		07:13 (2)	07:28	07:26	08:16	
	21	06:18 (4)	21:03	17	06:42 (3)	19:55	19	07:32 (2)	18:43	16:37	16:02	
8	05:01	05:55 (4)	05:45		06:23 (3)	06:38		07:13 (2)	07:30	07:28	08:18	
	21	06:19 (4)	21:01	19	06:42 (3)	19:53	20	07:33 (2)	18:41	16:35	16:01	
9	05:02	05:55 (4)	05:47		06:23 (3)	06:40		07:11 (2)	07:32	07:30	08:19	
	21	06:19 (4)	20:59	20	06:43 (3)	19:50	21	07:32 (2)	18:38	16:33	16:01	
10	05:03	05:55 (4)	05:48		06:23 (3)	06:42		07:12 (2)	07:34	07:31	08:20	
	21	06:20 (4)	20:57	29	07:00 (1)	19:48	20	07:32 (2)	18:36	16:32	16:01	
11	05:04	05:55 (4)	05:50		06:23 (3)	06:43		07:12 (2)	07:36	07:33	08:21	
	21	06:20 (4)	20:55	35	07:03 (1)	19:46	20	07:32 (2)	18:34	16:30	16:01	
12	05:05	05:55 (4)	05:52		06:23 (3)	06:45		07:11 (2)	07:37	07:35	08:22	
	21	06:20 (4)	20:53	37	07:04 (1)	19:43	19	07:30 (2)	18:31	16:28	16:00	
13	05:06	05:55 (4)	05:54		06:23 (3)	06:47		07:13 (2)	07:39	07:37	08:23	
	21	06:20 (4)	20:51	39	07:05 (1)	19:41	16	07:29 (2)	18:29	16:27	16:00	
14	05:08	05:55 (4)	05:55		06:24 (3)	06:48		07:15 (2)	07:41	07:39	08:24	
	21	06:20 (4)	20:49	38	07:06 (1)	19:38	13	07:28 (2)	18:27	16:25	16:00	
15	05:09	05:54 (4)	05:57		06:25 (3)	06:50		07:16 (2)	07:43	07:41	08:25	
	21	06:20 (4)	20:47	38	07:06 (1)	19:36	9	07:25 (2)	18:24	16:24	16:00	
16	05:10	05:54 (4)	05:59		06:27 (3)	06:52		07:45	07:42	08:26		
	21	06:20 (4)	20:45	35	07:06 (1)	19:33		18:22	16:22	16:00		
17	05:11	05:55 (4)	06:00		06:29 (3)	06:54		07:46	07:44	08:27		
	21	06:21 (4)	20:43	33	07:07 (1)	19:31		18:20	16:21	16:01		
18	05:13	05:55 (4)	06:02		06:30 (3)	06:55		07:48	07:46	08:28		
	21	06:21 (4)	20:41	28	07:06 (1)	19:29		18:18	16:19	16:01		
19	05:14	05:55 (4)	06:04		06:42 (1)	06:57		07:50	07:48	08:28		
	21	06:21 (4)	20:39	25	07:07 (1)	19:26		18:15	16:18	16:01		
20	05:15	05:55 (4)	06:05		06:41 (1)	06:59		07:52	07:50	08:29		
	21	06:20 (4)	20:37	25	07:06 (1)	19:24		18:13	16:17	16:01		
21	05:17	05:56 (4)	06:07		06:42 (1)	07:00		07:54	07:51	08:30		
	21	06:21 (4)	20:34	24	07:06 (1)	19:21		18:11	16:15	16:02		
22	05:18	05:56 (4)	06:09		06:42 (1)	07:02		07:56	07:53	08:30		
	21	06:20 (4)	20:32	23	07:05 (1)	19:19		18:09	16:14	16:02		
23	05:20	05:56 (4)	06:11		06:42 (1)	07:04		07:58	07:55	08:31		
	21	06:20 (4)	20:30	22	07:04 (1)	19:16		18:07	16:13	16:03		
24	05:21	05:57 (4)	06:12		06:43 (1)	07:06		07:59	07:57	08:31		
	21	06:20 (4)	20:28	20	07:03 (1)	19:14		18:05	16:12	16:03		
25	05:23	05:58 (4)	06:14		06:44 (1)	07:07		07:01	07:58	08:31		
	21	06:19 (4)	20:25	18	07:02 (1)	19:12		17:02	16:11	16:04		
26	05:24	05:59 (4)	06:16		06:45 (1)	07:09		07:03	08:00	08:32		
	21	06:19 (4)	20:23	14	06:59 (1)	19:09		17:00	16:10	16:05		
27	05:26	05:59 (4)	06:18		06:48 (1)	07:11		07:05	08:02	08:32		
	21	06:18 (4)	20:21	9	06:57 (1)	19:07		16:58	16:09	16:06		
28	05:27	06:01 (4)	06:19			07:13		07:07	08:03	08:32		
	21	06:17 (4)	20:19			19:04		16:56	16:08	16:06		
29	05:29	06:02 (4)	06:21			07:14		07:09	08:05	08:32		
	21	06:15 (4)	20:16			19:02		16:54	16:07	16:07		
30	05:30	06:03 (4)	06:23			07:16		07:11	08:06	08:32		
	21	06:13 (4)	20:14			19:00		16:52	16:06	16:08		
31	05:32		06:24					07:13		08:32		
	21	06:16	20:12					16:50		16:09		
Sonnenscheinstunden	508		458		382		330	262	237			
astr. max.mögl. Beschattung	679		599		213							
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met. wahrsch. Beschattung	179		175		51							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BJ - IO62

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:21 (2)	05:46	06:17 (3)	04:59
	16:10	17:00	17:55	19:51	20	07:41 (2)	20:45	29
2	08:32	08:02	07:05	06:52	07:21 (2)	05:44	06:17 (3)	04:58
	16:12	17:02	17:57	19:53	21	07:42 (2)	20:47	20
3	08:32	08:00	07:03	06:49	07:21 (2)	05:42	06:17 (3)	04:57
	16:13	17:04	17:58	19:55	20	07:41 (2)	20:49	19
4	08:32	07:58	07:01	06:47	07:21 (2)	05:41	06:17 (3)	04:56
	16:14	17:06	18:00	19:57	19	07:40 (2)	20:50	18
5	08:32	07:57	06:58	06:45	07:22 (2)	05:39	06:18 (3)	04:55
	16:15	17:08	18:02	19:59	17	07:39 (2)	20:52	16
6	08:31	07:55	06:56	06:42	07:22 (2)	05:37	06:18 (3)	04:55
	16:16	17:10	18:04	20:00	15	07:37 (2)	20:54	15
7	08:31	07:53	06:54	06:40	07:24 (2)	05:35	06:20 (3)	04:54
	16:18	17:12	18:06	20:02	11	07:35 (2)	20:56	12
8	08:30	07:51	06:51	06:37	07:27 (2)	05:33	06:22 (3)	04:53
	16:19	17:14	18:08	20:04	5	07:32 (2)	20:57	8
9	08:30	07:49	06:49	06:35		05:31		04:53
	16:20	17:16	18:10	20:06		20:59		21:42
10	08:29	07:48	06:47	06:33		05:29		04:52
	16:22	17:18	18:11	20:08		21:01		21:43
11	08:29	07:46	06:44	06:30		05:28	05:59 (4)	04:52
	16:23	17:20	18:13	20:09		21:03	5	06:04 (4)
12	08:28	07:44	06:42	06:28		05:26		05:55 (4)
	16:25	17:22	18:15	20:11		21:04	12	06:07 (4)
13	08:27	07:42	06:40	06:26		05:24		05:54 (4)
	16:26	17:24	18:17	20:13		21:06	15	06:09 (4)
14	08:26	07:40	06:37	06:24	06:51 (1)	05:22		05:52 (4)
	16:28	17:26	18:19	20:15	6	06:57 (1)	21:08	18
15	08:25	07:38	06:35	06:21	06:47 (1)	05:21		05:52 (4)
	16:30	17:28	18:21	20:17	13	07:00 (1)	21:09	19
16	08:24	07:36	06:32	06:19	06:45 (1)	05:19		05:50 (4)
	16:31	17:30	18:23	20:18	17	07:02 (1)	21:11	22
17	08:23	07:34	06:30	06:17	06:43 (1)	05:17		05:50 (4)
	16:33	17:32	18:24	20:20	19	07:02 (1)	21:12	23
18	08:22	07:32	06:28	06:14	06:42 (1)	05:16		05:50 (4)
	16:35	17:34	18:26	20:22	21	07:03 (1)	21:14	24
19	08:21	07:29	06:25	06:12	06:41 (1)	05:14		05:49 (4)
	16:36	17:35	18:28	20:24	23	07:04 (1)	21:16	24
20	08:20	07:27	06:23	06:10	06:41 (1)	05:13		05:49 (4)
	16:38	17:37	18:30	20:26	23	07:04 (1)	21:17	25
21	08:19	07:25	06:20	06:08	06:40 (1)	05:12		05:49 (4)
	16:40	17:39	18:32	20:27	25	07:05 (1)	21:19	26
22	08:18	07:23	06:18	06:06	06:40 (1)	05:10		05:48 (4)
	16:42	17:41	18:33	20:29	25	07:05 (1)	21:20	26
23	08:17	07:21	06:16	06:03	06:40 (1)	05:09		05:48 (4)
	16:44	17:43	18:35	20:31	24	07:04 (1)	21:22	27
24	08:15	07:19	06:13	06:01	06:26 (3)	05:07		05:49 (4)
	16:45	17:45	18:37	20:33	31	07:04 (1)	21:23	26
25	08:14	07:16	06:11	05:59	06:24 (3)	05:06		05:49 (4)
	16:47	17:47	18:39	20:35	35	07:04 (1)	21:24	26
26	08:13	07:14	06:08	05:57	06:21 (3)	05:05		05:49 (4)
	16:49	17:49	18:41	1	06:34 (2)	20:36	37	07:02 (1)
27	08:11	07:12	06:06	05:55	06:29 (2)	05:55		06:19 (3)
	16:50	17:51	18:42	9	06:38 (2)	20:38	38	07:01 (1)
28	08:10	07:10	06:04	05:53	06:27 (2)	05:53		06:17 (3)
	16:53	17:53	18:44	13	06:40 (2)	20:40	38	07:00 (1)
29	08:08		07:01	05:51	07:24 (2)	05:51		06:18 (3)
	16:55		19:46	17	07:41 (2)	20:42	36	07:00 (1)
30	08:07		06:59	05:49	07:23 (2)	05:49		06:17 (3)
	16:57		19:48	19	07:42 (2)	20:43	34	06:58 (1)
31	08:05		06:56	05:47	07:22 (2)	05:47		05:50 (4)
	16:58		19:50	20	07:42 (2)	20:44	35	06:59 (1)
Sonnenscheinstunden	253	275	367	418		491		506
astr.max.mögl.Beschattung			79	573		608		628
Red.Sonnenscheinwahrsch.			0.28	0.37		0.43		0.39
Reduktion Betriebsdauer			0.96	0.96		0.96		0.96
Reduktion Windrichtung			0.71	0.72		0.73		0.72
Gesamte Reduktion			0.19	0.26		0.30		0.27
Met.wahrsch.Beschattung			15	147		182		169

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BJ - IO62

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	06:00 (4)	05:34		06:07 (4)	06:26		07:18	07:14	08:08		
	21:48	06:17 (4)	21:14	9	06:16 (4)	20:09		18:57	16:48	16:05		
2	04:56	06:00 (4)	05:35			06:28		07:20	07:16	08:09		
	21:48	06:18 (4)	21:12			20:07		18:55	16:46	16:05		
3	04:56	06:00 (4)	05:37			06:30		07:21	07:18	08:11		
	21:47	06:19 (4)	21:11			20:05		18:52	16:44	16:04		
4	04:57	05:59 (4)	05:38		06:34 (3)	06:31		07:24 (2)	07:23	08:12		
	21:47	06:19 (4)	21:09	4	06:38 (3)	20:02	5	07:29 (2)	18:50	16:42	16:03	
5	04:58	05:59 (4)	05:40		06:31 (3)	06:33		07:21 (2)	07:25	07:22	08:14	
	21:46	06:19 (4)	21:07	10	06:41 (3)	20:00	11	07:32 (2)	18:48	16:41	16:03	
6	04:59	05:59 (4)	05:42		06:29 (3)	06:35		07:18 (2)	07:27	07:24	08:15	
	21:46	06:20 (4)	21:05	13	06:42 (3)	19:58	15	07:33 (2)	18:45	16:39	16:02	
7	05:00	05:59 (4)	05:43		06:28 (3)	06:36		07:17 (2)	07:28	07:26	08:16	
	21:45	06:21 (4)	21:03	16	06:44 (3)	19:55	17	07:34 (2)	18:43	16:37	16:02	
8	05:01	05:59 (4)	05:45		06:27 (3)	06:38		07:16 (2)	07:30	07:28	08:18	
	21:45	06:21 (4)	21:01	17	06:44 (3)	19:53	19	07:35 (2)	18:41	16:35	16:01	
9	05:02	05:59 (4)	05:47		06:27 (3)	06:40		07:15 (2)	07:32	07:30	08:19	
	21:44	06:22 (4)	20:59	18	06:45 (3)	19:50	20	07:35 (2)	18:38	16:33	16:01	
10	05:03	05:59 (4)	05:48		06:25 (3)	06:42		07:14 (2)	07:34	07:31	08:20	
	21:43	06:22 (4)	20:57	20	06:45 (3)	19:48	21	07:35 (2)	18:36	16:32	16:01	
11	05:04	05:59 (4)	05:50		06:25 (3)	06:43		07:14 (2)	07:36	07:33	08:21	
	21:42	06:23 (4)	20:55	20	06:45 (3)	19:46	21	07:35 (2)	18:34	16:30	16:01	
12	05:05	05:59 (4)	05:52		06:26 (3)	06:45		07:13 (2)	07:37	07:35	08:22	
	21:41	06:23 (4)	20:53	29	07:04 (1)	19:43	20	07:33 (2)	18:31	16:28	16:00	
13	05:06	05:58 (4)	05:54		06:25 (3)	06:47		07:14 (2)	07:39	07:37	08:23	
	21:40	06:23 (4)	20:51	35	07:06 (1)	19:41	19	07:33 (2)	18:29	16:27	16:00	
14	05:08	05:58 (4)	05:55		06:25 (3)	06:48		07:15 (2)	07:41	07:39	08:24	
	21:39	06:23 (4)	20:49	37	07:07 (1)	19:38	17	07:32 (2)	18:27	16:25	16:00	
15	05:09	05:58 (4)	05:57		06:25 (3)	06:50		07:16 (2)	07:43	07:41	08:25	
	21:38	06:24 (4)	20:47	38	07:08 (1)	19:36	14	07:30 (2)	18:24	16:24	16:00	
16	05:10	05:58 (4)	05:59		06:27 (3)	06:52		07:18 (2)	07:45	07:42	08:26	
	21:37	06:24 (4)	20:45	38	07:09 (1)	19:33	10	07:28 (2)	18:22	16:22	16:00	
17	05:11	05:59 (4)	06:00		06:29 (3)	06:54		07:20 (2)	07:46	07:44	08:27	
	21:36	06:25 (4)	20:43	36	07:10 (1)	19:31	5	07:25 (2)	18:20	16:21	16:01	
18	05:13	05:58 (4)	06:02		06:30 (3)	06:55			07:48	07:46	08:28	
	21:35	06:25 (4)	20:41	33	07:09 (1)	19:29			18:18	16:19	16:01	
19	05:14	05:58 (4)	06:04		06:32 (3)	06:57			07:50	07:48	08:28	
	21:34	06:24 (4)	20:39	30	07:10 (1)	19:26			18:15	16:18	16:01	
20	05:15	05:58 (4)	06:05		06:45 (1)	06:59			07:52	07:50	08:29	
	21:32	06:24 (4)	20:37	24	07:09 (1)	19:24			18:13	16:17	16:01	
21	05:17	05:59 (4)	06:07		06:45 (1)	07:00			07:54	07:51	08:30	
	21:31	06:25 (4)	20:34	24	07:09 (1)	19:21			18:11	16:15	16:02	
22	05:18	05:59 (4)	06:09		06:45 (1)	07:02			07:56	07:53	08:30	
	21:30	06:24 (4)	20:32	24	07:09 (1)	19:19			18:09	16:14	16:02	
23	05:20	05:59 (4)	06:11		06:44 (1)	07:04			07:58	07:55	08:31	
	21:28	06:24 (4)	20:30	24	07:08 (1)	19:16			18:07	16:13	16:03	
24	05:21	06:00 (4)	06:12		06:45 (1)	07:06			07:59	07:57	08:31	
	21:27	06:24 (4)	20:28	23	07:08 (1)	19:14			18:05	16:12	16:03	
25	05:23	06:00 (4)	06:14		06:46 (1)	07:07			07:01	07:58	08:31	
	21:25	06:24 (4)	20:25	21	07:07 (1)	19:12			17:02	16:11	16:04	
26	05:24	06:01 (4)	06:16		06:46 (1)	07:09			07:03	08:00	08:32	
	21:24	06:24 (4)	20:23	19	07:05 (1)	19:09			17:00	16:10	16:05	
27	05:26	06:01 (4)	06:18		06:47 (1)	07:11			07:05	08:02	08:32	
	21:22	06:23 (4)	20:21	17	07:04 (1)	19:07			16:58	16:09	16:06	
28	05:27	06:02 (4)	06:19		06:48 (1)	07:13			07:07	08:03	08:32	
	21:21	06:23 (4)	20:19	13	07:01 (1)	19:04			16:56	16:08	16:06	
29	05:29	06:02 (4)	06:21		06:52 (1)	07:14			07:09	08:05	08:32	
	21:19	06:21 (4)	20:16	6	06:58 (1)	19:02			16:54	16:07	16:07	
30	05:30	06:03 (4)	06:23			07:16			07:11	08:06	08:32	
	21:18	06:20 (4)	20:14			19:00			16:52	16:06	16:08	
31	05:32	06:05 (4)	06:24						07:13		08:32	
	21:16	06:19 (4)	20:12						16:50		16:09	
Sonnenscheinstunden	508		458		382			330	262	237		
astr.max.mögl.Beschattung	700		598		214							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	185		175		51							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BK - IO63

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32 08:03 07:08			06:54	07:20 (2) 05:46	06:17 (3) 04:59
	16:10 17:00 17:55			19:51	21 07:41 (2) 20:45	30 06:55 (1) 21:34
2	08:32 08:02 07:05			06:52	07:20 (2) 05:44	06:16 (3) 04:58
	16:12 17:02 17:57			19:53	21 07:41 (2) 20:47	23 06:51 (1) 21:35
3	08:32 08:00 07:03			06:49	07:20 (2) 05:42	06:16 (3) 04:57
	16:13 17:04 17:58			19:55	21 07:41 (2) 20:49	19 06:35 (3) 21:36
4	08:32 07:58 07:01			06:47	07:20 (2) 05:41	06:17 (3) 04:56
	16:14 17:06 18:00			19:57	19 07:39 (2) 20:50	18 06:35 (3) 21:37
5	08:32 07:57 06:58			06:45	07:21 (2) 05:39	06:17 (3) 04:55
	16:15 17:08 18:02			19:59	18 07:39 (2) 20:52	17 06:34 (3) 21:38
6	08:31 07:55 06:56			06:42	07:21 (2) 05:37	06:17 (3) 04:55
	16:16 17:10 18:04			20:00	16 07:37 (2) 20:54	16 06:33 (3) 21:39
7	08:31 07:53 06:54			06:40	07:22 (2) 05:35	06:19 (3) 04:54
	16:18 17:12 18:06			20:02	13 07:35 (2) 20:56	13 06:32 (3) 21:40
8	08:30 07:51 06:51			06:37	07:24 (2) 05:33	06:20 (3) 04:53
	16:19 17:14 18:08			20:04	9 07:33 (2) 20:57	10 06:30 (3) 21:41
9	08:30 07:49 06:49			06:35	05:31	4 06:23 (3) 04:53
	16:20 17:16 18:10			20:06	20:59	20:59
10	08:29 07:48 06:47			06:33	05:29	04:52
	16:22 17:18 18:11			20:08	21:01	21:43
11	08:29 07:46 06:44			06:30	05:28	04:52
	16:23 17:20 18:13			20:09	21:03	21:44
12	08:28 07:44 06:42			06:28	05:26	05:55 (4) 04:52
	16:25 17:22 18:15			20:11	21:04	10 06:05 (4) 21:44
13	08:27 07:42 06:40			06:26	05:24	05:54 (4) 04:51
	16:26 17:24 18:17			20:13	21:06	14 06:08 (4) 21:45
14	08:26 07:40 06:37			06:24	05:22	05:52 (4) 04:51
	16:28 17:26 18:19			20:15	21:08	17 06:09 (4) 21:46
15	08:25 07:38 06:35			06:21	06:47 (1) 05:21	05:51 (4) 04:51
	16:30 17:28 18:21			20:17	12 06:59 (1) 21:09	19 06:10 (4) 21:46
16	08:24 07:36 06:32			06:19	06:45 (1) 05:19	05:50 (4) 04:51
	16:31 17:30 18:23			20:18	16 07:01 (1) 21:11	21 06:11 (4) 21:47
17	08:23 07:34 06:30			06:17	06:43 (1) 05:17	05:50 (4) 04:51
	16:33 17:32 18:24			20:20	18 07:01 (1) 21:12	22 06:12 (4) 21:47
18	08:22 07:32 06:28			06:14	06:41 (1) 05:16	05:50 (4) 04:50
	16:35 17:34 18:26			20:22	21 07:02 (1) 21:14	23 06:13 (4) 21:48
19	08:21 07:29 06:25			06:12	06:41 (1) 05:14	05:49 (4) 04:50
	16:36 17:35 18:28			20:24	22 07:03 (1) 21:16	24 06:13 (4) 21:48
20	08:20 07:27 06:23			06:10	06:40 (1) 05:13	05:49 (4) 04:51
	16:38 17:37 18:30			20:26	23 07:03 (1) 21:17	24 06:13 (4) 21:48
21	08:19 07:25 06:20			06:08	06:40 (1) 05:12	05:49 (4) 04:51
	16:40 17:39 18:32			20:27	24 07:04 (1) 21:19	25 06:14 (4) 21:49
22	08:18 07:23 06:18			06:06	06:39 (1) 05:10	05:48 (4) 04:51
	16:42 17:41 18:33			20:29	25 07:04 (1) 21:20	25 06:13 (4) 21:49
23	08:17 07:21 06:16			06:03	06:39 (1) 05:09	05:48 (4) 04:51
	16:44 17:43 18:35			20:31	25 07:04 (1) 21:22	26 06:14 (4) 21:49
24	08:15 07:19 06:13			06:01	06:26 (3) 05:07	05:48 (4) 04:51
	16:45 17:45 18:37			20:33	30 07:03 (1) 21:23	26 06:14 (4) 21:49
25	08:14 07:16 06:11			05:59	06:24 (3) 05:06	05:48 (4) 04:52
	16:47 17:47 18:39			20:35	34 07:03 (1) 21:24	26 06:14 (4) 21:49
26	08:13 07:14 06:08			05:57	06:21 (3) 05:05	05:48 (4) 04:52
	16:49 17:49 18:41			20:36	36 07:01 (1) 21:26	26 06:14 (4) 21:49
27	08:11 07:12 06:06			06:29 (2)	05:55	06:19 (3) 05:04
	16:51 17:51 18:42			7 06:36 (2)	20:38	37 07:00 (1) 21:27
28	08:10 07:10 06:04			06:27 (2)	05:53	06:17 (3) 05:03
	16:53 17:53 18:44			12 06:39 (2)	20:40	37 06:59 (1) 21:29
29	08:08 07:01 06:51			07:24 (2)	05:51	06:17 (3) 05:02
	16:55 17:46 18:37			15 07:39 (2)	20:42	37 06:59 (1) 21:30
30	08:07 06:59 07:22 (2)			05:49	06:17 (3) 05:01	05:49 (4) 04:54
	16:57 17:48 18:39			18 07:40 (2)	20:43	34 06:58 (1) 21:31
31	08:05 06:56 07:22 (2)			05:00	05:00	05:49 (4) 04:54
	16:58 17:49 18:40			19 07:41 (2)	21:32	25 06:14 (4) 21:48
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			71	569	603	614
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.71	0.72	0.73	0.73
Gesamte Reduktion			0.19	0.26	0.30	0.27
Met.wahrsch.Beschattung			13	146	181	165

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BK - IO63

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:59 (4)	05:34		06:07 (4)	06:26		07:18	07:14	08:08		
	21:48	18	06:17 (4)	21:14	8	06:15 (4)	20:09		18:57	16:48	16:05	
2	04:56	05:59 (4)	05:35		06:28		06:28		07:20	07:16	08:09	
	21:48	19	06:18 (4)	21:12		20:07		18:55	16:46	16:05		
3	04:56	05:59 (4)	05:37		06:30		06:30		07:21	07:18	08:11	
	21:47	19	06:18 (4)	21:11		20:05		18:52	16:44	16:04		
4	04:57	05:58 (4)	05:38		06:32 (3)	06:31		07:22 (2)	07:23	07:20	08:12	
	21:47	20	06:18 (4)	21:09	7	06:39 (3)	20:02	8	07:30 (2)	18:50	16:42	16:03
5	04:58	05:58 (4)	05:40		06:30 (3)	06:33		07:19 (2)	07:25	07:22	08:14	
	21:46	21	06:19 (4)	21:07	11	06:41 (3)	20:00	13	07:32 (2)	18:48	16:41	16:03
6	04:59	05:58 (4)	05:42		06:28 (3)	06:35		07:17 (2)	07:27	07:24	08:15	
	21:46	22	06:20 (4)	21:05	14	06:42 (3)	19:58	16	07:33 (2)	18:45	16:39	16:02
7	05:00	05:58 (4)	05:43		06:28 (3)	06:36		07:16 (2)	07:28	07:26	08:16	
	21:45	22	06:20 (4)	21:03	15	06:43 (3)	19:55	18	07:34 (2)	18:43	16:37	16:02
8	05:01	05:58 (4)	05:45		06:26 (3)	06:38		07:15 (2)	07:30	07:28	08:18	
	21:45	23	06:21 (4)	21:01	17	06:43 (3)	19:53	19	07:34 (2)	18:41	16:35	16:01
9	05:02	05:58 (4)	05:47		06:26 (3)	06:40		07:14 (2)	07:32	07:30	08:19	
	21:44	23	06:21 (4)	20:59	18	06:44 (3)	19:50	20	07:34 (2)	18:38	16:33	16:01
10	05:03	05:58 (4)	05:48		06:25 (3)	06:42		07:13 (2)	07:34	07:31	08:20	
	21:43	24	06:22 (4)	20:57	19	06:44 (3)	19:48	21	07:34 (2)	18:36	16:32	16:01
11	05:04	05:58 (4)	05:50		06:25 (3)	06:43		07:14 (2)	07:36	07:33	08:21	
	21:42	24	06:22 (4)	20:55	25	07:01 (1)	19:46	20	07:34 (2)	18:34	16:30	16:01
12	05:05	05:58 (4)	05:52		06:25 (3)	06:45		07:13 (2)	07:37	07:35	08:22	
	21:41	24	06:22 (4)	20:53	32	07:04 (1)	19:43	19	07:32 (2)	18:31	16:28	16:00
13	05:06	05:58 (4)	05:54		06:24 (3)	06:47		07:13 (2)	07:39	07:37	08:23	
	21:40	25	06:23 (4)	20:51	35	07:05 (1)	19:41	19	07:32 (2)	18:29	16:27	16:00
14	05:08	05:58 (4)	05:55		06:25 (3)	06:48		07:15 (2)	07:41	07:39	08:24	
	21:39	25	06:23 (4)	20:49	37	07:07 (1)	19:38	16	07:31 (2)	18:27	16:25	16:00
15	05:09	05:57 (4)	05:57		06:25 (3)	06:50		07:16 (2)	07:43	07:41	08:25	
	21:38	26	06:23 (4)	20:47	38	07:07 (1)	19:36	13	07:29 (2)	18:24	16:24	16:00
16	05:10	05:57 (4)	05:59		06:27 (3)	06:52		07:18 (2)	07:45	07:42	08:26	
	21:37	26	06:23 (4)	20:45	37	07:08 (1)	19:33	8	07:26 (2)	18:22	16:22	16:00
17	05:11	05:58 (4)	06:00		06:29 (3)	06:54		07:46	07:44	08:27		
	21:36	26	06:24 (4)	20:43	35	07:09 (1)	19:31		18:20	16:21	16:01	
18	05:13	05:58 (4)	06:02		06:30 (3)	06:55		07:48	07:46	08:28		
	21:35	26	06:24 (4)	20:41	33	07:09 (1)	19:29		18:18	16:19	16:01	
19	05:14	05:58 (4)	06:04		06:32 (3)	06:57		07:50	07:48	08:28		
	21:34	26	06:24 (4)	20:39	29	07:09 (1)	19:26		18:15	16:18	16:01	
20	05:15	05:57 (4)	06:05		06:44 (1)	06:59		07:52	07:50	08:29		
	21:32	26	06:23 (4)	20:37	24	07:08 (1)	19:24		18:13	16:17	16:01	
21	05:17	05:58 (4)	06:07		06:44 (1)	07:00		07:54	07:51	08:30		
	21:31	26	06:24 (4)	20:34	24	07:08 (1)	19:21		18:11	16:15	16:02	
22	05:18	05:58 (4)	06:09		06:44 (1)	07:02		07:56	07:53	08:30		
	21:30	26	06:24 (4)	20:32	24	07:08 (1)	19:19		18:09	16:14	16:02	
23	05:20	05:58 (4)	06:11		06:44 (1)	07:04		07:58	07:55	08:31		
	21:28	25	06:23 (4)	20:30	23	07:07 (1)	19:16		18:07	16:13	16:03	
24	05:21	05:59 (4)	06:12		06:44 (1)	07:06		07:59	07:57	08:31		
	21:27	25	06:24 (4)	20:28	23	07:07 (1)	19:14		18:05	16:12	16:03	
25	05:23	05:59 (4)	06:14		06:45 (1)	07:07		07:01	07:58	08:31		
	21:25	24	06:23 (4)	20:25	21	07:06 (1)	19:12		17:02	16:11	16:04	
26	05:24	06:00 (4)	06:16		06:46 (1)	07:09		07:03	08:00	08:32		
	21:24	23	06:23 (4)	20:23	18	07:04 (1)	19:09		17:00	16:10	16:05	
27	05:26	06:00 (4)	06:18		06:47 (1)	07:11		07:05	08:02	08:32		
	21:22	22	06:22 (4)	20:21	15	07:02 (1)	19:07		16:58	16:09	16:06	
28	05:27	06:02 (4)	06:19		06:48 (1)	07:13		07:07	08:03	08:32		
	21:21	20	06:22 (4)	20:19	11	06:59 (1)	19:04		16:56	16:08	16:06	
29	05:29	06:02 (4)	06:21			07:14		07:09	08:05	08:32		
	21:19	18	06:20 (4)	20:16		19:02		16:54	16:07	16:07		
30	05:30	06:03 (4)	06:23			07:16		07:11	08:06	08:32		
	21:18	16	06:19 (4)	20:14		19:00		16:52	16:06	16:08		
31	05:32	06:05 (4)	06:24					07:13		08:32		
	21:16	13	06:18 (4)	20:12				16:50		16:09		
Sonnenscheinstunden	508		458			382		330	262	237		
astr.max.mögl.Beschattung	703			593		210						
Red.Sonnenscheinwahrsch.	0.38			0.42		0.35						
Reduktion Betriebsdauer	0.96			0.96		0.96						
Reduktion Windrichtung	0.73			0.72		0.71						
Gesamte Reduktion	0.26			0.29		0.24						
Met.wahrsch.Beschattung	185			173		50						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BL - IO64

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	07:23 (2)	05:46	06:20 (3)	04:59	05:55 (4)	
	16:10	17:00	17:55	19:51	21 07:44 (2)	20:45	19 06:39 (3)	21:34	21 06:16 (4)	
2	08:32	08:02	07:05	06:52	07:24 (2)	05:44	06:20 (3)	04:58	05:56 (4)	
	16:12	17:02	17:57	19:53	19 07:43 (2)	20:47	18 06:38 (3)	21:35	21 06:17 (4)	
3	08:32	08:00	07:03	06:49	07:24 (2)	05:42	06:21 (3)	04:57	05:57 (4)	
	16:13	17:04	17:58	19:55	19 07:43 (2)	20:49	17 06:38 (3)	21:36	19 06:16 (4)	
4	08:32	07:58	07:01	06:47	07:24 (2)	05:41	06:21 (3)	04:56	05:57 (4)	
	16:14	17:06	18:00	19:57	17 07:41 (2)	20:50	15 06:36 (3)	21:37	19 06:16 (4)	
5	08:32	07:57	06:58	06:45	07:25 (2)	05:39	06:22 (3)	04:55	05:58 (4)	
	16:15	17:08	18:02	19:59	15 07:40 (2)	20:52	13 06:35 (3)	21:38	18 06:16 (4)	
6	08:31	07:55	06:56	06:42	07:26 (2)	05:37	06:23 (3)	04:55	05:59 (4)	
	16:16	17:10	18:04	20:00	11 07:37 (2)	20:54	10 06:33 (3)	21:39	16 06:15 (4)	
7	08:31	07:53	06:54	06:40		05:35	06:27 (3)	04:54	05:25 (9)	
	16:18	17:12	18:06	20:02		20:56	4 06:31 (3)	21:40	16 06:15 (4)	
8	08:30	07:51	06:51	06:37		05:33		04:53	05:24 (9)	
	16:19	17:14	18:08	20:04		20:57		21:41	18 06:14 (4)	
9	08:30	07:49	06:49	06:35		05:31	8 06:01 (4)	04:53	05:24 (9)	
	16:20	17:16	18:10	20:06		20:59		20:59 (4)	21:42	18 06:14 (4)
10	08:29	07:48	06:47	06:33		05:29	05:59 (4)	04:52	05:23 (9)	
	16:22	17:18	18:11	20:08		21:01	13 06:12 (4)	21:43	18 06:13 (4)	
11	08:29	07:46	06:44	06:30		05:28	05:57 (4)	04:52	05:23 (9)	
	16:23	17:20	18:13	20:09		21:03	16 06:13 (4)	21:44	18 06:13 (4)	
12	08:28	07:44	06:42	06:28		05:26	05:55 (4)	04:52	05:23 (9)	
	16:25	17:22	18:15	20:11		21:04	19 06:14 (4)	21:44	16 06:12 (4)	
13	08:27	07:42	06:40	06:26		05:24	05:55 (4)	04:51	05:23 (9)	
	16:26	17:24	18:17	20:13	11 07:02 (1)	21:06	20 06:15 (4)	21:45	16 06:12 (4)	
14	08:26	07:40	06:37	06:24		05:22	05:54 (4)	04:51	05:22 (9)	
	16:28	17:26	18:19	20:15	16 07:05 (1)	21:08	22 06:16 (4)	21:46	14 06:10 (4)	
15	08:25	07:38	06:35	06:21		05:21	05:54 (4)	04:51	05:22 (9)	
	16:30	17:28	18:21	20:17	18 07:06 (1)	21:09	23 06:17 (4)	21:46	11 06:09 (4)	
16	08:24	07:36	06:32	06:19		05:19	06:18 (4)	21:49	12 05:35 (9)	
	16:31	17:30	18:23	20:18	21 07:07 (1)	21:11	24 06:17 (4)	21:47	11 05:33 (9)	
17	08:23	07:34	06:30	06:17		05:17	05:53 (4)	04:51	05:22 (9)	
	16:33	17:32	18:24	20:20	22 07:07 (1)	21:12	24 06:17 (4)	21:47	11 05:33 (9)	
18	08:22	07:32	06:28	06:14		05:16	05:53 (4)	04:50	05:22 (9)	
	16:35	17:34	18:26	20:22	23 07:07 (1)	21:14	25 06:18 (4)	21:48	11 05:33 (9)	
19	08:21	07:29	06:25	06:12		05:14	05:52 (4)	04:50	05:22 (9)	
	16:36	17:35	18:28	20:24	24 07:08 (1)	21:16	26 06:18 (4)	21:48	12 05:34 (9)	
20	08:20	07:27	06:23	06:10		05:13	05:52 (4)	04:51	05:23 (9)	
	16:38	17:37	18:30	20:26	25 07:08 (1)	21:17	26 06:18 (4)	21:48	12 05:35 (9)	
21	08:19	07:25	06:20	06:08		05:12	05:52 (4)	04:51	05:23 (9)	
	16:40	17:39	18:32	20:27	25 07:08 (1)	21:19	26 06:18 (4)	21:49	12 05:35 (9)	
22	08:18	07:23	06:18	06:06		05:10	05:52 (4)	04:51	05:23 (9)	
	16:42	17:41	18:33	20:29	28 07:07 (1)	21:20	26 06:18 (4)	21:49	12 05:35 (9)	
23	08:17	07:21	06:16	06:03		05:09	05:52 (4)	04:51	05:23 (9)	
	16:44	17:43	18:35	20:31	33 07:07 (1)	21:22	26 06:18 (4)	21:49	12 05:35 (9)	
24	08:15	07:19	06:13	06:01		05:07	05:52 (4)	04:51	05:24 (9)	
	16:45	17:45	18:37	20:33	34 07:06 (1)	21:23	26 06:18 (4)	21:49	11 05:35 (9)	
25	08:14	07:16	06:11	05:59		05:06	05:53 (4)	04:52	05:24 (9)	
	16:47	17:47	18:39	4 06:34 (2)	20:35	36 07:05 (1)	21:24	25 06:18 (4)	21:49	11 05:35 (9)
26	08:13	07:14	06:08	06:32 (2)	05:57	06:21 (3)	05:05	05:53 (4)	04:52	05:24 (9)
	16:49	17:49	18:41	10 06:42 (2)	20:36	37 07:03 (1)	21:26	25 06:18 (4)	21:49	11 05:35 (9)
27	08:11	07:12	06:06	06:29 (2)	05:55	06:20 (3)	05:04	05:53 (4)	04:53	05:25 (9)
	16:51	17:51	18:42	14 06:43 (2)	20:38	36 07:02 (1)	21:27	25 06:18 (4)	21:49	11 05:36 (9)
28	08:10	07:10	06:04	06:27 (2)	05:53	06:19 (3)	05:03	05:54 (4)	04:53	05:25 (9)
	16:53	17:53	18:44	17 06:44 (2)	20:40	34 07:00 (1)	21:29	24 06:18 (4)	21:49	14 06:13 (4)
29	08:08		07:01	07:25 (2)	05:51	06:20 (3)	05:02	05:54 (4)	04:54	05:26 (9)
	16:55		19:46	19 07:44 (2)	20:42	29 06:59 (1)	21:30	24 06:18 (4)	21:49	15 06:15 (4)
30	08:07		06:59	07:24 (2)	05:49	06:20 (3)	05:01	05:54 (4)	04:54	05:27 (9)
	16:57		19:48	20 07:44 (2)	20:43	20 06:40 (3)	21:31	23 06:17 (4)	21:48	16 06:16 (4)
31	08:05		06:56	07:24 (2)			05:00	05:55 (4)		
	16:58		19:50	21 07:45 (2)			21:32	22 06:17 (4)		
Sonnenscheinstunden	253	275	367	418		491		506		
astr.max.mögl.Beschattung			105		574		614		441	
Red.Sonnenscheinwahrsch.			0.28		0.37		0.43		0.39	
Reduktion Betriebsdauer			0.96		0.96		0.96		0.96	
Reduktion Windrichtung			0.71		0.72		0.73		0.72	
Gesamte Reduktion			0.19		0.26		0.30		0.27	
Met.wahrsch.Beschattung			20		147		184		118	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BL - IO64

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:27 (9)	05:34	06:06 (4)	06:26		07:18	07:14	08:08			
	21:48	18	06:17 (4)	21:14	18	06:24 (4)	20:09	18:57	16:48	16:05		
2	04:56	05:28 (9)	05:35	06:08 (4)	06:28		07:20	07:16	08:09			
	21:48	18	06:18 (4)	21:12	15	06:23 (4)	20:07	18:55	16:46	16:05		
3	04:56	05:29 (9)	05:37	06:09 (4)	06:30		07:21	07:18	08:11			
	21:47	18	06:19 (4)	21:11	11	06:20 (4)	20:05	18:52	16:44	16:04		
4	04:57	05:29 (9)	05:38	06:13 (4)	06:31		07:23	07:20	08:12			
	21:47	17	06:19 (4)	21:09	4	06:17 (4)	20:02	18:50	16:42	16:03		
5	04:58	05:30 (9)	05:40		06:33		07:25	07:22	08:14			
	21:46	18	06:20 (4)	21:07	20:00		18:48	16:41	16:03			
6	04:59	06:05 (4)	05:42	06:35 (3)	06:35		07:23 (2)	07:27	07:24	08:15		
	21:46	16	06:21 (4)	21:05	6	06:41 (3)	19:58	10	07:33 (2)	18:45	16:39	16:02
7	05:00	06:05 (4)	05:43	06:33 (3)	06:36		07:21 (2)	07:28	07:26	08:16		
	21:45	17	06:22 (4)	21:03	11	06:44 (3)	19:55	14	07:35 (2)	18:43	16:37	16:02
8	05:01	06:05 (4)	05:45	06:31 (3)	06:38		07:19 (2)	07:30	07:28	08:18		
	21:45	18	06:23 (4)	21:01	14	06:45 (3)	19:53	17	07:36 (2)	18:41	16:35	16:01
9	05:02	06:04 (4)	05:47	06:30 (3)	06:40		07:18 (2)	07:32	07:30	08:19		
	21:44	19	06:23 (4)	20:59	16	06:46 (3)	19:50	18	07:36 (2)	18:38	16:33	16:01
10	05:03	06:04 (4)	05:48	06:29 (3)	06:42		07:17 (2)	07:34	07:31	08:20		
	21:43	20	06:24 (4)	20:57	17	06:46 (3)	19:48	20	07:37 (2)	18:36	16:32	16:01
11	05:04	06:04 (4)	05:50	06:29 (3)	06:43		07:17 (2)	07:36	07:33	08:21		
	21:42	21	06:25 (4)	20:55	18	06:47 (3)	19:46	20	07:37 (2)	18:34	16:30	16:01
12	05:05	06:03 (4)	05:52	06:28 (3)	06:45		07:16 (2)	07:37	07:35	08:22		
	21:41	22	06:25 (4)	20:53	20	06:48 (3)	19:43	20	07:36 (2)	18:31	16:28	16:00
13	05:06	06:03 (4)	05:54	06:28 (3)	06:47		07:16 (2)	07:39	07:37	08:23		
	21:40	23	06:26 (4)	20:51	19	06:47 (3)	19:41	20	07:36 (2)	18:29	16:27	16:00
14	05:08	06:03 (4)	05:55	06:28 (3)	06:48		07:16 (2)	07:41	07:39	08:24		
	21:39	23	06:26 (4)	20:49	30	07:07 (1)	19:38	19	07:35 (2)	18:27	16:25	16:00
15	05:09	06:02 (4)	05:57	06:27 (3)	06:50		07:16 (2)	07:43	07:41	08:25		
	21:38	24	06:26 (4)	20:47	34	07:08 (1)	19:36	18	07:34 (2)	18:24	16:24	16:00
16	05:10	06:02 (4)	05:59	06:28 (3)	06:52		07:18 (2)	07:45	07:42	08:26		
	21:37	24	06:26 (4)	20:45	36	07:10 (1)	19:33	14	07:32 (2)	18:22	16:22	16:00
17	05:11	06:03 (4)	06:00	06:29 (3)	06:54		07:20 (2)	07:46	07:44	08:27		
	21:36	25	06:28 (4)	20:43	37	07:11 (1)	19:31	11	07:31 (2)	18:20	16:21	16:01
18	05:13	06:02 (4)	06:02	06:30 (3)	06:55		07:21 (2)	07:48	07:46	08:28		
	21:35	26	06:28 (4)	20:41	35	07:11 (1)	19:29	6	07:27 (2)	18:18	16:19	16:01
19	05:14	06:02 (4)	06:04	06:32 (3)	06:57			07:50	07:48	08:28		
	21:34	26	06:28 (4)	20:39	35	07:12 (1)	19:26		18:15	16:18	16:01	
20	05:15	06:02 (4)	06:05	06:33 (3)	06:59			07:52	07:50	08:29		
	21:32	26	06:28 (4)	20:37	32	07:12 (1)	19:24		18:13	16:17	16:01	
21	05:17	06:02 (4)	06:07	06:35 (3)	07:00			07:54	07:51	08:30		
	21:31	26	06:28 (4)	20:34	27	07:12 (1)	19:21		18:11	16:15	16:02	
22	05:18	06:02 (4)	06:09	06:48 (1)	07:02			07:56	07:53	08:30		
	21:30	26	06:28 (4)	20:32	24	07:12 (1)	19:19		18:09	16:14	16:02	
23	05:20	06:02 (4)	06:11	06:47 (1)	07:04			07:58	07:55	08:31		
	21:28	26	06:28 (4)	20:30	24	07:11 (1)	19:16		18:07	16:13	16:03	
24	05:21	06:03 (4)	06:12	06:47 (1)	07:06			07:59	07:57	08:31		
	21:27	25	06:28 (4)	20:28	24	07:11 (1)	19:14		18:05	16:12	16:03	
25	05:23	06:02 (4)	06:14	06:48 (1)	07:07			07:01	07:58	08:31		
	21:25	26	06:28 (4)	20:25	23	07:11 (1)	19:12		17:02	16:11	16:04	
26	05:24	06:03 (4)	06:16	06:47 (1)	07:09			07:03	08:00	08:32		
	21:24	25	06:28 (4)	20:23	23	07:10 (1)	19:09		17:00	16:10	16:05	
27	05:26	06:03 (4)	06:18	06:48 (1)	07:11			07:05	08:02	08:32		
	21:22	25	06:28 (4)	20:21	21	07:09 (1)	19:07		16:58	16:09	16:06	
28	05:27	06:04 (4)	06:19	06:49 (1)	07:13			07:07	08:03	08:32		
	21:21	24	06:28 (4)	20:19	18	07:07 (1)	19:04		16:56	16:08	16:06	
29	05:29	06:04 (4)	06:21	06:50 (1)	07:14			07:09	08:05	08:32		
	21:19	23	06:27 (4)	20:16	15	07:05 (1)	19:02		16:54	16:07	16:07	
30	05:30	06:04 (4)	06:23	06:52 (1)	07:16			07:11	08:06	08:32		
	21:18	22	06:26 (4)	20:14	11	07:03 (1)	19:00		16:52	16:06	16:08	
31	05:32	06:06 (4)	06:24					07:13		08:32		
	21:16	19	06:25 (4)	20:12				16:50		16:09		
Sonnenscheinstunden	508		458		382			330		262		237
astr.max.mögl.Beschattung	686		618		207							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	181		181		49							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BM - IO65

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:08	06:54	07:20 (2)	05:47
	16:10	17:00	17:55	19:51	20	07:40 (2)
2	08:32	08:02	07:05	06:52	07:20 (2)	05:44
	16:12	17:02	17:57	19:53	20	07:40 (2)
3	08:32	08:00	07:03	06:49	07:20 (2)	05:42
	16:13	17:04	17:58	19:55	20	07:40 (2)
4	08:32	07:58	07:01	06:47	07:19 (2)	05:41
	16:14	17:06	18:00	19:57	20	07:39 (2)
5	08:32	07:57	06:58	06:45	07:20 (2)	05:39
	16:15	17:08	18:02	19:59	18	07:38 (2)
6	08:31	07:55	06:56	06:42	07:20 (2)	05:37
	16:16	17:10	18:04	20:00	16	07:36 (2)
7	08:31	07:53	06:54	06:40	07:22 (2)	05:35
	16:18	17:12	18:06	20:02	12	07:34 (2)
8	08:30	07:51	06:51	06:37	07:24 (2)	05:33
	16:19	17:14	18:08	20:04	8	07:32 (2)
9	08:30	07:49	06:49	06:35	05:31	20:59
	16:20	17:16	18:10	20:06	05:29	05:29
10	08:29	07:48	06:47	06:33	21:01	04:52
	16:22	17:18	18:11	20:08	05:28	18
11	08:29	07:46	06:44	06:30	21:03	05:57 (4)
	16:23	17:20	18:13	20:09	10	06:07 (4)
12	08:28	07:44	06:42	06:28	05:26	19
	16:25	17:22	18:15	20:11	15	06:09 (4)
13	08:27	07:42	06:40	06:26	05:24	19
	16:26	17:24	18:17	20:13	16	06:10 (4)
14	08:26	07:40	06:37	06:24	05:22	19
	16:28	17:26	18:19	20:15	5	06:51 (1)
15	08:25	07:38	06:35	06:21	06:47 (1)	19
	16:30	17:28	18:21	20:17	12	06:59 (1)
16	08:24	07:36	06:32	06:19	06:45 (1)	20
	16:31	17:30	18:23	20:18	16	07:01 (1)
17	08:23	07:34	06:30	06:17	06:42 (1)	21
	16:33	17:32	18:24	20:20	19	07:01 (1)
18	08:22	07:32	06:28	06:14	06:41 (1)	23
	16:35	17:34	18:26	20:22	21	07:02 (1)
19	08:21	07:29	06:25	06:12	06:41 (1)	24
	16:36	17:35	18:28	20:24	22	07:03 (1)
20	08:20	07:27	06:23	06:10	06:40 (1)	25
	16:38	17:37	18:30	20:26	23	07:03 (1)
21	08:19	07:25	06:20	06:08	06:40 (1)	24
	16:40	17:39	18:32	20:27	23	07:03 (1)
22	08:18	07:23	06:18	06:06	06:39 (1)	25
	16:42	17:41	18:33	20:29	24	07:03 (1)
23	08:17	07:21	06:16	06:03	06:28 (3)	25
	16:44	17:43	18:35	20:31	25	07:03 (1)
24	08:15	07:19	06:13	06:01	06:26 (3)	26
	16:45	17:45	18:37	20:33	31	07:03 (1)
25	08:14	07:16	06:11	05:59	06:24 (3)	26
	16:47	17:47	18:39	20:35	33	07:02 (1)
26	08:13	07:14	06:08	05:57	06:21 (3)	25
	16:49	17:49	18:41	20:36	36	07:01 (1)
27	08:11	07:12	06:06	05:55	06:19 (3)	25
	16:51	17:51	18:42	6	06:35 (2)	25
28	08:10	07:10	06:04	05:53	06:17 (3)	25
	16:53	17:53	18:44	11	06:38 (2)	25
29	08:08	07:01	06:00	05:51	06:18 (3)	25
	16:55	19:46	15	07:39 (2)	35	06:58 (1)
30	08:07	06:59	07:22 (2)	05:49	06:17 (3)	24
	16:57	19:48	18	07:40 (2)	32	06:56 (1)
31	08:05	06:56	07:21 (2)	05:00	05:00	23
	16:58	19:50	19	07:40 (2)	21:32	06:14 (4)
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			69	565	596	550
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.71	0.72	0.73	0.72
Gesamte Reduktion			0.19	0.26	0.30	0.27
Met.wahrsch.Beschattung			13	145	179	148

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BM - IO65

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:27 (9)	05:34		06:05 (4)	06:26		07:18	07:14	08:08		
	21:48	19 06:16 (4)	21:14	13	06:18 (4)	20:09		18:57	16:48	16:05		
2	04:56	05:28 (9)	05:35		06:08 (4)	06:28		07:20	07:16	08:09		
	21:48	19 06:17 (4)	21:12	8	06:16 (4)	20:07		18:55	16:46	16:05		
3	04:56	05:29 (9)	05:37			06:30		07:21	07:18	08:11		
	21:47	18 06:18 (4)	21:11			20:05		18:52	16:44	16:04		
4	04:57	06:01 (4)	05:38			06:31		07:21 (2)	07:23	08:12		
	21:47	17 06:18 (4)	21:09			20:02	8	07:29 (2)	18:50	16:42	16:03	
5	04:58	06:01 (4)	05:40		06:32 (3)	06:33		07:19 (2)	07:25	07:22	08:14	
	21:46	17 06:18 (4)	21:07	8	06:40 (3)	20:00	12	07:31 (2)	18:48	16:41	16:03	
6	04:59	06:01 (4)	05:42		06:30 (3)	06:35		07:16 (2)	07:27	07:24	08:15	
	21:46	18 06:19 (4)	21:05	11	06:41 (3)	19:58	16	07:32 (2)	18:45	16:39	16:02	
7	05:00	06:01 (4)	05:43		06:29 (3)	06:36		07:15 (2)	07:28	07:26	08:16	
	21:45	19 06:20 (4)	21:03	14	06:43 (3)	19:55	18	07:33 (2)	18:43	16:37	16:02	
8	05:01	06:01 (4)	05:45		06:27 (3)	06:38		07:15 (2)	07:30	07:28	08:18	
	21:45	19 06:20 (4)	21:01	16	06:43 (3)	19:53	19	07:34 (2)	18:41	16:35	16:01	
9	05:02	06:00 (4)	05:47		06:27 (3)	06:40		07:13 (2)	07:32	07:30	08:19	
	21:44	21 06:21 (4)	20:59	17	06:44 (3)	19:50	20	07:33 (2)	18:38	16:33	16:01	
10	05:03	06:00 (4)	05:48		06:26 (3)	06:42		07:13 (2)	07:34	07:31	08:20	
	21:43	22 06:22 (4)	20:57	18	06:44 (3)	19:48	20	07:33 (2)	18:36	16:32	16:01	
11	05:04	06:00 (4)	05:50		06:26 (3)	06:43		07:13 (2)	07:36	07:33	08:21	
	21:42	22 06:22 (4)	20:55	19	06:45 (3)	19:46	20	07:33 (2)	18:34	16:30	16:01	
12	05:05	06:00 (4)	05:52		06:26 (3)	06:45		07:12 (2)	07:37	07:35	08:22	
	21:41	23 06:23 (4)	20:53	28	07:03 (1)	19:43	20	07:32 (2)	18:31	16:28	16:00	
13	05:06	06:00 (4)	05:54		06:25 (3)	06:47		07:13 (2)	07:39	07:37	08:23	
	21:40	23 06:23 (4)	20:51	32	07:04 (1)	19:41	18	07:31 (2)	18:29	16:27	16:00	
14	05:08	05:59 (4)	05:55		06:25 (3)	06:48		07:15 (2)	07:41	07:39	08:24	
	21:39	24 06:23 (4)	20:49	35	07:06 (1)	19:38	15	07:30 (2)	18:27	16:25	16:00	
15	05:09	05:59 (4)	05:57		06:25 (3)	06:50		07:16 (2)	07:43	07:41	08:25	
	21:38	24 06:23 (4)	20:47	36	07:06 (1)	19:36	12	07:28 (2)	18:24	16:24	16:00	
16	05:10	05:59 (4)	05:59		06:27 (3)	06:52		07:18 (2)	07:45	07:42	08:26	
	21:37	24 06:23 (4)	20:45	37	07:08 (1)	19:33	8	07:26 (2)	18:22	16:22	16:00	
17	05:11	06:00 (4)	06:00		06:29 (3)	06:54			07:46	07:44	08:27	
	21:36	25 06:25 (4)	20:43	34	07:08 (1)	19:31			18:20	16:21	16:01	
18	05:13	05:59 (4)	06:02		06:30 (3)	06:55			07:48	07:46	08:28	
	21:35	26 06:25 (4)	20:41	33	07:08 (1)	19:29			18:18	16:19	16:01	
19	05:14	05:59 (4)	06:04		06:32 (3)	06:57			07:50	07:48	08:28	
	21:34	25 06:24 (4)	20:39	30	07:09 (1)	19:26			18:15	16:18	16:01	
20	05:15	05:59 (4)	06:05		06:44 (1)	06:59			07:52	07:50	08:29	
	21:32	25 06:24 (4)	20:37	24	07:08 (1)	19:24			18:13	16:17	16:01	
21	05:17	06:00 (4)	06:07		06:44 (1)	07:00			07:54	07:51	08:30	
	21:31	25 06:25 (4)	20:34	24	07:08 (1)	19:21			18:11	16:15	16:02	
22	05:18	05:59 (4)	06:09		06:44 (1)	07:02			07:56	07:53	08:30	
	21:30	26 06:25 (4)	20:32	24	07:08 (1)	19:19			18:09	16:14	16:02	
23	05:20	05:59 (4)	06:11		06:44 (1)	07:04			07:58	07:55	08:31	
	21:28	25 06:24 (4)	20:30	23	07:07 (1)	19:16			18:07	16:13	16:03	
24	05:21	06:00 (4)	06:12		06:44 (1)	07:06			07:59	07:57	08:31	
	21:27	25 06:25 (4)	20:28	23	07:07 (1)	19:14			18:05	16:12	16:03	
25	05:23	06:00 (4)	06:14		06:45 (1)	07:07			07:01	07:58	08:31	
	21:25	24 06:24 (4)	20:25	21	07:06 (1)	19:12			17:02	16:11	16:04	
26	05:24	06:01 (4)	06:16		06:45 (1)	07:09			07:03	08:00	08:32	
	21:24	23 06:24 (4)	20:23	19	07:04 (1)	19:09			17:00	16:10	16:05	
27	05:26	06:01 (4)	06:18		06:47 (1)	07:11			07:05	08:02	08:32	
	21:22	23 06:24 (4)	20:21	16	07:03 (1)	19:07			16:58	16:09	16:06	
28	05:27	06:02 (4)	06:19		06:48 (1)	07:13			07:07	08:03	08:32	
	21:21	22 06:24 (4)	20:19	12	07:00 (1)	19:04			16:56	16:08	16:06	
29	05:29	06:02 (4)	06:21		06:52 (1)	07:14			07:09	08:05	08:32	
	21:19	20 06:22 (4)	20:16	4	06:56 (1)	19:02			16:54	16:07	16:07	
30	05:30	06:03 (4)	06:23			07:16			07:11	08:06	08:32	
	21:18	18 06:21 (4)	20:14			19:00			16:52	16:06	16:08	
31	05:32	06:04 (4)	06:24						07:13		08:32	
	21:16	16 06:20 (4)	20:12						16:50		16:09	
Sonnenscheinstunden	508		458		382			330	262	237		
astr.max.mögl.Beschattung	677		579		206							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	179		169		49							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BN - IO66

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:24 (2)	05:47	04:59	05:28 (9)
	16:10	17:00	17:55	19:51	19 07:43 (2)	20:45	21:34	9 06:13 (4)
2	08:32	08:02	07:05	06:52	07:25 (2)	05:44	04:58	05:28 (9)
	16:12	17:02	17:57	19:53	18 07:43 (2)	20:47	21:35	6 05:34 (9)
3	08:32	08:00	07:03	06:49	07:26 (2)	05:43	04:57	05:27 (9)
	16:13	17:04	17:58	19:55	16 07:42 (2)	20:49	21:36	7 05:34 (9)
4	08:32	07:58	07:01	06:47	07:26 (2)	05:41	04:56	05:26 (9)
	16:14	17:06	18:00	19:57	14 07:40 (2)	20:50	21:37	9 05:35 (9)
5	08:32	07:57	06:58	06:45	07:28 (2)	05:39	04:55	05:26 (9)
	16:15	17:08	18:02	19:59	10 07:38 (2)	20:52	21:38	10 05:36 (9)
6	08:31	07:55	06:56	06:42	05:37	06:04 (4)	04:55	05:25 (9)
	16:16	17:10	18:04	20:00	20:54	10 06:14 (4)	21:39	11 05:36 (9)
7	08:31	07:53	06:54	06:40	05:35	06:03 (4)	04:54	05:25 (9)
	16:18	17:12	18:06	20:02	20:56	14 06:17 (4)	21:40	12 05:37 (9)
8	08:30	07:51	06:51	06:37	05:33	06:01 (4)	04:53	05:24 (9)
	16:19	17:14	18:08	20:04	20:57	17 06:18 (4)	21:41	13 05:37 (9)
9	08:30	07:49	06:49	06:35	05:31	06:00 (4)	04:53	05:24 (9)
	16:20	17:16	18:10	20:06	20:59	19 06:19 (4)	21:42	14 05:38 (9)
10	08:29	07:48	06:47	06:33	05:29	05:59 (4)	04:52	05:23 (9)
	16:22	17:18	18:12	20:08	21:01	21 06:20 (4)	21:43	15 05:38 (9)
11	08:29	07:46	06:44	06:30	06:56 (1)	05:28	05:58 (4)	04:52
	16:23	17:20	18:13	20:09	7 07:03 (1)	21:03	22 06:20 (4)	21:44
12	08:28	07:44	06:42	06:28	06:53 (1)	05:26	05:57 (4)	04:52
	16:25	17:22	18:15	20:11	13 07:06 (1)	21:04	23 06:20 (4)	21:44
13	08:27	07:42	06:40	06:26	06:50 (1)	05:24	05:58 (4)	04:51
	16:26	17:24	18:17	20:13	17 07:07 (1)	21:06	23 06:21 (4)	21:45
14	08:26	07:40	06:37	06:24	06:49 (1)	05:22	05:57 (4)	04:51
	16:28	17:26	18:19	20:15	19 07:08 (1)	21:08	24 06:21 (4)	21:46
15	08:25	07:38	06:35	06:21	06:48 (1)	05:21	05:57 (4)	04:51
	16:30	17:28	18:21	20:17	21 07:09 (1)	21:09	25 06:22 (4)	21:46
16	08:24	07:36	06:32	06:19	06:48 (1)	05:19	05:57 (4)	04:51
	16:31	17:30	18:23	20:18	22 07:10 (1)	21:11	24 06:21 (4)	21:47
17	08:23	07:34	06:30	06:17	06:46 (1)	05:18	05:57 (4)	04:51
	16:33	17:32	18:24	20:20	23 07:09 (1)	21:12	25 06:22 (4)	21:47
18	08:22	07:32	06:28	06:14	06:46 (1)	05:16	05:57 (4)	04:50
	16:35	17:34	18:26	20:22	23 07:09 (1)	21:14	25 06:22 (4)	21:48
19	08:21	07:29	06:25	06:12	06:46 (1)	05:14	05:57 (4)	04:50
	16:36	17:35	18:28	20:24	23 07:09 (1)	21:16	24 06:21 (4)	21:48
20	08:20	07:27	06:23	06:10	06:46 (1)	05:13	05:58 (4)	04:51
	16:38	17:37	18:30	20:26	23 07:09 (1)	21:17	23 06:21 (4)	21:48
21	08:19	07:25	06:20	06:08	06:46 (1)	05:12	05:58 (4)	04:51
	16:40	17:39	18:32	20:27	22 07:08 (1)	21:19	23 06:21 (4)	21:49
22	08:18	07:23	06:18	06:06	06:47 (1)	05:10	05:58 (4)	04:51
	16:42	17:41	18:33	20:29	21 07:08 (1)	21:20	22 06:20 (4)	21:49
23	08:17	07:21	06:16	06:03	06:47 (1)	05:09	05:58 (4)	04:51
	16:44	17:43	18:35	20:31	20 07:07 (1)	21:22	22 06:20 (4)	21:49
24	08:15	07:19	06:13	06:01	06:48 (1)	05:07	05:59 (4)	04:51
	16:45	17:45	18:37	20:33	18 07:06 (1)	21:23	21 06:20 (4)	21:49
25	08:14	07:16	06:11	05:59	06:49 (1)	05:06	06:00 (4)	04:52
	16:47	17:47	18:39	6 06:40 (2)	20:35	15 07:04 (1)	21:24	20 06:20 (4)
26	08:13	07:14	06:08	05:57	06:32 (2)	05:57	06:01 (4)	04:52
	16:49	17:49	18:41	11 06:43 (2)	20:36	11 07:01 (1)	21:26	18 06:19 (4)
27	08:11	07:12	06:06	05:55	06:29 (2)	05:55	06:01 (4)	04:53
	16:51	17:51	18:42	14 06:43 (2)	20:38	2 06:56 (1)	21:27	18 06:19 (4)
28	08:10	07:10	06:04	05:53	06:27 (2)	05:53	06:02 (4)	04:53
	16:53	17:53	18:44	17 06:44 (2)	20:40	21:29	16 06:18 (4)	21:49
29	08:08	07:01	06:27 (2)	05:51	05:02	06:03 (4)	04:54	05:27 (9)
	16:55	19:46	19 07:44 (2)	20:42	21:30	14 06:17 (4)	21:49	16 05:43 (9)
30	08:07	06:59	07:25 (2)	05:49	05:01	06:04 (4)	04:54	05:28 (9)
	16:57	19:48	19 07:44 (2)	20:43	21:31	12 06:16 (4)	21:48	15 05:43 (9)
31	08:05	06:56	07:25 (2)	05:47	05:00	06:06 (4)		
	16:58	19:50	19 07:44 (2)	20:43	21:32	9 06:15 (4)		
Sonnenscheinstunden	253	275	367	418	491		506	
astr.max.mögl.Beschattung			105		377		514	421
Red.Sonnenscheinwahrsch.			0.28		0.37		0.43	0.39
Reduktion Betriebsdauer			0.96		0.96		0.96	0.96
Reduktion Windrichtung			0.71		0.72		0.73	0.72
Gesamte Reduktion			0.19		0.26		0.30	0.27
Met.wahrsch.Beschattung			20		97		154	112

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BN - IO66

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:27 (9)	05:34		06:08 (4)	06:26	06:55 (1)	07:18	07:14	08:08		
	21:48	16	05:43 (9)	21:14	23	06:31 (4)	20:09	7	07:02 (1)	18:57	16:48	16:05
2	04:56	05:28 (9)	05:35		06:09 (4)	06:28			07:20	07:16	08:09	
	21:48	15	05:43 (9)	21:12	22	06:31 (4)	20:07		18:55	16:46	16:05	
3	04:56	05:29 (9)	05:37		06:09 (4)	06:30			07:21	07:18	08:11	
	21:47	14	05:43 (9)	21:11	20	06:29 (4)	20:05		18:52	16:44	16:04	
4	04:57	05:29 (9)	05:38		06:10 (4)	06:31			07:23	07:20	08:12	
	21:47	13	05:42 (9)	21:09	19	06:29 (4)	20:02		18:50	16:42	16:03	
5	04:58	05:30 (9)	05:40		06:12 (4)	06:33			07:25	07:22	08:14	
	21:46	13	05:43 (9)	21:07	16	06:28 (4)	20:00		18:48	16:41	16:03	
6	04:59	05:31 (9)	05:42		06:13 (4)	06:35			07:27	07:24	08:15	
	21:46	12	05:43 (9)	21:05	13	06:26 (4)	19:58		18:45	16:39	16:02	
7	05:00	05:32 (9)	05:43		06:16 (4)	06:36		07:23 (2)	07:28	07:26	08:16	
	21:45	11	05:43 (9)	21:03	8	06:24 (4)	19:55	10	07:33 (2)	18:43	16:37	16:02
8	05:01	05:33 (9)	05:45			06:38			07:21 (2)	07:30	07:28	08:18
	21:45	9	05:42 (9)	21:01		19:53	14	07:35 (2)	18:41	16:35	16:01	
9	05:02	05:34 (9)	05:47			06:40			07:19 (2)	07:32	07:30	08:19
	21:44	8	05:42 (9)	20:59		19:50	16	07:35 (2)	18:38	16:33	16:01	
10	05:03	05:35 (9)	05:48			06:42			07:18 (2)	07:34	07:31	08:20
	21:43	6	05:41 (9)	20:57		19:48	18	07:36 (2)	18:36	16:32	16:01	
11	05:04	05:36 (9)	05:50			06:43			07:17 (2)	07:36	07:33	08:21
	21:42	5	05:41 (9)	20:55		19:46	19	07:36 (2)	18:34	16:30	16:01	
12	05:05	05:37 (9)	05:52			06:45			07:16 (2)	07:37	07:35	08:22
	21:41	9	06:22 (4)	20:53		19:43	20	07:36 (2)	18:31	16:28	16:00	
13	05:06	06:13 (4)	05:54			06:47			07:16 (2)	07:39	07:37	08:23
	21:40	11	06:24 (4)	20:51		19:41	20	07:36 (2)	18:29	16:27	16:00	
14	05:08	06:12 (4)	05:55			06:48			07:16 (2)	07:41	07:39	08:24
	21:39	13	06:25 (4)	20:49		19:38	19	07:35 (2)	18:27	16:25	16:00	
15	05:09	06:11 (4)	05:57			06:50			07:16 (2)	07:43	07:41	08:25
	21:38	15	06:26 (4)	20:47		19:36	18	07:34 (2)	18:24	16:24	16:00	
16	05:10	06:10 (4)	05:59		07:00 (1)	06:52			07:18 (2)	07:45	07:43	08:26
	21:37	17	06:27 (4)	20:45	6	07:06 (1)	19:33	15	07:33 (2)	18:22	16:22	16:00
17	05:11	06:10 (4)	06:00			06:57 (1)	06:54		07:20 (2)	07:46	07:44	08:27
	21:36	18	06:28 (4)	20:43	12	07:09 (1)	19:31	12	07:32 (2)	18:20	16:21	16:01
18	05:13	06:10 (4)	06:02			06:55 (1)	06:55		07:21 (2)	07:48	07:46	08:28
	21:35	19	06:29 (4)	20:41	15	07:10 (1)	19:29	8	07:29 (2)	18:18	16:19	16:01
19	05:14	06:09 (4)	06:04			06:53 (1)	06:57			07:50	07:48	08:28
	21:34	20	06:29 (4)	20:39	18	07:11 (1)	19:26			18:15	16:18	16:01
20	05:15	06:08 (4)	06:05			06:52 (1)	06:59			07:52	07:50	08:29
	21:32	22	06:30 (4)	20:37	20	07:12 (1)	19:24			18:13	16:17	16:01
21	05:17	06:09 (4)	06:07			06:51 (1)	07:00			07:54	07:51	08:30
	21:31	22	06:31 (4)	20:34	21	07:12 (1)	19:21			18:11	16:15	16:02
22	05:18	06:08 (4)	06:09			06:51 (1)	07:02			07:56	07:53	08:30
	21:30	23	06:31 (4)	20:32	22	07:13 (1)	19:19			18:09	16:14	16:02
23	05:20	06:07 (4)	06:11			06:50 (1)	07:04			07:58	07:55	08:31
	21:28	24	06:31 (4)	20:30	22	07:12 (1)	19:16			18:07	16:13	16:03
24	05:21	06:08 (4)	06:12			06:50 (1)	07:06			07:59	07:57	08:31
	21:27	24	06:32 (4)	20:28	23	07:13 (1)	19:14			18:05	16:12	16:03
25	05:23	06:07 (4)	06:14			06:50 (1)	07:07			07:01	07:58	08:31
	21:25	25	06:32 (4)	20:25	23	07:13 (1)	19:12			17:02	16:11	16:04
26	05:24	06:08 (4)	06:16			06:49 (1)	07:09			07:03	08:00	08:32
	21:24	25	06:33 (4)	20:23	23	07:12 (1)	19:09			17:00	16:10	16:05
27	05:26	06:07 (4)	06:18			06:49 (1)	07:11			07:05	08:02	08:32
	21:22	25	06:32 (4)	20:21	22	07:11 (1)	19:07			16:58	16:09	16:06
28	05:27	06:08 (4)	06:19			06:49 (1)	07:13			07:07	08:03	08:32
	21:21	25	06:33 (4)	20:19	21	07:10 (1)	19:04			16:56	16:08	16:06
29	05:29	06:08 (4)	06:21			06:50 (1)	07:14			07:09	08:05	08:32
	21:19	24	06:32 (4)	20:16	19	07:09 (1)	19:02			16:54	16:07	16:07
30	05:30	06:07 (4)	06:23			06:51 (1)	07:16			07:11	08:06	08:32
	21:18	24	06:31 (4)	20:14	17	07:08 (1)	19:00			16:52	16:06	16:08
31	05:32	06:08 (4)	06:24			06:52 (1)				07:13		08:32
	21:16	24	06:32 (4)	20:12	13	07:05 (1)				16:50		16:09
Sonnenscheinstunden	508		458			382			330	262	237	
astr. max.mögl. Beschattung	531		418			196						
Red. Sonnenscheinwahrsch.	0.38		0.42			0.35						
Reduktion Betriebsdauer	0.96		0.96			0.96						
Reduktion Windrichtung	0.73		0.72			0.71						
Gesamte Reduktion	0.26		0.29			0.24						
Met. wahrsch. Beschattung	140		122			47						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BO - IO67

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:25 (2)	05:46	06:19 (3)	04:59
	16:10	17:00	17:55	19:51	20	07:45 (2)	20:45	20
2	08:32	08:02	07:05	06:52	07:25 (2)	05:44	06:19 (3)	04:58
	16:12	17:02	17:57	19:53	20	07:45 (2)	20:47	20
3	08:32	08:00	07:03	06:49	07:26 (2)	05:42	06:19 (3)	04:57
	16:13	17:04	17:58	19:55	19	07:45 (2)	20:49	19
4	08:32	07:58	07:01	06:47	07:26 (2)	05:41	06:20 (3)	04:56
	16:14	17:06	18:00	19:57	17	07:43 (2)	20:50	17
5	08:32	07:57	06:58	06:45	07:27 (2)	05:39	06:20 (3)	04:55
	16:15	17:08	18:02	19:59	14	07:41 (2)	20:52	16
6	08:31	07:55	06:56	06:42	07:28 (2)	05:37	06:21 (3)	04:55
	16:16	17:10	18:04	20:00	10	07:38 (2)	20:54	14
7	08:31	07:53	06:54	06:40		05:35	06:23 (3)	04:54
	16:18	17:12	18:06	20:02		20:56	11	06:34 (3)
8	08:30	07:51	06:51	06:37		05:33		06:26 (3)
	16:19	17:14	18:08	20:04		20:57	4	06:30 (3)
9	08:30	07:49	06:49	06:35		05:31		04:53
	16:20	17:16	18:10	20:06		20:59		21:42
10	08:29	07:48	06:47	06:33		05:29		06:03 (4)
	16:22	17:18	18:11	20:08		21:01	2	06:05 (4)
11	08:29	07:46	06:44	06:30		05:27		05:58 (4)
	16:23	17:20	18:13	20:09		21:03	11	06:09 (4)
12	08:28	07:44	06:42	06:28		05:26		05:56 (4)
	16:25	17:22	18:15	20:11		21:04	15	06:11 (4)
13	08:27	07:42	06:40	06:26		05:24		05:55 (4)
	16:26	17:24	18:17	20:13	11	07:03 (1)	21:06	18
14	08:26	07:40	06:37	06:24		05:22		05:53 (4)
	16:28	17:26	18:19	20:15	15	07:05 (1)	21:08	20
15	08:25	07:38	06:35	06:21		05:21		05:53 (4)
	16:30	17:28	18:21	20:17	19	07:07 (1)	21:09	22
16	08:24	07:36	06:32	06:19		05:19		06:15 (4)
	16:31	17:30	18:23	20:18	21	07:08 (1)	21:11	23
17	08:23	07:34	06:30	06:17		05:17		06:15 (4)
	16:33	17:32	18:24	20:20	23	07:08 (1)	21:12	24
18	08:22	07:32	06:28	06:14		05:16		05:52 (4)
	16:35	17:34	18:26	20:22	24	07:08 (1)	21:14	25
19	08:21	07:29	06:25	06:12		05:14		05:51 (4)
	16:36	17:35	18:28	20:24	25	07:09 (1)	21:16	25
20	08:20	07:27	06:23	06:10		05:13		05:51 (4)
	16:38	17:37	18:30	20:26	25	07:09 (1)	21:17	26
21	08:19	07:25	06:20	06:08		05:12		05:51 (4)
	16:40	17:39	18:32	20:27	26	07:09 (1)	21:19	26
22	08:18	07:23	06:18	06:06		05:10		05:52 (4)
	16:42	17:41	18:33	20:29	25	07:08 (1)	21:20	27
23	08:17	07:21	06:16	06:03		05:09		06:17 (4)
	16:44	17:43	18:35	20:31	33	07:08 (1)	21:22	27
24	08:15	07:19	06:13	06:01		05:07		05:50 (4)
	16:45	17:45	18:37	20:33	35	07:08 (1)	21:23	27
25	08:14	07:16	06:11	05:59		05:06		06:24 (3)
	16:47	17:47	18:39	8 06:34 (2)	20:35	37	07:07 (1)	21:24
26	08:13	07:14	06:08	06:32 (2)	05:57		06:21 (3)	05:05
	16:49	17:49	18:41	13 06:45 (2)	20:36	38	07:05 (1)	21:26
27	08:11	07:12	06:06	06:29 (2)	05:55		06:20 (3)	05:04
	16:51	17:51	18:42	16 06:45 (2)	20:38	39	07:04 (1)	21:27
28	08:10	07:10	06:04	06:27 (2)	05:53		06:19 (3)	05:03
	16:53	17:53	18:44	19 06:46 (2)	20:40	37	07:02 (1)	21:29
29	08:08		07:01	07:26 (2)	05:51		06:20 (3)	05:02
	16:55		19:46	20 07:46 (2)	20:42	34	07:02 (1)	21:30
30	08:07		06:59	07:26 (2)	05:49		06:19 (3)	05:01
	16:57		19:48	20 07:46 (2)	20:43	30	06:59 (1)	21:31
31	08:05		06:56	07:26 (2)				05:00
	16:58		19:50	21 07:47 (2)				21:32
Sonnenscheinstunden	253	275	367	418		491		506
astr.max.mögl.Beschattung			117		597		625	648
Red.Sonnenscheinwahrsch.			0.28		0.37		0.43	0.39
Reduktion Betriebsdauer			0.96		0.96		0.96	0.96
Reduktion Windrichtung			0.71		0.72		0.73	0.73
Gesamte Reduktion			0.19		0.26		0.30	0.27
Met.wahrsch.Beschattung			22		153		187	174

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
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Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BO - IO67

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55	06:01 (4) 05:34	06:07 (4) 06:26	07:18	07:14	08:08
	21:48	19 06:20 (4) 21:14	13 06:20 (4) 20:09	18:57	16:48	16:05
2	04:56	06:02 (4) 05:35	06:10 (4) 06:28	07:20	07:16	08:09
	21:48	19 06:21 (4) 21:12	8 06:18 (4) 20:07	18:55	16:46	16:05
3	04:56	06:02 (4) 05:37	06:30	07:21	07:18	08:11
	21:47	19 06:21 (4) 21:11	20:05	18:52	16:44	16:04
4	04:57	06:01 (4) 05:38	06:31	07:23	07:20	08:12
	21:47	20 06:21 (4) 21:09	20:02	18:50	16:42	16:03
5	04:58	06:01 (4) 05:40	06:35 (3) 06:33	07:25	07:22	08:14
	21:46	21 06:22 (4) 21:07	7 06:42 (3) 20:00	18:48	16:41	16:03
6	04:59	06:01 (4) 05:42	06:32 (3) 06:35	07:24 (2) 07:27	07:24	08:15
	21:46	22 06:23 (4) 21:05	12 06:44 (3) 19:58	10 07:34 (2) 18:45	16:39	16:02
7	05:00	06:01 (4) 05:43	06:31 (3) 06:36	07:22 (2) 07:28	07:26	08:16
	21:45	22 06:23 (4) 21:03	14 06:45 (3) 19:55	14 07:36 (2) 18:43	16:37	16:02
8	05:01	06:01 (4) 05:45	06:29 (3) 06:38	07:21 (2) 07:30	07:28	08:18
	21:45	23 06:24 (4) 21:01	17 06:46 (3) 19:53	17 07:38 (2) 18:41	16:35	16:01
9	05:02	06:01 (4) 05:47	06:29 (3) 06:40	07:19 (2) 07:32	07:30	08:19
	21:44	23 06:24 (4) 20:59	18 06:47 (3) 19:50	19 07:38 (2) 18:38	16:33	16:01
10	05:03	06:01 (4) 05:48	06:28 (3) 06:42	07:18 (2) 07:34	07:31	08:20
	21:43	24 06:25 (4) 20:57	19 06:47 (3) 19:48	20 07:38 (2) 18:36	16:32	16:01
11	05:04	06:00 (4) 05:50	06:28 (3) 06:43	07:18 (2) 07:36	07:33	08:21
	21:42	25 06:25 (4) 20:55	19 06:47 (3) 19:46	21 07:39 (2) 18:34	16:30	16:01
12	05:05	06:00 (4) 05:52	06:28 (3) 06:45	07:17 (2) 07:37	07:35	08:22
	21:41	26 06:26 (4) 20:53	20 06:48 (3) 19:43	21 07:38 (2) 18:31	16:28	16:00
13	05:06	06:00 (4) 05:54	06:27 (3) 06:47	07:17 (2) 07:39	07:37	08:23
	21:40	26 06:26 (4) 20:51	30 07:07 (1) 19:41	21 07:38 (2) 18:29	16:27	16:00
14	05:07	06:00 (4) 05:55	06:27 (3) 06:48	07:17 (2) 07:41	07:39	08:24
	21:39	26 06:26 (4) 20:49	35 07:10 (1) 19:38	20 07:37 (2) 18:27	16:25	16:00
15	05:09	06:00 (4) 05:57	06:27 (3) 06:50	07:17 (2) 07:43	07:41	08:25
	21:38	26 06:26 (4) 20:47	36 07:10 (1) 19:36	19 07:36 (2) 18:24	16:24	16:00
16	05:10	06:00 (4) 05:59	06:27 (3) 06:52	07:18 (2) 07:45	07:42	08:26
	21:37	26 06:26 (4) 20:45	39 07:12 (1) 19:33	17 07:35 (2) 18:22	16:22	16:00
17	05:11	06:00 (4) 06:00	06:29 (3) 06:54	07:20 (2) 07:46	07:44	08:27
	21:36	27 06:27 (4) 20:43	39 07:13 (1) 19:31	13 07:33 (2) 18:20	16:21	16:01
18	05:13	06:00 (4) 06:02	06:30 (3) 06:55	07:21 (2) 07:48	07:46	08:28
	21:35	27 06:27 (4) 20:41	38 07:13 (1) 19:29	9 07:30 (2) 18:18	16:19	16:01
19	05:14	06:00 (4) 06:04	06:32 (3) 06:57	07:50	07:48	08:28
	21:34	27 06:27 (4) 20:39	35 07:13 (1) 19:26	18:15	16:18	16:01
20	05:15	06:00 (4) 06:05	06:33 (3) 06:59	07:52	07:50	08:29
	21:32	27 06:27 (4) 20:37	32 07:13 (1) 19:24	18:13	16:17	16:01
21	05:17	06:01 (4) 06:07	06:48 (1) 07:00	07:54	07:51	08:30
	21:31	27 06:28 (4) 20:34	25 07:13 (1) 19:21	18:11	16:15	16:02
22	05:18	06:00 (4) 06:09	06:48 (1) 07:02	07:56	07:53	08:30
	21:30	27 06:27 (4) 20:32	25 07:13 (1) 19:19	18:09	16:14	16:02
23	05:20	06:00 (4) 06:11	06:47 (1) 07:04	07:58	07:55	08:31
	21:28	27 06:27 (4) 20:30	25 07:12 (1) 19:16	18:07	16:13	16:03
24	05:21	06:01 (4) 06:12	06:48 (1) 07:06	07:59	07:57	08:31
	21:27	26 06:27 (4) 20:28	24 07:12 (1) 19:14	18:05	16:12	16:03
25	05:23	06:01 (4) 06:14	06:48 (1) 07:07	07:01	07:58	08:31
	21:25	26 06:27 (4) 20:25	24 07:12 (1) 19:12	17:02	16:11	16:04
26	05:24	06:02 (4) 06:16	06:48 (1) 07:09	07:03	08:00	08:32
	21:24	25 06:27 (4) 20:23	22 07:10 (1) 19:09	17:00	16:10	16:05
27	05:26	06:02 (4) 06:18	06:49 (1) 07:11	07:05	08:02	08:32
	21:22	24 06:26 (4) 20:21	21 07:10 (1) 19:07	16:58	16:09	16:06
28	05:27	06:03 (4) 06:19	06:49 (1) 07:13	07:07	08:03	08:32
	21:21	23 06:26 (4) 20:19	18 07:07 (1) 19:04	16:56	16:08	16:06
29	05:29	06:04 (4) 06:21	06:51 (1) 07:14	07:09	08:05	08:32
	21:19	21 06:25 (4) 20:16	15 07:06 (1) 19:02	16:54	16:07	16:07
30	05:30	06:04 (4) 06:23	06:53 (1) 07:16	07:11	08:06	08:32
	21:18	19 06:23 (4) 20:14	10 07:03 (1) 19:00	16:52	16:06	16:08
31	05:32	06:06 (4) 06:24		07:13		08:32
	21:16	16 06:22 (4) 20:12		16:50		16:09
Sonnenscheinstunden	508	458	382	330	262	237
astr.max.mögl.Beschattung	736	640	221			
Red.Sonnenscheinwahrsch.	0.38	0.42	0.35			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.73	0.72	0.71			
Gesamte Reduktion	0.26	0.29	0.24			
Met.wahrsch.Beschattung	194	187	52			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BP - IO68

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:34 (2)	05:46	06:29 (3)	04:59
	16:10	17:00	17:55	19:51	15 07:49 (2)	20:45	15 06:44 (3)	21:34
2	08:32	08:02	07:05	06:52	07:36 (2)	05:44	06:30 (3)	04:58
	16:12	17:02	17:57	19:53	12 07:48 (2)	20:47	12 06:42 (3)	21:35
3	08:32	08:00	07:03	06:49	07:39 (2)	05:42	06:32 (3)	04:57
	16:13	17:04	17:58	19:55	5 07:44 (2)	20:49	8 06:40 (3)	21:36
4	08:32	07:58	07:01	06:47		05:41		04:56
	16:14	17:06	18:00	19:57		20:50		21:37
5	08:32	07:57	06:58	06:45		05:39	06:08 (4)	04:55
	16:15	17:08	18:02	19:59		20:52	11 06:19 (4)	21:38
6	08:31	07:55	06:56	06:42		05:37	06:06 (4)	04:55
	16:16	17:10	18:04	20:00		20:54	15 06:21 (4)	21:39
7	08:31	07:53	06:54	06:40		05:35	06:05 (4)	04:54
	16:18	17:12	18:06	20:02		20:56	18 06:23 (4)	21:40
8	08:30	07:51	06:51	06:37		05:33	06:03 (4)	04:53
	16:19	17:14	18:08	20:04	4 07:06 (1)	05:33	21 06:24 (4)	21:41
9	08:30	07:49	06:49	06:35		05:31	06:02 (4)	04:53
	16:20	17:16	18:10	20:06	12 07:14 (1)	20:59	22 06:24 (4)	21:42
10	08:29	07:48	06:47	06:33		05:29	06:02 (4)	04:52
	16:22	17:18	18:11	20:08	16 07:15 (1)	21:01	24 06:26 (4)	21:43
11	08:29	07:46	06:44	06:30		05:27	06:01 (4)	04:52
	16:23	17:20	18:13	20:09	20 07:17 (1)	21:03	25 06:26 (4)	21:44
12	08:28	07:44	06:42	06:28		05:26	06:00 (4)	04:52
	16:25	17:22	18:15	20:11	22 07:18 (1)	21:04	26 06:26 (4)	21:44
13	08:27	07:42	06:40	06:26		05:24	06:00 (4)	04:51
	16:26	17:24	18:17	20:13	24 07:18 (1)	21:06	27 06:27 (4)	21:45
14	08:26	07:40	06:37	06:24		05:22	06:00 (4)	04:51
	16:28	17:26	18:19	20:15	24 07:18 (1)	21:08	26 06:26 (4)	21:46
15	08:25	07:38	06:35	06:21		05:21	06:00 (4)	04:51
	16:30	17:28	18:21	20:17	24 07:18 (1)	21:09	27 06:27 (4)	21:46
16	08:24	07:36	06:32	06:19		05:19	05:59 (4)	04:51
	16:31	17:30	18:23	20:18	25 07:18 (1)	21:11	27 06:26 (4)	21:47
17	08:23	07:34	06:30	06:17		05:17	06:00 (4)	04:51
	16:33	17:32	18:24	20:20	25 07:17 (1)	21:12	27 06:27 (4)	21:47
18	08:22	07:32	06:28	06:14		05:16	06:00 (4)	04:50
	16:35	17:34	18:26	20:22	24 07:17 (1)	21:14	27 06:27 (4)	21:48
19	08:21	07:29	06:25	06:12		05:14	06:00 (4)	04:50
	16:36	17:35	18:28	20:24	30 07:17 (1)	21:16	26 06:26 (4)	21:48
20	08:20	07:27	06:23	06:10		05:13	06:00 (4)	04:51
	16:38	17:37	18:30	20:26	34 07:16 (1)	21:17	27 06:27 (4)	21:48
21	08:19	07:25	06:20	06:08		05:12	06:01 (4)	04:51
	16:40	17:39	18:32	20:27	35 07:15 (1)	21:19	26 06:27 (4)	21:49
22	08:18	07:23	06:18	06:06		05:10	06:01 (4)	04:51
	16:42	17:41	18:33	9 06:41 (2)	20:27	06:30 (3)	05:10	04:51
23	08:17	07:21	06:16	06:03		05:09	06:01 (4)	04:51
	16:44	17:43	18:35	13 06:52 (2)	20:31	35 07:12 (1)	21:22	24 06:25 (4)
24	08:15	07:19	06:13	06:01		05:07	06:02 (4)	04:51
	16:45	17:45	18:37	17 06:53 (2)	20:33	32 07:10 (1)	21:23	23 06:25 (4)
25	08:14	07:16	06:11	06:00		05:06	06:03 (4)	04:52
	16:47	17:47	18:39	19 06:54 (2)	20:35	26 07:07 (1)	21:24	22 06:25 (4)
26	08:13	07:14	06:08	06:00		05:05	06:03 (4)	04:52
	16:49	17:49	18:41	20 06:54 (2)	20:36	20 06:46 (3)	21:26	22 06:25 (4)
27	08:11	07:12	06:06	06:00		05:04	06:04 (4)	04:53
	16:51	17:51	18:42	21 06:54 (2)	20:38	20 06:46 (3)	21:27	20 06:24 (4)
28	08:10	07:10	06:04	06:00		05:03	06:05 (4)	04:53
	16:53	17:53	18:44	21 06:54 (2)	20:40	20 06:46 (3)	21:29	18 06:23 (4)
29	08:08	07:01	06:00	06:00		05:02	06:06 (4)	04:54
	16:55	17:55	18:46	21 07:53 (2)	20:42	18 06:46 (3)	21:30	17 06:23 (4)
30	08:07	06:59	07:33 (2)	05:49		05:01	06:06 (4)	04:54
	16:57	17:57	18:48	19 07:52 (2)	20:43	17 06:45 (3)	21:31	16 06:22 (4)
31	08:05	06:56	07:34 (2)	05:00		05:00	06:07 (4)	04:54
	16:58	17:58	18:49	17 07:51 (2)	20:44	14 21:32	14 06:21 (4)	04:54
Sonnenscheinstunden	253	275	367	418		491		506
astr.max.mögl.Beschattung			0.77		0.57		0.638	0.438
Red.Sonnenscheinwahrsch.			0.28		0.37		0.43	0.39
Reduktion Betriebsdauer			0.96		0.96		0.96	0.96
Reduktion Windrichtung			0.71		0.72		0.73	0.72
Gesamte Reduktion			0.19		0.26		0.30	0.27
Met.wahrsch.Beschattung			33		147		191	116

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BP - IO68

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:28 (9)	05:34	06:11 (4)	06:26	06:56 (1)	07:18	07:14	08:08			
	21:48	15 05:43 (9)	21:14	25 06:36 (4)	20:09	20 07:16 (1)	18:57	16:48	16:05			
2	04:56	05:28 (9)	05:35	06:12 (4)	06:28	06:58 (1)	07:20	07:16	08:09			
	21:48	15 05:43 (9)	21:12	24 06:36 (4)	20:07	16 07:14 (1)	18:55	16:46	16:05			
3	04:56	05:29 (9)	05:37	06:12 (4)	06:30	06:59 (1)	07:21	07:18	08:11			
	21:47	14 05:43 (9)	21:11	23 06:35 (4)	20:05	12 07:11 (1)	18:52	16:44	16:04			
4	04:57	05:29 (9)	05:38	06:13 (4)	06:31	07:02 (1)	07:23	07:20	08:12			
	21:47	13 05:42 (9)	21:09	21 06:34 (4)	20:02	6 07:08 (1)	18:50	16:42	16:03			
5	04:58	05:30 (9)	05:40	06:14 (4)	06:33		07:25	07:22	08:14			
	21:46	12 05:42 (9)	21:07	20 06:34 (4)	20:00		18:48	16:41	16:03			
6	04:59	05:31 (9)	05:42	06:15 (4)	06:35		07:27	07:24	08:15			
	21:46	11 05:42 (9)	21:05	17 06:32 (4)	19:58		18:45	16:39	16:02			
7	05:00	05:32 (9)	05:43	06:17 (4)	06:36		07:28	07:26	08:16			
	21:45	10 05:42 (9)	21:03	14 06:31 (4)	19:55		18:43	16:37	16:02			
8	05:01	05:33 (9)	05:45	06:19 (4)	06:38		07:30	07:28	08:18			
	21:45	9 05:42 (9)	21:01	8 06:27 (4)	19:53		18:41	16:35	16:01			
9	05:02	05:34 (9)	05:47		06:40		07:32	07:30	08:19			
	21:44	7 05:41 (9)	20:59		19:50	4	07:37 (2)	18:38	16:33	16:01		
10	05:03	05:35 (9)	05:48	06:40 (3)	06:42		07:37 (2)	18:38	16:33	16:01		
	21:43	12 06:26 (4)	20:57	9 06:49 (3)	19:48	12	07:41 (2)	18:36	16:32	16:01		
11	05:04	05:37 (9)	05:50	06:38 (3)	06:43		07:27 (2)	07:36	07:33	08:21		
	21:42	11 06:27 (4)	20:55	13 06:51 (3)	19:46	15	07:42 (2)	18:34	16:30	16:01		
12	05:05	06:16 (4)	05:52	06:37 (3)	06:45		07:25 (2)	07:37	07:35	08:22		
	21:41	13 06:29 (4)	20:53	16 06:53 (3)	19:43	18	07:43 (2)	18:31	16:28	16:00		
13	05:06	06:15 (4)	05:54	06:36 (3)	06:47		07:24 (2)	07:39	07:37	08:23		
	21:40	15 06:30 (4)	20:51	17 06:53 (3)	19:41	19	07:43 (2)	18:29	16:27	16:00		
14	05:07	06:14 (4)	05:55	06:35 (3)	06:48		07:24 (2)	07:41	07:39	08:24		
	21:39	17 06:31 (4)	20:49	19 06:54 (3)	19:38	20	07:44 (2)	18:27	16:25	16:00		
15	05:09	06:14 (4)	05:57	06:34 (3)	06:50		07:22 (2)	07:43	07:41	08:25		
	21:38	18 06:32 (4)	20:47	19 06:53 (3)	19:36	21	07:43 (2)	18:24	16:24	16:00		
16	05:10	06:13 (4)	05:59	06:34 (3)	06:52		07:22 (2)	07:45	07:42	08:26		
	21:37	19 06:32 (4)	20:45	20 06:54 (3)	19:33	21	07:43 (2)	18:22	16:22	16:00		
17	05:11	06:13 (4)	06:00	06:34 (3)	06:54		07:23 (2)	07:46	07:44	08:27		
	21:36	21 06:34 (4)	20:43	20 06:54 (3)	19:31	20	07:43 (2)	18:20	16:21	16:01		
18	05:13	06:12 (4)	06:02	06:33 (3)	06:55		07:22 (2)	07:48	07:46	08:28		
	21:35	22 06:34 (4)	20:41	27 07:13 (1)	19:29	19	07:41 (2)	18:18	16:19	16:01		
19	05:14	06:12 (4)	06:04	06:34 (3)	06:57		07:23 (2)	07:50	07:48	08:28		
	21:34	23 06:35 (4)	20:39	32 07:16 (1)	19:26	17	07:40 (2)	18:15	16:18	16:01		
20	05:15	06:11 (4)	06:05	06:33 (3)	06:59		07:25 (2)	07:52	07:50	08:29		
	21:32	24 06:35 (4)	20:37	36 07:17 (1)	19:24	14	07:39 (2)	18:13	16:17	16:01		
21	05:17	06:11 (4)	06:07	06:35 (3)	07:00		07:26 (2)	07:54	07:51	08:30		
	21:31	25 06:36 (4)	20:34	36 07:19 (1)	19:21	10	07:36 (2)	18:11	16:15	16:02		
22	05:18	06:11 (4)	06:09	06:37 (3)	07:02		07:28 (2)	07:56	07:53	08:30		
	21:30	25 06:36 (4)	20:32	35 07:20 (1)	19:19	5	07:33 (2)	18:09	16:14	16:02		
23	05:20	06:10 (4)	06:11	06:38 (3)	07:04			07:58	07:55	08:31		
	21:28	26 06:36 (4)	20:30	33 07:20 (1)	19:16			18:07	16:13	16:03		
24	05:21	06:11 (4)	06:12	06:40 (3)	07:06			07:59	07:57	08:31		
	21:27	26 06:37 (4)	20:28	29 07:20 (1)	19:14			18:05	16:12	16:03		
25	05:23	06:10 (4)	06:14	06:56 (1)	07:07			07:01	07:58	08:31		
	21:25	27 06:37 (4)	20:25	25 07:21 (1)	19:12			17:02	16:11	16:04		
26	05:24	06:11 (4)	06:16	06:55 (1)	07:09			07:03	08:00	08:32		
	21:24	27 06:38 (4)	20:23	25 07:20 (1)	19:09			17:00	16:10	16:05		
27	05:26	06:10 (4)	06:18	06:55 (1)	07:11			07:05	08:02	08:32		
	21:22	27 06:37 (4)	20:21	25 07:20 (1)	19:07			16:58	16:09	16:06		
28	05:27	06:11 (4)	06:19	06:54 (1)	07:13			07:07	08:03	08:32		
	21:21	27 06:38 (4)	20:19	25 07:19 (1)	19:04			16:56	16:08	16:06		
29	05:29	06:10 (4)	06:21	06:55 (1)	07:14			07:09	08:05	08:32		
	21:19	27 06:37 (4)	20:16	24 07:19 (1)	19:02			16:54	16:07	16:07		
30	05:30	06:10 (4)	06:23	06:55 (1)	07:16			07:11	08:06	08:32		
	21:18	27 06:37 (4)	20:14	23 07:18 (1)	19:00			16:52	16:06	16:08		
31	05:32	06:11 (4)	06:24	06:55 (1)				07:13		08:32		
	21:16	26 06:37 (4)	20:12	22 07:17 (1)				16:50		16:09		
Sonnenscheinstunden	508		458		382		330		262		237	
astr.max.mögl.Beschattung	591		682		269							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	155		200		64							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BQ - IO69

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:31 (2)	05:46	06:27 (3)	04:59
	16:10	17:00	17:55	19:51	17 07:48 (2)	20:45	16 06:43 (3)	21:34
2	08:32	08:02	07:05	06:52	07:32 (2)	05:44	06:28 (3)	04:58
	16:12	17:02	17:57	19:53	15 07:47 (2)	20:47	13 06:41 (3)	21:35
3	08:32	08:00	07:03	06:49	07:34 (2)	05:42	06:29 (3)	04:57
	16:13	17:04	17:58	19:55	11 07:45 (2)	20:49	10 06:39 (3)	21:36
4	08:32	07:58	07:01	06:47	07:36 (2)	05:41	06:33 (3)	04:56
	16:14	17:06	18:00	19:57	4 07:40 (2)	20:50	2 06:35 (3)	21:37
5	08:32	07:57	06:58	06:45	07:37 (2)	05:39	06:08 (4)	04:55
	16:15	17:08	18:02	19:59	20:52	6 06:15 (4)	21:38	9 05:35 (9)
6	08:31	07:55	06:56	06:42	07:38 (2)	05:37	06:05 (4)	04:55
	16:16	17:10	18:04	20:00	20:54	13 06:18 (4)	21:39	10 05:35 (9)
7	08:31	07:53	06:54	06:40	07:39 (2)	05:35	06:04 (4)	04:54
	16:18	17:12	18:06	20:02	20:56	16 06:20 (4)	21:40	11 05:36 (9)
8	08:30	07:51	06:51	06:37	07:40 (2)	05:33	06:03 (4)	04:53
	16:19	17:14	18:08	20:04	20:57	18 06:21 (4)	21:41	12 05:36 (9)
9	08:30	07:49	06:49	06:35	07:03 (1)	05:31	06:01 (4)	04:53
	16:20	17:16	18:10	20:06	5 07:08 (1)	20:59	21 06:22 (4)	21:42
10	08:29	07:48	06:47	06:33	06:58 (1)	05:29	06:01 (4)	04:52
	16:22	17:18	18:11	20:08	13 07:11 (1)	21:01	22 06:23 (4)	21:43
11	08:29	07:46	06:44	06:30	06:56 (1)	05:27	06:00 (4)	04:52
	16:23	17:20	18:13	20:09	17 07:13 (1)	21:03	24 06:24 (4)	21:44
12	08:28	07:44	06:42	06:28	06:55 (1)	05:26	05:59 (4)	04:52
	16:25	17:22	18:15	20:11	19 07:14 (1)	21:04	25 06:24 (4)	21:44
13	08:27	07:42	06:40	06:26	06:53 (1)	05:24	05:59 (4)	04:51
	16:26	17:24	18:17	20:13	21 07:14 (1)	21:06	26 06:25 (4)	21:45
14	08:26	07:40	06:37	06:24	06:52 (1)	05:22	05:59 (4)	04:51
	16:28	17:26	18:19	20:15	23 07:15 (1)	21:08	25 06:24 (4)	21:46
15	08:25	07:38	06:35	06:21	06:52 (1)	05:21	05:59 (4)	04:51
	16:30	17:28	18:21	20:17	23 07:15 (1)	21:09	26 06:25 (4)	21:46
16	08:24	07:36	06:32	06:19	06:51 (1)	05:19	05:58 (4)	04:51
	16:31	17:30	18:23	20:18	25 07:16 (1)	21:11	27 06:25 (4)	21:47
17	08:23	07:34	06:30	06:17	06:50 (1)	05:17	05:59 (4)	04:51
	16:33	17:32	18:24	20:20	25 07:15 (1)	21:12	26 06:25 (4)	21:47
18	08:22	07:32	06:28	06:14	06:50 (1)	05:16	05:59 (4)	04:50
	16:35	17:34	18:26	20:22	25 07:15 (1)	21:14	26 06:25 (4)	21:48
19	08:21	07:29	06:25	06:12	06:36 (3)	05:14	05:59 (4)	04:50
	16:36	17:35	18:28	20:24	25 07:14 (1)	21:16	26 06:25 (4)	21:48
20	08:20	07:27	06:23	06:10	06:34 (3)	05:13	05:59 (4)	04:51
	16:38	17:37	18:30	20:26	31 07:14 (1)	21:17	26 06:25 (4)	21:48
21	08:19	07:25	06:20	06:08	06:32 (3)	05:12	06:00 (4)	04:51
	16:40	17:39	18:32	20:27	33 07:13 (1)	21:19	25 06:25 (4)	21:49
22	08:18	07:23	06:18	06:06	06:30 (3)	05:10	05:59 (4)	04:51
	16:42	17:41	18:33	20:29	35 07:12 (1)	21:20	25 06:24 (4)	21:49
23	08:17	07:21	06:16	06:03	06:28 (3)	05:09	06:00 (4)	04:51
	16:44	17:43	18:35	9 06:48 (2)	20:31	35 07:11 (1)	21:22	24 06:24 (4)
24	08:15	07:19	06:13	06:01	06:27 (3)	05:07	06:00 (4)	04:51
	16:45	17:45	18:37	13 06:49 (2)	20:33	34 07:09 (1)	21:23	24 06:24 (4)
25	08:14	07:16	06:11	06:00	06:26 (3)	05:06	06:01 (4)	04:52
	16:47	17:47	18:39	16 06:50 (2)	20:35	31 07:07 (1)	21:24	22 06:23 (4)
26	08:13	07:14	06:08	06:00	06:25 (3)	05:05	06:02 (4)	04:52
	16:49	17:49	18:41	19 06:51 (2)	20:36	21 07:01 (1)	21:26	21 06:23 (4)
27	08:11	07:12	06:06	06:00	06:31 (2)	05:55	06:02 (4)	04:53
	16:50	17:50	18:42	20 06:51 (2)	20:38	20 06:45 (3)	21:27	20 06:22 (4)
28	08:10	07:10	06:04	06:00	06:31 (2)	05:53	06:03 (4)	04:53
	16:53	17:53	18:44	20 06:51 (2)	20:40	19 06:44 (3)	21:29	19 06:22 (4)
29	08:08	07:01	06:00	06:00	06:30 (2)	05:51	06:04 (4)	04:54
	16:55	17:55	18:46	20 07:50 (2)	20:42	19 06:45 (3)	21:30	17 06:21 (4)
30	08:07	06:59	06:00	06:00	06:30 (2)	05:49	06:05 (4)	04:54
	16:57	17:57	18:48	20 07:50 (2)	20:43	18 06:44 (3)	21:31	15 06:20 (4)
31	08:05	06:56	06:00	06:00	06:31 (2)	05:47	06:06 (4)	04:54
	16:58	17:58	18:49	19 07:50 (2)	20:44	17 06:45 (3)	21:32	13 06:19 (4)
Sonnenscheinstunden	253	275	367	418	491	506	425	339
astr.max.mögl.Beschattung			156	564	619	425	339	253
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39	0.39	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.71	0.72	0.73	0.72	0.72	0.72
Gesamte Reduktion			0.19	0.26	0.30	0.27	0.27	0.27
Met.wahrsch.Beschattung			29	145	186	113	81	53

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BQ - IO69

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55	05:27 (9) 05:34	06:10 (4) 06:26	06:55 (1) 07:18	07:14	08:08
	21:48	15 05:42 (9) 21:14	24 06:34 (4) 20:09	17 07:12 (1) 18:57	16:48	16:05
2	04:56	05:28 (9) 05:35	06:11 (4) 06:28	06:57 (1) 07:20	07:16	08:09
	21:48	14 05:42 (9) 21:12	23 06:34 (4) 20:07	13 07:10 (1) 18:55	16:46	16:05
3	04:56	05:29 (9) 05:37	06:11 (4) 06:30	07:00 (1) 07:21	07:18	08:11
	21:47	14 05:43 (9) 21:11	22 06:33 (4) 20:05	5 07:05 (1) 18:52	16:44	16:04
4	04:57	05:29 (9) 05:38	06:12 (4) 06:31	07:23	07:20	08:12
	21:47	13 05:42 (9) 21:09	20 06:32 (4) 20:02	18:50	16:42	16:03
5	04:58	05:30 (9) 05:40	06:13 (4) 06:33	07:25	07:22	08:14
	21:46	12 05:42 (9) 21:07	18 06:31 (4) 20:00	18:48	16:41	16:03
6	04:59	05:31 (9) 05:42	06:14 (4) 06:35	07:27	07:24	08:15
	21:46	11 05:42 (9) 21:05	15 06:29 (4) 19:58	18:45	16:39	16:02
7	05:00	05:32 (9) 05:43	06:17 (4) 06:36	07:28	07:26	08:16
	21:45	10 05:42 (9) 21:03	11 06:28 (4) 19:55	18:43	16:37	16:02
8	05:01	05:33 (9) 05:45	06:21 (4) 06:38	07:32 (2) 07:30	07:28	08:18
	21:45	8 05:41 (9) 21:01	1 06:22 (4) 19:53	3 07:35 (2) 18:41	16:35	16:01
9	05:02	05:34 (9) 05:47	06:41 (3) 06:40	07:27 (2) 07:32	07:30	08:19
	21:44	7 05:41 (9) 20:59	5 06:46 (3) 19:50	11 07:38 (2) 18:38	16:33	16:01
10	05:03	05:35 (9) 05:48	06:37 (3) 06:42	07:25 (2) 07:34	07:31	08:20
	21:43	12 06:24 (4) 20:57	11 06:48 (3) 19:48	15 07:40 (2) 18:36	16:32	16:01
11	05:04	06:16 (4) 05:50	06:36 (3) 06:43	07:24 (2) 07:36	07:33	08:21
	21:42	10 06:26 (4) 20:55	14 06:50 (3) 19:46	17 07:41 (2) 18:34	16:30	16:01
12	05:05	06:15 (4) 05:52	06:35 (3) 06:45	07:22 (2) 07:37	07:35	08:22
	21:41	12 06:27 (4) 20:53	16 06:51 (3) 19:43	19 07:41 (2) 18:31	16:28	16:00
13	05:06	06:14 (4) 05:54	06:34 (3) 06:47	07:22 (2) 07:39	07:37	08:23
	21:40	14 06:28 (4) 20:51	17 06:51 (3) 19:41	19 07:41 (2) 18:29	16:27	16:00
14	05:08	06:13 (4) 05:55	06:34 (3) 06:48	07:21 (2) 07:41	07:39	08:24
	21:39	16 06:29 (4) 20:49	18 06:52 (3) 19:38	21 07:42 (2) 18:27	16:25	16:00
15	05:09	06:12 (4) 05:57	06:32 (3) 06:50	07:20 (2) 07:43	07:41	08:25
	21:38	18 06:30 (4) 20:47	20 06:52 (3) 19:36	20 07:40 (2) 18:24	16:24	16:00
16	05:10	06:11 (4) 05:59	06:32 (3) 06:52	07:20 (2) 07:45	07:42	08:26
	21:37	20 06:31 (4) 20:45	20 06:52 (3) 19:33	20 07:40 (2) 18:22	16:22	16:00
17	05:11	06:12 (4) 06:00	06:33 (3) 06:54	07:21 (2) 07:46	07:44	08:27
	21:36	20 06:32 (4) 20:43	25 07:11 (1) 19:31	19 07:40 (2) 18:20	16:21	16:01
18	05:13	06:11 (4) 06:02	06:32 (3) 06:55	07:21 (2) 07:48	07:46	08:28
	21:35	22 06:33 (4) 20:41	31 07:13 (1) 19:29	17 07:38 (2) 18:18	16:19	16:01
19	05:14	06:10 (4) 06:04	06:32 (3) 06:57	07:23 (2) 07:50	07:48	08:28
	21:34	23 06:33 (4) 20:39	35 07:15 (1) 19:26	14 07:37 (2) 18:15	16:18	16:01
20	05:15	06:10 (4) 06:05	06:33 (3) 06:59	07:25 (2) 07:52	07:50	08:29
	21:32	23 06:33 (4) 20:37	36 07:16 (1) 19:24	10 07:35 (2) 18:13	16:17	16:01
21	05:17	06:10 (4) 06:07	06:35 (3) 07:00	07:26 (2) 07:54	07:51	08:30
	21:31	24 06:34 (4) 20:34	35 07:17 (1) 19:21	4 07:30 (2) 18:11	16:15	16:02
22	05:18	06:09 (4) 06:09	06:37 (3) 07:02	07:56	07:53	08:30
	21:30	25 06:34 (4) 20:32	33 07:18 (1) 19:19	18:09	16:14	16:02
23	05:20	06:09 (4) 06:11	06:38 (3) 07:04	07:58	07:55	08:31
	21:28	25 06:34 (4) 20:30	31 07:18 (1) 19:16	18:07	16:13	16:03
24	05:21	06:09 (4) 06:12	06:54 (1) 07:06	07:59	07:57	08:31
	21:27	26 06:35 (4) 20:28	24 07:18 (1) 19:14	18:05	16:12	16:03
25	05:23	06:09 (4) 06:14	06:54 (1) 07:07	07:01	07:58	08:31
	21:25	26 06:35 (4) 20:25	24 07:18 (1) 19:12	17:02	16:11	16:04
26	05:24	06:09 (4) 06:16	06:53 (1) 07:09	07:03	08:00	08:32
	21:24	27 06:36 (4) 20:23	25 07:18 (1) 19:09	17:00	16:10	16:05
27	05:26	06:09 (4) 06:18	06:53 (1) 07:11	07:05	08:02	08:32
	21:22	26 06:35 (4) 20:21	24 07:17 (1) 19:07	16:58	16:09	16:06
28	05:27	06:10 (4) 06:19	06:53 (1) 07:13	07:07	08:03	08:32
	21:21	26 06:36 (4) 20:19	23 07:16 (1) 19:04	16:56	16:08	16:06
29	05:29	06:09 (4) 06:21	06:53 (1) 07:14	07:09	08:05	08:32
	21:19	26 06:35 (4) 20:16	23 07:16 (1) 19:02	16:54	16:07	16:07
30	05:30	06:09 (4) 06:23	06:54 (1) 07:16	07:11	08:06	08:32
	21:18	26 06:35 (4) 20:14	21 07:15 (1) 19:00	16:52	16:06	16:08
31	05:32	06:10 (4) 06:24	06:54 (1)	07:13	08:32	
	21:16	25 06:35 (4) 20:12	19 07:13 (1)	16:50	16:09	
Sonnenscheinstunden	508	458	382	330	262	237
astr. max.mögl. Beschattung	576	664	744	816	888	960
Red. Sonnenscheinwahrsch.	0.38	0.42	0.35	0.35	0.35	0.35
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96	0.96	0.96
Reduktion Windrichtung	0.73	0.72	0.71	0.71	0.71	0.71
Gesamte Reduktion	0.26	0.29	0.24	0.24	0.24	0.24
Met. wahrsch. Beschattung	152	194	244	296	348	400

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BR - IO70

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:08	06:54	07:29 (2)	05:46
	16:10	17:00	17:55	19:51	17 07:46 (2)	14 06:42 (3)
2	08:32	08:02	07:05	06:52	07:30 (2)	05:44
	16:12	17:02	17:57	19:53	15 07:45 (2)	10 06:40 (3)
3	08:32	08:00	07:03	06:49	07:32 (2)	05:42
	16:13	17:04	17:58	19:55	11 07:43 (2)	4 06:36 (3)
4	08:32	07:58	07:01	06:47	07:34 (2)	05:41
	16:14	17:06	18:00	19:57	5 07:39 (2)	8 06:17 (4)
5	08:32	07:57	06:58	06:45	05:39	06:06 (4)
	16:15	17:08	18:02	19:59	20:52	13 06:19 (4)
6	08:31	07:55	06:56	06:42	05:37	06:04 (4)
	16:16	17:10	18:04	20:00	20:54	17 06:21 (4)
7	08:31	07:53	06:54	06:40	05:35	06:04 (4)
	16:18	17:12	18:06	20:02	20:56	19 06:23 (4)
8	08:30	07:51	06:51	06:37	05:33	06:03 (4)
	16:19	17:14	18:08	20:04	20:57	20 06:23 (4)
9	08:30	07:49	06:49	06:35	07:02 (1)	05:31
	16:20	17:16	18:10	20:06	5 07:07 (1)	22 06:24 (4)
10	08:29	07:48	06:47	06:33	06:57 (1)	05:29
	16:22	17:18	18:12	20:08	13 07:10 (1)	23 06:25 (4)
11	08:29	07:46	06:44	06:30	06:56 (1)	05:28
	16:23	17:20	18:13	20:09	16 07:12 (1)	24 06:25 (4)
12	08:28	07:44	06:42	06:28	06:54 (1)	05:26
	16:25	17:22	18:15	20:11	19 07:13 (1)	25 06:25 (4)
13	08:27	07:42	06:40	06:26	06:52 (1)	05:24
	16:26	17:24	18:17	20:13	21 07:13 (1)	25 06:25 (4)
14	08:26	07:40	06:37	06:24	06:52 (1)	05:22
	16:28	17:26	18:19	20:15	22 07:14 (1)	25 06:25 (4)
15	08:25	07:38	06:35	06:21	06:51 (1)	05:21
	16:30	17:28	18:21	20:17	23 07:14 (1)	25 06:25 (4)
16	08:24	07:36	06:32	06:19	06:51 (1)	05:19
	16:31	17:30	18:23	20:18	23 07:14 (1)	25 06:25 (4)
17	08:23	07:34	06:30	06:17	06:50 (1)	05:18
	16:33	17:32	18:24	20:20	23 07:13 (1)	25 06:25 (4)
18	08:22	07:32	06:28	06:14	06:50 (1)	05:16
	16:35	17:34	18:26	20:22	23 07:13 (1)	24 06:25 (4)
19	08:21	07:29	06:25	06:12	06:36 (3)	05:14
	16:36	17:35	18:28	20:24	27 07:13 (1)	25 06:25 (4)
20	08:20	07:27	06:23	06:10	06:34 (3)	05:13
	16:38	17:37	18:30	20:26	30 07:12 (1)	24 06:25 (4)
21	08:19	07:25	06:20	06:08	06:32 (3)	05:12
	16:40	17:39	18:32	20:27	32 07:11 (1)	22 06:02 (4)
22	08:18	07:23	06:18	06:06	06:30 (3)	05:10
	16:42	17:41	18:33	20:29	33 07:10 (1)	21 06:23 (4)
23	08:17	07:21	06:16	06:03	06:28 (3)	05:09
	16:44	17:43	18:35	5 06:44 (2)	20:31	33 07:09 (1)
24	08:15	07:19	06:13	06:01	06:27 (3)	05:07
	16:45	17:45	18:37	10 06:46 (2)	20:33	31 07:07 (1)
25	08:14	07:16	06:11	06:04	06:26 (3)	05:06
	16:47	17:47	18:39	14 06:48 (2)	20:35	26 07:04 (1)
26	08:13	07:14	06:08	06:02	06:25 (3)	05:05
	16:49	17:49	18:41	17 06:49 (2)	20:36	20 06:45 (3)
27	08:11	07:12	06:06	06:00	06:30 (2)	05:55
	16:50	17:51	18:42	18 06:48 (2)	20:38	19 06:44 (3)
28	08:10	07:10	06:04	06:29	05:53	06:25 (3)
	16:53	17:53	18:44	20 06:49 (2)	20:40	19 06:44 (3)
29	08:08	07:01	07:28	05:51	06:27 (3)	05:02
	16:55	19:46	20 07:48 (2)	20:42	17 06:44 (3)	21:30
30	08:07	06:59	07:29	05:49	06:27 (3)	05:01
	16:57	19:48	19 07:48 (2)	20:43	16 06:43 (3)	21:31
31	08:05	06:56	07:29	05:47	05:00	05:29 (9)
	16:58	19:50	19 07:48 (2)	21:32	5 05:34 (9)	
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			142	539	558	460
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.71	0.72	0.73	0.72
Gesamte Reduktion			0.19	0.26	0.30	0.27
Met.wahrsch.Beschattung			27	138	167	122

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BR - IO70

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:29 (9)	05:34		06:10 (4)	06:26	06:55 (1)	07:18	07:14	08:08		
	21:48	16	05:45 (9)	21:14	25	06:35 (4)	20:09	16	07:11 (1)	18:57	16:48	16:05
2	04:56	05:29 (9)	05:35		06:11 (4)	06:28	06:56 (1)	07:20	07:16	08:09		
	21:48	16	05:45 (9)	21:12	24	06:35 (4)	20:07	13	07:09 (1)	18:55	16:46	16:05
3	04:56	05:30 (9)	05:37		06:11 (4)	06:30	06:59 (1)	07:21	07:18	08:11		
	21:47	16	05:46 (9)	21:11	23	06:34 (4)	20:05	5	07:04 (1)	18:52	16:44	16:04
4	04:57	05:30 (9)	05:38		06:12 (4)	06:31		07:23	07:20	08:12		
	21:47	15	05:45 (9)	21:09	22	06:34 (4)	20:02		18:50	16:42	16:03	
5	04:58	05:30 (9)	05:40		06:13 (4)	06:33		07:25	07:22	08:14		
	21:46	15	05:45 (9)	21:07	20	06:33 (4)	20:00		18:48	16:41	16:03	
6	04:59	05:31 (9)	05:42		06:14 (4)	06:35		07:27	07:24	08:15		
	21:46	14	05:45 (9)	21:05	18	06:32 (4)	19:58		18:45	16:39	16:02	
7	05:00		05:32 (9)	05:43		06:15 (4)	06:36		07:28	07:26	08:16	
	21:45	13	05:45 (9)	21:03	16	06:31 (4)	19:55		18:43	16:37	16:02	
8	05:01		05:33 (9)	05:45		06:16 (4)	06:38		07:29 (2)	07:30	07:28	08:18
	21:45	12	05:45 (9)	21:01	12	06:28 (4)	19:53	5	07:34 (2)	18:41	16:35	16:01
9	05:02		05:34 (9)	05:47		06:20 (4)	06:40		07:25 (2)	07:32	07:30	08:19
	21:44	11	05:45 (9)	20:59	5	06:25 (4)	19:50	11	07:36 (2)	18:38	16:33	16:01
10	05:03		05:35 (9)	05:48		06:40 (3)	06:42		07:23 (2)	07:34	07:31	08:20
	21:43	10	05:45 (9)	20:57	6	06:46 (3)	19:48	15	07:38 (2)	18:36	16:32	16:01
11	05:04		05:36 (9)	05:50		06:38 (3)	06:43		07:22 (2)	07:36	07:33	08:21
	21:42	8	05:44 (9)	20:55	11	06:49 (3)	19:46	17	07:39 (2)	18:34	16:30	16:01
12	05:05		05:37 (9)	05:52		06:36 (3)	06:45		07:20 (2)	07:37	07:35	08:22
	21:41	6	05:43 (9)	20:53	14	06:50 (3)	19:43	19	07:39 (2)	18:31	16:28	16:00
13	05:06		05:38 (9)	05:54		06:35 (3)	06:47		07:20 (2)	07:39	07:37	08:23
	21:40	4	05:42 (9)	20:51	16	06:51 (3)	19:41	19	07:39 (2)	18:29	16:27	16:00
14	05:08		06:19 (4)	05:55		06:34 (3)	06:48		07:20 (2)	07:41	07:39	08:24
	21:39	6	06:25 (4)	20:49	18	06:52 (3)	19:38	19	07:39 (2)	18:27	16:25	16:00
15	05:09		06:17 (4)	05:57		06:33 (3)	06:50		07:19 (2)	07:43	07:41	08:25
	21:38	10	06:27 (4)	20:47	18	06:51 (3)	19:36	19	07:38 (2)	18:24	16:24	16:00
16	05:10		06:15 (4)	05:59		06:33 (3)	06:52		07:19 (2)	07:45	07:43	08:26
	21:37	13	06:28 (4)	20:45	19	06:52 (3)	19:33	19	07:38 (2)	18:22	16:22	16:00
17	05:11		06:15 (4)	06:00		06:33 (3)	06:54		07:20 (2)	07:46	07:44	08:27
	21:36	15	06:30 (4)	20:43	19	06:52 (3)	19:31	17	07:37 (2)	18:20	16:21	16:01
18	05:13		06:14 (4)	06:02		06:32 (3)	06:55		07:21 (2)	07:48	07:46	08:28
	21:35	17	06:31 (4)	20:41	27	07:10 (1)	19:29	14	07:35 (2)	18:18	16:19	16:01
19	05:14		06:13 (4)	06:04		06:33 (3)	06:57		07:23 (2)	07:50	07:48	08:28
	21:34	19	06:32 (4)	20:39	31	07:13 (1)	19:26	11	07:34 (2)	18:15	16:18	16:01
20	05:15		06:12 (4)	06:05		06:33 (3)	06:59		07:25 (2)	07:52	07:50	08:29
	21:32	20	06:32 (4)	20:37	34	07:14 (1)	19:24	6	07:31 (2)	18:13	16:17	16:01
21	05:17		06:13 (4)	06:07		06:35 (3)	07:00		07:54	07:51	08:30	
	21:31	21	06:34 (4)	20:34	33	07:15 (1)	19:21		18:11	16:15	16:02	
22	05:18		06:12 (4)	06:09		06:37 (3)	07:02		07:56	07:53	08:30	
	21:30	22	06:34 (4)	20:32	31	07:16 (1)	19:19		18:09	16:14	16:02	
23	05:20		06:11 (4)	06:11		06:38 (3)	07:04		07:58	07:55	08:31	
	21:28	23	06:34 (4)	20:30	30	07:16 (1)	19:16		18:07	16:13	16:03	
24	05:21		06:11 (4)	06:12		06:40 (3)	07:06		07:59	07:57	08:31	
	21:27	24	06:35 (4)	20:28	26	07:17 (1)	19:14		18:05	16:12	16:03	
25	05:23		06:11 (4)	06:14		06:54 (1)	07:07		07:01	07:58	08:31	
	21:25	24	06:35 (4)	20:25	23	07:17 (1)	19:12		17:02	16:11	16:04	
26	05:24		06:11 (4)	06:16		06:53 (1)	07:09		07:03	08:00	08:32	
	21:24	25	06:36 (4)	20:23	23	07:16 (1)	19:09		17:00	16:10	16:05	
27	05:26		06:11 (4)	06:18		06:53 (1)	07:11		07:05	08:02	08:32	
	21:22	25	06:36 (4)	20:21	23	07:16 (1)	19:07		16:58	16:09	16:06	
28	05:27		06:11 (4)	06:19		06:52 (1)	07:13		07:07	08:03	08:32	
	21:21	25	06:36 (4)	20:19	23	07:15 (1)	19:04		16:56	16:08	16:06	
29	05:29		06:11 (4)	06:21		06:53 (1)	07:14		07:09	08:05	08:32	
	21:19	25	06:36 (4)	20:16	22	07:15 (1)	19:02		16:54	16:07	16:07	
30	05:30		06:10 (4)	06:23		06:53 (1)	07:16		07:11	08:06	08:32	
	21:18	25	06:35 (4)	20:14	21	07:14 (1)	19:00		16:52	16:06	16:08	
31	05:32		06:11 (4)	06:24		06:53 (1)			07:13		08:32	
	21:16	25	06:36 (4)	20:12	19	07:12 (1)			16:50		16:09	
Sonnenscheinstunden		508		458		382			330	262	237	
astr.max.mögl.Beschattung		520		652		225						
Red.Sonnenscheinwahrsch.		0.38		0.42		0.35						
Reduktion Betriebsdauer		0.96		0.96		0.96						
Reduktion Windrichtung		0.72		0.72		0.71						
Gesamte Reduktion		0.26		0.29		0.24						
Met.wahrsch.Beschattung		137		191		53						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BS - IO71

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:08	06:54	05:46	06:15 (4) 04:59
	16:10	17:00	17:55	19:51	20:45	19 06:34 (4) 21:34
2	08:32	08:02	07:05	06:52	05:44	06:14 (4) 04:58
	16:12	17:02	17:57	19:53	20:47	21 06:35 (4) 21:35
3	08:32	08:00	07:03	06:49	05:42	06:13 (4) 04:57
	16:13	17:04	17:58	19:55	20:49	22 06:35 (4) 21:36
4	08:32	07:58	07:01	06:47	05:41	06:12 (4) 04:56
	16:14	17:06	18:00	19:57	20:50	23 06:35 (4) 21:37
5	08:32	07:57	06:58	06:45	07:09 (1) 05:39	06:11 (4) 04:55
	16:15	17:08	18:02	19:59	12 07:21 (1) 20:52	24 06:35 (4) 21:38
6	08:31	07:55	06:56	06:42	07:06 (1) 05:37	06:11 (4) 04:55
	16:16	17:10	18:04	20:00	16 07:22 (1) 20:54	24 06:35 (4) 21:39
7	08:31	07:53	06:54	06:40	07:05 (1) 05:35	06:11 (4) 04:54
	16:18	17:12	18:06	20:02	18 07:23 (1) 20:56	25 06:36 (4) 21:40
8	08:30	07:51	06:51	06:37	07:04 (1) 05:33	06:11 (4) 04:53
	16:19	17:14	18:08	20:04	20 07:24 (1) 20:57	25 06:36 (4) 21:41
9	08:30	07:49	06:49	06:35	07:03 (1) 05:31	06:10 (4) 04:53
	16:20	17:16	18:10	20:06	22 07:25 (1) 20:59	25 06:35 (4) 21:42
10	08:29	07:48	06:47	06:33	07:02 (1) 05:29	06:11 (4) 04:52
	16:22	17:18	18:12	20:08	22 07:24 (1) 21:01	25 06:36 (4) 21:43
11	08:29	07:46	06:44	06:30	07:01 (1) 05:28	06:11 (4) 04:52
	16:23	17:20	18:13	20:09	24 07:25 (1) 21:03	24 06:35 (4) 21:44
12	08:28	07:44	06:42	06:28	07:01 (1) 05:26	06:11 (4) 04:52
	16:25	17:22	18:15	20:11	24 07:25 (1) 21:04	23 06:34 (4) 21:44
13	08:27	07:42	06:40	06:26	07:01 (1) 05:24	06:12 (4) 04:51
	16:26	17:24	18:17	20:13	23 07:24 (1) 21:06	23 06:35 (4) 21:45
14	08:26	07:40	06:37	06:24	07:01 (1) 05:22	06:12 (4) 04:51
	16:28	17:26	18:19	20:15	22 07:23 (1) 21:08	21 06:33 (4) 21:46
15	08:25	07:38	06:35	06:21	06:45 (3) 05:21	06:13 (4) 04:51
	16:30	17:28	18:21	20:17	26 07:23 (1) 21:09	20 06:33 (4) 21:46
16	08:24	07:36	06:32	06:19	06:43 (3) 05:19	06:13 (4) 04:51
	16:31	17:30	18:23	20:18	29 07:22 (1) 21:11	19 06:32 (4) 21:47
17	08:23	07:34	06:30	06:17	06:40 (3) 05:17	06:15 (4) 04:51
	16:33	17:32	18:24	20:20	30 07:20 (1) 21:12	16 06:31 (4) 21:47
18	08:22	07:32	06:28	06:14	06:38 (3) 05:16	06:16 (4) 04:50
	16:35	17:34	18:26	20:22	30 07:18 (1) 21:14	14 06:30 (4) 21:48
19	08:21	07:29	06:25	06:12	06:36 (3) 05:14	06:17 (4) 04:50
	16:36	17:35	18:28	3 06:52 (2) 20:24	28 07:16 (1) 21:16	11 06:28 (4) 21:48
20	08:20	07:27	06:23	06:10	06:35 (3) 05:13	06:20 (4) 04:51
	16:38	17:37	18:30	8 06:54 (2) 20:26	19 06:54 (3) 21:17	6 06:26 (4) 21:48
21	08:19	07:25	06:20	06:08	06:35 (3) 05:12	04:51
	16:40	17:39	18:32	12 06:56 (2) 20:27	19 06:54 (3) 21:19	21:49
22	08:18	07:23	06:18	06:06	06:35 (3) 05:10	04:51
	16:42	17:41	18:33	16 06:57 (2) 20:29	19 06:54 (3) 21:20	21:49
23	08:17	07:21	06:16	06:03	06:35 (3) 05:09	05:37 (9) 04:51
	16:44	17:43	18:35	18 06:57 (2) 20:31	18 06:53 (3) 21:22	2 05:39 (9) 21:49
24	08:15	07:19	06:13	06:01	06:35 (3) 05:07	05:36 (9) 04:51
	16:45	17:45	18:37	19 06:57 (2) 20:33	18 06:53 (3) 21:23	6 05:42 (9) 21:49
25	08:14	07:16	06:11	05:59	06:36 (3) 05:06	05:35 (9) 04:52
	16:47	17:47	18:39	19 06:57 (2) 20:35	16 06:52 (3) 21:24	8 05:43 (9) 21:49
26	08:13	07:14	06:08	05:57	06:36 (3) 05:05	05:34 (9) 04:52
	16:49	17:49	18:41	19 06:57 (2) 20:36	14 06:50 (3) 21:26	10 05:44 (9) 21:49
27	08:11	07:12	06:06	05:55	06:37 (3) 05:04	05:33 (9) 04:53
	16:51	17:51	18:42	19 06:56 (2) 20:38	11 06:48 (3) 21:27	12 05:45 (9) 21:49
28	08:10	07:10	06:04	05:53	06:21 (4) 05:03	05:32 (9) 04:53
	16:53	17:53	18:44	17 06:55 (2) 20:40	13 06:46 (3) 21:29	14 05:46 (9) 21:49
29	08:08	07:01	06:01	05:51	06:18 (4) 05:02	05:31 (9) 04:54
	16:55	19:46	15 07:53 (2) 20:42	13 06:31 (4) 21:30	15 05:46 (9) 21:49	20 05:52 (9)
30	08:07	06:59	07:40 (2) 05:49	06:16 (4) 05:01	05:31 (9) 04:54	05:33 (8)
	16:57	19:48	12 07:52 (2) 20:43	17 06:33 (4) 21:31	15 05:46 (9) 21:48	20 05:53 (9)
31	08:05	06:56	07:43 (2) 05:48	05:00	05:31 (9) 04:54	05:33 (8)
	16:58	19:50	6 07:49 (2) 20:46	21:32	16 05:47 (9) 21:49	20 05:54 (9)
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			183	523	508	587
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.70	0.72	0.73	0.72
Gesamte Reduktion			0.19	0.26	0.30	0.27
Met.wahrsch.Beschattung			34	134	152	157

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BS - IO71

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:33 (8)	05:34	06:21 (4)	06:26	07:00 (1)	07:18	07:14	08:08			
	20	05:53 (9)	21:14	24	06:45 (4)	20:09	24	07:24 (1)	18:57	16:48	16:05	
2	04:56	05:33 (8)	05:35	06:21 (4)	06:28	07:01 (1)	07:20	07:16	08:09			
	20	05:53 (9)	21:12	25	06:46 (4)	20:07	22	07:23 (1)	18:55	16:46	16:05	
3	04:56	05:34 (8)	05:37	06:20 (4)	06:30	07:00 (1)	07:21	07:18	08:11			
	20	05:54 (9)	21:11	25	06:45 (4)	20:05	22	07:22 (1)	18:52	16:44	16:04	
4	04:57	05:34 (8)	05:38	06:21 (4)	06:31	07:01 (1)	07:23	07:20	08:12			
	19	05:53 (9)	21:09	25	06:46 (4)	20:02	20	07:21 (1)	18:50	16:42	16:03	
5	04:58	05:34 (8)	05:40	06:21 (4)	06:33	07:02 (1)	07:25	07:22	08:14			
	20	05:54 (9)	21:07	25	06:46 (4)	20:00	18	07:20 (1)	18:48	16:41	16:03	
6	04:59	05:35 (8)	05:42	06:21 (4)	06:35	07:02 (1)	07:27	07:24	08:15			
	19	05:54 (9)	21:05	25	06:46 (4)	19:58	16	07:18 (1)	18:45	16:39	16:02	
7	05:00	05:36 (8)	05:43	06:21 (4)	06:36	07:04 (1)	07:28	07:26	08:16			
	19	05:55 (9)	21:03	25	06:46 (4)	19:55	12	07:16 (1)	18:43	16:37	16:02	
8	05:01	05:36 (8)	05:45	06:21 (4)	06:38	07:09 (1)	07:30	07:28	08:18			
	19	05:55 (9)	21:01	24	06:45 (4)	19:53	3	07:12 (1)	18:41	16:35	16:01	
9	05:02	05:37 (8)	05:47	06:21 (4)	06:40			07:32	07:30	08:19		
	18	05:55 (9)	20:59	24	06:45 (4)	19:50		18:38	16:33	16:01		
10	05:03	05:38 (8)	05:48	06:21 (4)	06:42			07:34	07:31	08:20		
	17	05:55 (9)	20:57	22	06:43 (4)	19:48		18:36	16:32	16:01		
11	05:04	05:39 (9)	05:50	06:22 (4)	06:43			07:36	07:33	08:21		
	16	05:55 (9)	20:55	21	06:43 (4)	19:46		18:34	16:30	16:01		
12	05:05	05:39 (9)	05:52	06:24 (4)	06:45		07:35 (2)	07:37	07:35	08:22		
	16	05:55 (9)	20:53	18	06:42 (4)	19:43	4	07:39 (2)	18:31	16:28	16:00	
13	05:06	05:39 (9)	05:54	06:24 (4)	06:47			07:31 (2)	07:39	07:37	08:23	
	16	05:55 (9)	20:51	16	06:40 (4)	19:41	12	07:43 (2)	18:29	16:27	16:00	
14	05:08	05:39 (9)	05:55	06:26 (4)	06:48			07:30 (2)	07:41	07:39	08:24	
	16	05:55 (9)	20:49	12	06:38 (4)	19:38	14	07:44 (2)	18:27	16:25	16:00	
15	05:09	05:40 (9)	05:57	06:30 (4)	06:50			07:28 (2)	07:43	07:41	08:25	
	14	05:54 (9)	20:47	12	06:54 (3)	19:36	16	07:44 (2)	18:24	16:24	16:00	
16	05:10	05:41 (9)	05:59	06:44 (3)	06:52			07:27 (2)	07:45	07:43	08:26	
	13	05:54 (9)	20:45	12	06:56 (3)	19:33	18	07:45 (2)	18:22	16:22	16:00	
17	05:11	05:43 (9)	06:00	06:43 (3)	06:54			07:26 (2)	07:46	07:44	08:27	
	11	05:54 (9)	20:43	15	06:58 (3)	19:31	20	07:46 (2)	18:20	16:21	16:01	
18	05:13	05:44 (9)	06:02	06:41 (3)	06:55			07:25 (2)	07:48	07:46	08:28	
	9	05:53 (9)	20:41	17	06:58 (3)	19:29	20	07:45 (2)	18:18	16:19	16:01	
19	05:14	05:45 (9)	06:04	06:41 (3)	06:57			07:25 (2)	07:50	07:48	08:28	
	7	05:52 (9)	20:39	18	06:59 (3)	19:26	19	07:44 (2)	18:15	16:18	16:01	
20	05:15	05:46 (9)	06:05	06:39 (3)	06:59			07:25 (2)	07:52	07:50	08:29	
	4	05:50 (9)	20:37	19	06:58 (3)	19:24	19	07:44 (2)	18:13	16:17	16:01	
21	05:17		06:07	06:39 (3)	07:00			07:26 (2)	07:54	07:51	08:30	
	21		20:34	20	06:59 (3)	19:21	16	07:42 (2)	18:11	16:15	16:02	
22	05:18		06:09	06:40 (3)	07:02			07:28 (2)	07:56	07:53	08:30	
	21		20:32	19	06:59 (3)	19:19	13	07:41 (2)	18:09	16:14	16:02	
23	05:20		06:11	06:39 (3)	07:04			07:30 (2)	07:58	07:55	08:31	
	21		20:30	19	06:58 (3)	19:16	10	07:40 (2)	18:07	16:13	16:03	
24	05:21	06:29 (4)	06:12	06:40 (3)	07:06			07:32 (2)	07:59	07:57	08:31	
	9	06:38 (4)	20:28	28	07:20 (1)	19:14	5	07:37 (2)	18:05	16:12	16:03	
25	05:23	06:27 (4)	06:14	06:42 (3)	07:07			07:01	07:58	07:58	08:32	
	12	06:39 (4)	20:25	30	07:22 (1)	19:12		17:02	16:11	16:04		
26	05:24	06:26 (4)	06:16	06:43 (3)	07:09			07:03	08:00	08:32		
	15	06:41 (4)	20:23	30	07:23 (1)	19:09		17:00	16:10	16:05		
27	05:26	06:25 (4)	06:18	06:45 (3)	07:11			07:05	08:02	08:32		
	17	06:42 (4)	20:21	28	07:24 (1)	19:07		16:58	16:09	16:06		
28	05:27	06:24 (4)	06:19	06:46 (3)	07:13			07:07	08:03	08:32		
	20	06:44 (4)	20:19	26	07:24 (1)	19:04		16:56	16:08	16:06		
29	05:29	06:23 (4)	06:21	07:02 (1)	07:14			07:09	08:05	08:32		
	21	06:44 (4)	20:16	22	07:24 (1)	19:02		16:54	16:07	16:07		
30	05:30	06:22 (4)	06:23	07:01 (1)	07:16			07:11	08:06	08:32		
	22	06:44 (4)	20:14	23	07:24 (1)	19:00		16:52	16:06	16:08		
31	05:32	06:22 (4)	06:24	07:00 (1)				07:13		08:32		
	23	06:45 (4)	20:12	24	07:24 (1)			16:50		16:09		
Sonnenscheinstunden	508		458		382			330		262		237
astr.max.mögl.Beschattung	452		673		323							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	118		197		76							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BT - IO72

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni					
1	08:32	08:03	07:08	06:54	07:41 (2)	05:46	06:16 (4)	04:59	05:28 (9)		
	16:10	17:00	17:55	19:51	07:47 (2)	20:45	06:25 (4)	21:34	13 05:41 (9)		
2	08:32	08:02	07:05	06:52		05:44	06:13 (4)	04:58	05:28 (9)		
	16:12	17:02	17:57	19:53		20:47	06:27 (4)	21:35	15 05:43 (9)		
3	08:32	08:00	07:03	06:49		05:42	06:11 (4)	04:57	05:28 (9)		
	16:13	17:04	17:58	19:55		20:49	06:29 (4)	21:36	15 05:43 (9)		
4	08:32	07:58	07:01	06:47		05:41	06:10 (4)	04:56	05:27 (9)		
	16:14	17:06	18:00	19:57		20:50	06:30 (4)	21:37	16 05:43 (9)		
5	08:32	07:57	06:58	06:45		05:39	06:08 (4)	04:55	05:28 (9)		
	16:15	17:08	18:02	19:59		20:52	06:30 (4)	21:38	16 05:44 (9)		
6	08:31	07:55	06:56	06:42	07:08 (1)	05:37	06:08 (4)	04:55	05:27 (9)		
	16:16	17:10	18:04	20:00	07:16 (1)	20:54	06:31 (4)	21:39	17 05:44 (9)		
7	08:31	07:53	06:54	06:40	07:05 (1)	05:35	06:08 (4)	04:54	05:28 (9)		
	16:18	17:12	18:06	20:02	07:19 (1)	20:56	06:32 (4)	21:40	16 05:44 (9)		
8	08:30	07:51	06:51	06:37	07:03 (1)	05:33	06:07 (4)	04:53	05:27 (9)		
	16:19	17:14	18:08	20:04	07:21 (1)	20:57	06:32 (4)	21:41	17 05:44 (9)		
9	08:30	07:49	06:49	06:35	07:02 (1)	05:31	06:06 (4)	04:53	05:28 (9)		
	16:20	17:16	18:10	20:06	07:22 (1)	20:59	06:32 (4)	21:42	17 05:45 (9)		
10	08:29	07:48	06:47	06:33	07:00 (1)	05:29	06:07 (4)	04:52	05:27 (9)		
	16:22	17:18	18:11	20:08	07:22 (1)	21:01	06:33 (4)	21:43	17 05:44 (9)		
11	08:29	07:46	06:44	06:30	07:00 (1)	05:27	06:06 (4)	04:52	05:27 (8)		
	16:23	17:20	18:13	20:09	07:22 (1)	21:03	06:32 (4)	21:44	18 05:45 (9)		
12	08:28	07:44	06:42	06:28	06:59 (1)	05:26	06:06 (4)	04:52	05:27 (8)		
	16:25	17:22	18:15	20:11	07:23 (1)	21:04	06:32 (4)	21:44	18 05:45 (9)		
13	08:27	07:42	06:40	06:26	06:58 (1)	05:24	06:06 (4)	04:51	05:27 (8)		
	16:26	17:24	18:17	20:13	07:22 (1)	21:06	06:32 (4)	21:45	19 05:46 (9)		
14	08:26	07:40	06:37	06:24	06:58 (1)	05:22	06:06 (4)	04:51	05:26 (8)		
	16:28	17:26	18:19	20:15	07:22 (1)	21:08	06:32 (4)	21:46	19 05:45 (9)		
15	08:25	07:38	06:35	06:21	06:58 (1)	05:21	06:07 (4)	04:51	05:26 (8)		
	16:30	17:28	18:21	20:17	07:22 (1)	21:09	06:32 (4)	21:46	20 05:46 (9)		
16	08:24	07:36	06:32	06:19	06:58 (1)	05:19	06:07 (4)	04:51	05:26 (8)		
	16:31	17:30	18:23	20:18	07:21 (1)	21:11	06:31 (4)	21:47	20 05:46 (9)		
17	08:23	07:34	06:30	06:17	06:40 (3)	05:17	06:07 (4)	04:51	05:26 (8)		
	16:33	17:32	18:24	20:20	07:20 (1)	21:12	06:31 (4)	21:47	20 05:46 (9)		
18	08:22	07:32	06:28	06:14	06:38 (3)	05:16	06:08 (4)	04:50	05:26 (8)		
	16:35	17:34	18:26	20:22	07:19 (1)	21:14	06:31 (4)	21:48	20 05:46 (9)		
19	08:21	07:29	06:25	06:12	06:36 (3)	05:14	06:08 (4)	04:50	05:26 (8)		
	16:36	17:35	18:28	20:24	07:18 (1)	21:16	06:30 (4)	21:48	20 05:46 (9)		
20	08:20	07:27	06:23	06:10	06:34 (3)	05:13	06:09 (4)	04:51	05:27 (8)		
	16:38	17:37	18:30	5 06:51 (2)	20:26	32 07:16 (1)	21:17	20 06:29 (4)	21:48	20 05:47 (9)	
21	08:19	07:25	06:20	06:44 (2)	06:08	06:33 (3)	05:12	06:10 (4)	04:51	05:27 (8)	
	16:40	17:39	18:32	10 06:54 (2)	20:27	29 07:14 (1)	21:19	06:29 (4)	21:49	20 05:47 (9)	
22	08:18	07:23	06:18	06:41 (2)	06:06	06:32 (3)	05:10	06:11 (4)	04:51	05:27 (8)	
	16:42	17:41	18:33	14 06:55 (2)	20:29	20 06:52 (3)	21:20	16 06:27 (4)	21:49	20 05:47 (9)	
23	08:17	07:21	06:16	06:39 (2)	06:03	06:32 (3)	05:09	06:12 (4)	04:51	05:27 (8)	
	16:44	17:43	18:35	17 06:56 (2)	20:31	20 06:52 (3)	21:22	14 06:26 (4)	21:49	20 05:47 (9)	
24	08:15	07:19	06:13	06:37 (2)	06:01	06:32 (3)	05:07	06:14 (4)	04:51	05:28 (8)	
	16:45	17:45	18:37	19 06:56 (2)	20:33	19 06:51 (3)	21:23	11 06:25 (4)	21:49	20 05:48 (9)	
25	08:14	07:16	06:11	06:37 (2)	05:59	06:32 (3)	05:06	06:16 (4)	04:52	05:28 (8)	
	16:47	17:47	18:39	19 06:56 (2)	20:35	19 06:51 (3)	21:24	7 06:23 (4)	21:49	20 05:48 (9)	
26	08:13	07:14	06:08	06:37 (2)	05:57	06:31 (3)	05:05		04:52	05:28 (8)	
	16:49	17:49	18:41	20 06:57 (2)	20:36	18 06:49 (3)	21:26		21:49	20 05:48 (9)	
27	08:11	07:12	06:06	06:36 (2)	05:55	06:32 (3)	05:04		05:33 (9)	04:53	05:29 (8)
	16:50	17:51	18:42	20 06:56 (2)	20:38	16 06:48 (3)	21:27	3 05:36 (9)	21:49	20 05:49 (9)	
28	08:10	07:10	06:04	06:36 (2)	05:53	06:33 (3)	05:03		05:32 (9)	04:53	05:29 (8)
	16:53	17:53	18:44	19 06:55 (2)	20:40	14 06:47 (3)	21:29	6 05:38 (9)	21:49	19 05:48 (9)	
29	08:08		07:01	07:36 (2)	05:51	06:35 (3)	05:02		05:31 (9)	04:54	05:30 (8)
	16:55		19:46	18 07:54 (2)	20:42	12 06:47 (3)	21:30	8 05:39 (9)	21:49	19 05:49 (9)	
30	08:07		06:59	07:37 (2)	05:49	06:37 (3)	05:01		05:30 (9)	04:54	05:31 (8)
	16:57		19:48	16 07:53 (2)	20:43	7 06:44 (3)	21:31	10 05:40 (9)	21:48	19 05:50 (9)	
31	08:05		06:56	07:39 (2)			05:00		05:29 (9)		
	16:58		19:50	12 07:51 (2)			21:32	12 05:41 (9)			
Sonnenscheinstunden	253	275	367	418	491	506					
astr.max.mögl.Beschattung			189	529	554	550					
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39					
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96					
Reduktion Windrichtung			0.70	0.72	0.73	0.72					
Gesamte Reduktion			0.19	0.26	0.30	0.27					
Met.wahrsch.Beschattung			35	136	166	146					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BT - IO72

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:31 (8)	05:34	06:16 (4)	06:26	06:58 (1)	07:18	07:14	08:08			
	21:48	18 05:49 (9)	21:14	26 06:42 (4)	20:09	23 07:21 (1)	18:57	16:48	16:05			
2	04:56	05:32 (8)	05:35	06:17 (4)	06:28	06:59 (1)	07:20	07:16	08:09			
	21:48	18 05:50 (9)	21:12	26 06:43 (4)	20:07	22 07:21 (1)	18:55	16:46	16:05			
3	04:56	05:33 (9)	05:37	06:16 (4)	06:30	06:59 (1)	07:21	07:18	08:11			
	21:47	17 05:50 (9)	21:11	26 06:42 (4)	20:05	20 07:19 (1)	18:52	16:44	16:04			
4	04:57	05:33 (9)	05:38	06:17 (4)	06:31	07:00 (1)	07:23	07:20	08:12			
	21:47	16 05:49 (9)	21:09	25 06:42 (4)	20:02	18 07:18 (1)	18:50	16:42	16:03			
5	04:58	05:33 (9)	05:40	06:17 (4)	06:33	07:02 (1)	07:25	07:22	08:14			
	21:46	17 05:50 (9)	21:07	25 06:42 (4)	20:00	14 07:16 (1)	18:48	16:41	16:03			
6	04:59	05:34 (9)	05:42	06:17 (4)	06:35	07:03 (1)	07:27	07:24	08:15			
	21:46	16 05:50 (9)	21:05	24 06:41 (4)	19:58	10 07:13 (1)	18:45	16:39	16:02			
7	05:00	05:34 (9)	05:43	06:18 (4)	06:36		07:28	07:26	08:16			
	21:45	16 05:50 (9)	21:03	23 06:41 (4)	19:55		18:43	16:37	16:02			
8	05:01	05:34 (9)	05:45	06:18 (4)	06:38		07:30	07:28	08:18			
	21:45	16 05:50 (9)	21:01	21 06:39 (4)	19:53		18:41	16:35	16:01			
9	05:02	05:35 (9)	05:47	06:20 (4)	06:40		07:32	07:30	08:19			
	21:44	15 05:50 (9)	20:59	19 06:39 (4)	19:50		18:38	16:33	16:01			
10	05:03	05:35 (9)	05:48	06:20 (4)	06:42		07:34	07:31	08:20			
	21:43	15 05:50 (9)	20:57	17 06:37 (4)	19:48		18:36	16:32	16:01			
11	05:04	05:36 (9)	05:50	06:22 (4)	06:43		07:34 (2)	07:36	07:33	08:21		
	21:42	14 05:50 (9)	20:55	13 06:35 (4)	19:46	6 07:40 (2)	18:34	16:30	16:01			
12	05:05	05:37 (9)	05:52	06:25 (4)	06:45		07:30 (2)	07:37	07:35	08:22		
	21:41	13 05:50 (9)	20:53	8 06:33 (4)	19:43	12 07:42 (2)	18:31	16:28	16:00			
13	05:06	05:38 (9)	05:54	06:44 (3)	06:47		07:29 (2)	07:39	07:37	08:23		
	21:40	11 05:49 (9)	20:51	8 06:52 (3)	19:41	15 07:44 (2)	18:29	16:27	16:00			
14	05:07	05:39 (9)	05:55	06:42 (3)	06:48		07:27 (2)	07:41	07:39	08:24		
	21:39	9 05:48 (9)	20:49	13 06:55 (3)	19:38	18 07:45 (2)	18:27	16:25	16:00			
15	05:09	05:40 (9)	05:57	06:40 (3)	06:50		07:26 (2)	07:43	07:41	08:25		
	21:38	7 05:47 (9)	20:47	15 06:55 (3)	19:36	19 07:45 (2)	18:24	16:24	16:00			
16	05:10	05:41 (9)	05:59	06:39 (3)	06:52		07:25 (2)	07:45	07:43	08:26		
	21:37	5 05:46 (9)	20:45	17 06:56 (3)	19:33	20 07:45 (2)	18:22	16:22	16:00			
17	05:11		06:00	06:39 (3)	06:54		07:25 (2)	07:46	07:44	08:27		
	21:36		20:43	18 06:57 (3)	19:31	20 07:45 (2)	18:20	16:21	16:01			
18	05:13	06:28 (4)	06:02	06:38 (3)	06:55		07:24 (2)	07:48	07:46	08:28		
	21:35	2 06:30 (4)	20:41	19 06:57 (3)	19:29	20 07:44 (2)	18:18	16:19	16:01			
19	05:14	06:24 (4)	06:04	06:37 (3)	06:57		07:24 (2)	07:50	07:48	08:28		
	21:34	9 06:33 (4)	20:39	20 06:57 (3)	19:26	20 07:44 (2)	18:15	16:18	16:01			
20	05:15	06:22 (4)	06:05	06:37 (3)	06:59		07:25 (2)	07:52	07:50	08:29		
	21:32	13 06:35 (4)	20:37	19 06:56 (3)	19:24	18 07:43 (2)	18:13	16:17	16:01			
21	05:17	06:22 (4)	06:07	06:37 (3)	07:00		07:26 (2)	07:54	07:51	08:30		
	21:31	15 06:37 (4)	20:34	23 07:15 (1)	19:21	15 07:41 (2)	18:11	16:15	16:02			
22	05:18	06:21 (4)	06:09	06:37 (3)	07:02		07:28 (2)	07:56	07:53	08:30		
	21:30	17 06:38 (4)	20:32	31 07:19 (1)	19:19	11 07:39 (2)	18:09	16:14	16:02			
23	05:20	06:19 (4)	06:11	06:38 (3)	07:04		07:30 (2)	07:58	07:55	08:31		
	21:28	20 06:39 (4)	20:30	33 07:20 (1)	19:16	7 07:37 (2)	18:07	16:13	16:03			
24	05:21	06:19 (4)	06:12	06:40 (3)	07:06		07:59	07:57	08:31			
	21:27	21 06:40 (4)	20:28	33 07:22 (1)	19:14		18:05	16:12	16:03			
25	05:23	06:18 (4)	06:14	06:42 (3)	07:07		07:01	07:58	08:31			
	21:25	22 06:40 (4)	20:25	32 07:23 (1)	19:12		17:02	16:11	16:04			
26	05:24	06:18 (4)	06:16	06:43 (3)	07:09		07:03	08:00	08:32			
	21:24	23 06:41 (4)	20:23	29 07:23 (1)	19:09		17:00	16:10	16:05			
27	05:26	06:18 (4)	06:18	07:00 (1)	07:11		07:05	08:02	08:32			
	21:22	24 06:42 (4)	20:21	23 07:23 (1)	19:07		16:58	16:09	16:06			
28	05:27	06:18 (4)	06:19	06:59 (1)	07:13		07:07	08:03	08:32			
	21:21	24 06:42 (4)	20:19	24 07:23 (1)	19:04		16:56	16:08	16:06			
29	05:29	06:17 (4)	06:21	06:59 (1)	07:14		07:09	08:05	08:32			
	21:19	25 06:42 (4)	20:16	24 07:23 (1)	19:02		16:54	16:07	16:07			
30	05:30	06:16 (4)	06:23	06:59 (1)	07:16		07:11	08:06	08:32			
	21:18	26 06:42 (4)	20:14	24 07:23 (1)	19:00		16:52	16:06	16:08			
31	05:32	06:17 (4)	06:24	06:58 (1)			07:13		08:32			
	21:16	26 06:43 (4)	20:12	24 07:22 (1)			16:50		16:09			
Sonnenscheinstunden	508		458		382		330		262			237
astr. max.mögl. Beschattung	490		682		308							
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met. wahrsch. Beschattung	128		200		73							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BU - IO73

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:32	08:03	07:08	06:54	05:46	06:15 (4)	04:59
	16:10	17:00	17:55	19:51	20:45	20	06:35 (4)
2	08:32	08:02	07:05	06:52	05:44	06:14 (4)	04:58
	16:12	17:02	17:57	19:53	20:47	21	06:35 (4)
3	08:32	08:00	07:03	06:49	05:42	06:13 (4)	04:57
	16:13	17:04	17:58	19:55	20:49	23	06:36 (4)
4	08:32	07:58	07:01	06:47	05:41	06:12 (4)	04:56
	16:14	17:06	18:00	19:57	20:51	24	06:36 (4)
5	08:32	07:57	06:58	06:45	07:10 (1)	05:39	06:12 (4)
	16:15	17:08	18:02	19:59	20:52	24	06:36 (4)
6	08:31	07:55	06:56	06:42	07:07 (1)	05:37	06:11 (4)
	16:16	17:10	18:04	20:00	20:53	25	06:36 (4)
7	08:31	07:53	06:54	06:40	07:06 (1)	05:35	06:11 (4)
	16:18	17:12	18:06	20:02	20:54	26	06:37 (4)
8	08:30	07:51	06:51	06:37	07:05 (1)	05:33	06:11 (4)
	16:19	17:14	18:08	20:04	20:55	26	06:37 (4)
9	08:30	07:49	06:49	06:35	07:04 (1)	05:31	06:11 (4)
	16:20	17:16	18:10	20:06	20:56	26	06:37 (4)
10	08:29	07:48	06:47	06:33	07:03 (1)	05:29	06:11 (4)
	16:22	17:18	18:11	20:08	20:57	26	06:37 (4)
11	08:29	07:46	06:44	06:30	07:03 (1)	05:27	06:11 (4)
	16:23	17:20	18:13	20:09	20:58	25	06:36 (4)
12	08:28	07:44	06:42	06:28	07:03 (1)	05:26	06:11 (4)
	16:25	17:22	18:15	20:11	20:59	25	06:36 (4)
13	08:27	07:42	06:40	06:26	07:02 (1)	05:24	06:12 (4)
	16:26	17:24	18:17	20:13	20:59	24	06:36 (4)
14	08:26	07:40	06:37	06:24	07:02 (1)	05:22	06:12 (4)
	16:28	17:26	18:19	20:15	21:00	23	06:35 (4)
15	08:25	07:38	06:35	06:21	06:45 (3)	05:21	06:13 (4)
	16:30	17:28	18:21	20:17	21:01	22	06:35 (4)
16	08:24	07:36	06:32	06:19	06:43 (3)	05:19	06:13 (4)
	16:31	17:30	18:23	20:18	20:59	20	06:33 (4)
17	08:23	07:34	06:30	06:17	06:40 (3)	05:17	06:15 (4)
	16:33	17:32	18:24	20:20	21:02	18	06:33 (4)
18	08:22	07:32	06:28	06:14	06:38 (3)	05:16	06:16 (4)
	16:35	17:34	18:26	20:22	21:03	16	06:32 (4)
19	08:21	07:29	06:25	06:12	06:36 (3)	05:14	06:17 (4)
	16:36	17:35	18:28	20:24	21:04	13	06:30 (4)
20	08:20	07:27	06:23	06:10	06:36 (3)	05:13	06:19 (4)
	16:38	17:37	18:30	20:26	21:05	10	06:29 (4)
21	08:19	07:25	06:20	06:08	06:36 (3)	05:12	06:22 (4)
	16:40	17:39	18:32	20:27	21:06	4	06:26 (4)
22	08:18	07:23	06:18	06:06	06:35 (3)	05:10	06:21 (4)
	16:42	17:41	18:33	20:29	21:07		21:49
23	08:17	07:21	06:16	06:04	06:36 (3)	05:09	06:21 (4)
	16:44	17:43	18:35	20:31	21:08		21:49
24	08:15	07:19	06:13	06:01	06:36 (3)	05:07	06:21 (4)
	16:45	17:45	18:37	20:33	21:09	4	05:40 (9)
25	08:14	07:16	06:11	05:59	06:36 (3)	05:06	05:35 (9)
	16:47	17:47	18:39	20:35	21:10	7	05:42 (9)
26	08:13	07:14	06:08	05:57	06:36 (3)	05:05	05:34 (9)
	16:49	17:49	18:41	20:36	21:11	9	05:43 (9)
27	08:11	07:12	06:06	05:55	06:38 (3)	05:04	05:33 (9)
	16:51	17:51	18:42	20:38	21:12	11	05:44 (9)
28	08:10	07:10	06:04	05:53	06:21 (4)	05:03	05:32 (9)
	16:53	17:53	18:44	20:40	21:13	13	05:45 (9)
29	08:08	07:01	05:51	05:51	06:19 (4)	05:02	05:31 (9)
	16:55	19:46	14	07:55 (2)	20:42	13	06:32 (4)
30	08:07	06:59	07:43 (2)	05:49	06:17 (4)	05:01	05:31 (9)
	16:57	19:48	9	07:52 (2)	20:43	17	06:34 (4)
31	08:05	06:56				05:00	05:30 (9)
	16:58	19:50				21:32	05:46 (9)
Sonnenscheinstunden	253	275	367	418	491		506
astr.max.mögl.Beschattung			187	550	530		586
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43		0.39
Reduktion Betriebsdauer			0.96	0.96	0.96		0.96
Reduktion Windrichtung			0.70	0.72	0.73		0.72
Gesamte Reduktion			0.19	0.26	0.30		0.27
Met.wahrsch.Beschattung			35	141	158		156

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BU - IO73

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:32 (8)	05:34	06:21 (4)	06:26	07:02 (1)	07:18	07:14	08:08			
	21	05:53 (9)	21:14	25	06:46 (4)	20:09	24	07:26 (1)	18:57	16:48	16:05	
2	04:56	05:33 (8)	05:35	06:21 (4)	06:28	07:02 (1)	07:20	07:16	08:09			
	20	05:53 (9)	21:12	26	06:47 (4)	20:07	24	07:26 (1)	18:55	16:46	16:05	
3	04:56	05:34 (8)	05:37	06:21 (4)	06:30	07:01 (1)	07:21	07:18	08:11			
	20	05:54 (9)	21:11	26	06:47 (4)	20:05	23	07:24 (1)	18:52	16:44	16:04	
4	04:57	05:34 (8)	05:38	06:21 (4)	06:31	07:02 (1)	07:23	07:20	08:12			
	19	05:53 (9)	21:09	26	06:47 (4)	20:02	22	07:24 (1)	18:50	16:42	16:03	
5	04:58	05:34 (8)	05:40	06:21 (4)	06:33	07:03 (1)	07:25	07:22	08:14			
	20	05:54 (9)	21:07	26	06:47 (4)	20:00	20	07:23 (1)	18:48	16:41	16:03	
6	04:59	05:35 (8)	05:42	06:21 (4)	06:35	07:03 (1)	07:27	07:24	08:15			
	19	05:54 (9)	21:05	26	06:47 (4)	19:58	18	07:21 (1)	18:45	16:39	16:02	
7	05:00	05:36 (8)	05:43	06:21 (4)	06:36	07:05 (1)	07:28	07:26	08:16			
	18	05:54 (9)	21:03	26	06:47 (4)	19:55	14	07:19 (1)	18:43	16:37	16:02	
8	05:01	05:37 (8)	05:45	06:21 (4)	06:38	07:07 (1)	07:30	07:28	08:18			
	17	05:54 (9)	21:01	25	06:46 (4)	19:53	10	07:17 (1)	18:41	16:35	16:01	
9	05:02	05:38 (9)	05:47	06:22 (4)	06:40			07:32	07:30	08:19		
	17	05:55 (9)	20:59	24	06:46 (4)	19:50		18:38	16:33	16:01		
10	05:03	05:38 (9)	05:48	06:22 (4)	06:42	07:24 (1)	07:34	07:31	08:20			
	17	05:55 (9)	20:57	22	06:44 (4)	19:48		18:36	16:32	16:01		
11	05:04	05:38 (9)	05:50	06:23 (4)	06:43			07:36	07:33	08:21		
	17	05:55 (9)	20:55	21	06:44 (4)	19:46		18:34	16:30	16:01		
12	05:05	05:39 (9)	05:52	06:24 (4)	06:45			07:37	07:35	08:22		
	16	05:55 (9)	20:53	19	06:43 (4)	19:43		18:31	16:28	16:00		
13	05:06	05:39 (9)	05:54	06:25 (4)	06:47	07:35 (2)	07:39	07:37	08:23			
	15	05:54 (9)	20:51	16	06:41 (4)	19:41	8	07:43 (2)	18:29	16:27	16:00	
14	05:07	05:39 (9)	05:55	06:27 (4)	06:48	07:33 (2)	07:41	07:39	08:24			
	15	05:54 (9)	20:49	12	06:39 (4)	19:38	13	07:46 (2)	18:27	16:25	16:00	
15	05:09	05:40 (9)	05:57	06:30 (4)	06:50	07:30 (2)	07:43	07:41	08:25			
	14	05:54 (9)	20:47	12	06:55 (3)	19:36	16	07:46 (2)	18:24	16:24	16:00	
16	05:10	05:41 (9)	05:59	06:45 (3)	06:52	07:29 (2)	07:45	07:43	08:26			
	12	05:53 (9)	20:45	12	06:57 (3)	19:33	18	07:47 (2)	18:22	16:22	16:00	
17	05:11	05:43 (9)	06:00	06:44 (3)	06:54	07:28 (2)	07:46	07:44	08:27			
	10	05:53 (9)	20:43	15	06:59 (3)	19:31	19	07:47 (2)	18:20	16:21	16:01	
18	05:13	05:44 (9)	06:02	06:42 (3)	06:55	07:27 (2)	07:48	07:46	08:28			
	8	05:52 (9)	20:41	17	06:59 (3)	19:29	20	07:47 (2)	18:18	16:19	16:01	
19	05:14	05:45 (9)	06:04	06:41 (3)	06:57	07:27 (2)	07:50	07:48	08:28			
	6	05:51 (9)	20:39	19	07:00 (3)	19:26	20	07:47 (2)	18:15	16:18	16:01	
20	05:15		06:05	06:40 (3)	06:59	07:27 (2)	07:52	07:50	08:29			
	21	20:37	19	06:59 (3)	19:24	20	07:47 (2)	18:13	16:17	16:01		
21	05:17	06:07		06:40 (3)	07:00	07:26 (2)	07:54	07:51	08:30			
	21	20:34	20	07:00 (3)	19:21	19	07:45 (2)	18:11	16:15	16:02		
22	05:18	06:09		06:40 (3)	07:02	07:28 (2)	07:56	07:53	08:30			
	21	20:32	20	07:00 (3)	19:19	16	07:44 (2)	18:09	16:14	16:02		
23	05:20	06:30 (4)	06:11	06:40 (3)	07:04	07:30 (2)	07:58	07:55	08:31			
	7	06:37 (4)	20:30	19	06:59 (3)	19:16	13	07:43 (2)	18:07	16:13	16:03	
24	05:21	06:28 (4)	06:12	06:40 (3)	07:06	07:31 (2)	07:59	07:57	08:31			
	12	06:40 (4)	20:28	28	07:21 (1)	19:14	9	07:40 (2)	18:05	16:12	16:03	
25	05:23	06:26 (4)	06:14	06:42 (3)	07:07	07:33 (2)	07:01	07:58	08:32			
	15	06:41 (4)	20:25	30	07:23 (1)	19:12	4	07:37 (2)	17:02	16:11	16:04	
26	05:24	06:26 (4)	06:16	06:43 (3)	07:09			07:03	08:00	08:32		
	17	06:43 (4)	20:23	30	07:24 (1)	19:09		17:00	16:10	16:05		
27	05:26	06:25 (4)	06:18	06:45 (3)	07:11	07:05		07:05	08:02	08:32		
	19	06:44 (4)	20:21	29	07:25 (1)	19:07		16:58	16:09	16:06		
28	05:27	06:24 (4)	06:19	06:46 (3)	07:13	07:07		07:07	08:03	08:32		
	21	06:45 (4)	20:19	27	07:25 (1)	19:04		16:56	16:08	16:06		
29	05:29	06:23 (4)	06:21	07:03 (1)	07:14	07:09		08:05	08:32			
	22	06:45 (4)	20:16	23	07:26 (1)	19:02		16:54	16:07	16:07		
30	05:30	06:22 (4)	06:23	07:03 (1)	07:16	07:11		08:06	08:32			
	23	06:45 (4)	20:14	23	07:26 (1)	19:00		16:52	16:06	16:08		
31	05:32	06:22 (4)	06:24	07:02 (1)		07:13		07:13	08:32			
	24	06:46 (4)	20:12	24	07:26 (1)			16:50	16:09	16:09		
Sonnenscheinstunden	508		458		382		330		262		237	
astr. max.mögl. Beschattung	461		687		350							
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met. wahrsch. Beschattung	121		201		83							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BV - IO74

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	05:46	06:16 (4)	04:59	05:29 (9)		
	16:10	17:00	17:55	19:51	20:45	18 06:34 (4)	21:34	16 05:45 (9)		
2	08:32	08:02	07:05	06:52	05:44	06:14 (4)	04:58	05:30 (9)		
	16:12	17:02	17:57	19:53	20:47	21 06:35 (4)	21:35	16 05:46 (9)		
3	08:32	08:00	07:03	06:49	05:42	06:13 (4)	04:57	05:30 (9)		
	16:13	17:04	17:58	19:55	20:49	22 06:35 (4)	21:36	16 05:46 (9)		
4	08:32	07:58	07:01	06:47	05:41	06:12 (4)	04:56	05:29 (9)		
	16:14	17:06	18:00	19:57	9 07:22 (1)	20:50	06:36 (4)	21:37	17 05:46 (9)	
5	08:32	07:57	06:58	06:45	07:10 (1)	05:39	06:11 (4)	04:55	05:30 (9)	
	16:15	17:08	18:02	19:59	15 07:25 (1)	20:52	25 06:36 (4)	21:38	17 05:47 (9)	
6	08:31	07:55	06:56	06:42	07:07 (1)	05:37	06:11 (4)	04:55	05:29 (9)	
	16:16	17:10	18:04	20:00	18 07:25 (1)	20:54	25 06:36 (4)	21:39	18 05:47 (9)	
7	08:31	07:53	06:54	06:40	07:06 (1)	05:35	06:11 (4)	04:54	05:29 (9)	
	16:18	17:12	18:06	20:02	20 07:26 (1)	20:56	26 06:37 (4)	21:40	19 05:48 (9)	
8	08:30	07:51	06:51	06:37	07:05 (1)	05:33	06:10 (4)	04:53	05:28 (9)	
	16:19	17:14	18:08	20:04	22 07:27 (1)	20:57	27 06:37 (4)	21:41	19 05:47 (9)	
9	08:30	07:49	06:49	06:35	07:05 (1)	05:31	06:10 (4)	04:53	05:29 (9)	
	16:20	17:16	18:10	20:06	23 07:28 (1)	20:59	26 06:36 (4)	21:42	19 05:48 (9)	
10	08:29	07:48	06:47	06:33	07:03 (1)	05:29	06:11 (4)	04:52	05:28 (9)	
	16:22	17:18	18:11	20:08	24 07:27 (1)	21:01	26 06:37 (4)	21:43	19 05:47 (9)	
11	08:29	07:46	06:44	06:30	07:03 (1)	05:27	06:10 (4)	04:52	05:28 (9)	
	16:23	17:20	18:13	20:09	24 07:27 (1)	21:03	26 06:36 (4)	21:44	20 05:48 (9)	
12	08:28	07:44	06:42	06:28	07:03 (1)	05:26	06:10 (4)	04:52	05:28 (9)	
	16:25	17:22	18:15	20:11	24 07:27 (1)	21:04	26 06:36 (4)	21:44	20 05:48 (9)	
13	08:27	07:42	06:40	06:26	07:02 (1)	05:24	06:11 (4)	04:51	05:28 (9)	
	16:26	17:24	18:17	20:13	24 07:26 (1)	21:06	25 06:36 (4)	21:45	21 05:49 (9)	
14	08:26	07:40	06:37	06:24	07:03 (1)	05:22	06:11 (4)	04:51	05:27 (9)	
	16:28	17:26	18:19	20:15	23 07:26 (1)	21:08	24 06:35 (4)	21:46	21 05:48 (9)	
15	08:25	07:38	06:35	06:21	06:45 (3)	05:21	06:12 (4)	04:51	05:28 (9)	
	16:30	17:28	18:21	20:17	28 07:25 (1)	21:09	23 06:35 (4)	21:46	20 05:48 (9)	
16	08:24	07:36	06:32	06:19	06:43 (3)	05:19	06:12 (4)	04:51	05:28 (9)	
	16:31	17:30	18:23	20:18	30 07:24 (1)	21:11	22 06:34 (4)	21:47	20 05:48 (9)	
17	08:23	07:34	06:30	06:17	06:40 (3)	05:17	06:13 (4)	04:51	05:28 (9)	
	16:33	17:32	18:24	20:20	31 07:22 (1)	21:12	21 06:34 (4)	21:47	21 05:49 (9)	
18	08:22	07:32	06:28	06:51 (2)	06:14	06:38 (3)	05:16	06:14 (4)	04:50	05:28 (9)
	16:35	17:34	18:26	4 06:55 (2)	20:22	32 07:21 (1)	21:14	19 06:33 (4)	21:48	21 05:49 (9)
19	08:21	07:29	06:25	06:49 (2)	06:12	06:36 (3)	05:14	06:15 (4)	04:50	05:28 (9)
	16:36	17:35	18:28	9 06:58 (2)	20:24	29 07:18 (1)	21:16	17 06:32 (4)	21:48	21 05:49 (9)
20	08:20	07:27	06:23	06:46 (2)	06:10	06:36 (3)	05:13	06:16 (4)	04:51	05:29 (9)
	16:38	17:37	18:30	13 06:59 (2)	20:26	19 06:55 (3)	21:17	15 06:31 (4)	21:48	21 05:50 (9)
21	08:19	07:25	06:20	06:44 (2)	06:08	06:35 (3)	05:12	06:18 (4)	04:51	05:29 (9)
	16:40	17:39	18:32	17 07:01 (2)	20:27	20 06:55 (3)	21:19	11 06:29 (4)	21:49	21 05:50 (9)
22	08:18	07:23	06:18	06:42 (2)	06:06	06:35 (3)	05:10	06:20 (4)	04:51	05:29 (9)
	16:42	17:41	18:33	18 07:00 (2)	20:29	20 06:55 (3)	21:20	6 06:26 (4)	21:49	21 05:50 (9)
23	08:17	07:21	06:16	06:41 (2)	06:03	06:35 (3)	05:09	06:21 (4)	04:51	05:29 (9)
	16:44	17:43	18:35	20 07:01 (2)	20:31	20 06:55 (3)	21:22	06:22 (4)	21:49	21 05:50 (9)
24	08:15	07:19	06:13	06:40 (2)	06:01	06:36 (3)	05:07	06:23 (4)	04:51	05:30 (9)
	16:45	17:45	18:37	20 07:00 (2)	20:33	18 06:54 (3)	21:23	06:24 (4)	21:49	21 05:51 (9)
25	08:14	07:16	06:11	06:40 (2)	05:59	06:36 (3)	05:06	05:35 (9)	04:52	05:30 (9)
	16:47	17:47	18:39	20 07:00 (2)	20:35	17 06:53 (3)	21:24	4 05:39 (9)	21:49	21 05:51 (9)
26	08:13	07:14	06:08	06:41 (2)	05:57	06:36 (3)	05:05	05:34 (9)	04:52	05:30 (9)
	16:49	17:49	18:41	19 07:00 (2)	20:36	15 06:51 (3)	21:26	7 05:41 (9)	21:49	21 05:51 (9)
27	08:11	07:12	06:06	06:40 (2)	05:55	06:37 (3)	05:04	05:33 (9)	04:53	05:31 (9)
	16:51	17:51	18:42	18 06:58 (2)	20:38	13 06:50 (3)	21:27	9 05:42 (9)	21:49	20 05:51 (9)
28	08:10	07:10	06:04	06:41 (2)	05:53	06:39 (3)	05:03	05:32 (9)	04:53	05:31 (9)
	16:53	17:53	18:44	17 06:58 (2)	20:40	9 06:48 (3)	21:29	11 05:43 (9)	21:49	20 05:51 (9)
29	08:08	07:01	07:42 (2)	05:51	06:20 (4)	05:02	05:31 (9)	04:54	05:31 (9)	
	16:55	19:46	13 07:55 (2)	20:42	11 06:31 (4)	21:30	13 05:44 (9)	21:49	21 05:52 (9)	
30	08:07	06:59	07:44 (2)	05:49	06:17 (4)	05:01	05:30 (9)	04:54	05:32 (9)	
	16:57	19:48	9 07:53 (2)	20:43	16 06:33 (4)	21:31	14 05:44 (9)	21:48	20 05:52 (9)	
31	08:05	06:56				05:00	05:30 (9)			
	16:58	19:50				21:32	15 05:45 (9)			
Sonnenscheinstunden	253	275	367	418	491		506			
astr.max.mögl.Beschattung			197	554	548		589			
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43		0.39			
Reduktion Betriebsdauer			0.96	0.96	0.96		0.96			
Reduktion Windrichtung			0.70	0.72	0.73		0.72			
Gesamte Reduktion			0.19	0.26	0.30		0.27			
Met.wahrsch.Beschattung			37	142	164		157			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BV - IO74

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:32 (8)	05:34	06:20 (4)	06:26	07:02 (1)	07:18	07:14	08:08			
	21:48	05:52 (9)	21:14	26	06:46 (4)	20:09	24	07:26 (1)	18:57	16:48	16:05	
2	04:56	05:33 (8)	05:35	06:21 (4)	06:28	07:02 (1)	07:20	07:16	08:09			
	21:48	05:53 (9)	21:12	26	06:47 (4)	20:07	24	07:26 (1)	18:55	16:46	16:05	
3	04:56	05:34 (8)	05:37	06:20 (4)	06:30	07:02 (1)	07:21	07:18	08:11			
	21:47	05:53 (9)	21:11	26	06:46 (4)	20:05	23	07:25 (1)	18:52	16:44	16:04	
4	04:57	05:33 (8)	05:38	06:20 (4)	06:31	07:02 (1)	07:23	07:20	08:12			
	21:47	05:52 (9)	21:09	27	06:47 (4)	20:02	22	07:24 (1)	18:50	16:42	16:03	
5	04:58	05:34 (8)	05:40	06:21 (4)	06:33	07:03 (1)	07:25	07:22	08:14			
	21:46	05:53 (9)	21:07	26	06:47 (4)	20:00	21	07:24 (1)	18:48	16:41	16:03	
6	04:59	05:35 (8)	05:42	06:20 (4)	06:35	07:03 (1)	07:27	07:24	08:15			
	21:46	05:53 (9)	21:05	26	06:46 (4)	19:58	18	07:21 (1)	18:45	16:39	16:02	
7	05:00	05:36 (9)	05:43	06:21 (4)	06:36	07:05 (1)	07:28	07:26	08:16			
	21:45	05:53 (9)	21:03	25	06:46 (4)	19:55	15	07:20 (1)	18:43	16:37	16:02	
8	05:01	05:37 (9)	05:45	06:21 (4)	06:38	07:07 (1)	07:30	07:28	08:18			
	21:45	05:54 (9)	21:01	24	06:45 (4)	19:53	10	07:17 (1)	18:41	16:35	16:01	
9	05:02	05:37 (9)	05:47	06:22 (4)	06:40			07:32	07:30	08:19		
	21:44	05:54 (9)	20:59	23	06:45 (4)	19:50		18:38	16:33	16:01		
10	05:03	05:37 (9)	05:48	06:22 (4)	06:42			07:34	07:31	08:20		
	21:43	05:54 (9)	20:57	22	06:44 (4)	19:48		18:36	16:32	16:01		
11	05:04	05:38 (9)	05:50	06:23 (4)	06:43			07:36	07:33	08:21		
	21:42	05:54 (9)	20:55	20	06:43 (4)	19:46		18:34	16:30	16:01		
12	05:05	05:38 (9)	05:52	06:24 (4)	06:45			07:37	07:35	08:22		
	21:41	05:53 (9)	20:53	18	06:42 (4)	19:43		18:31	16:28	16:00		
13	05:06	05:38 (9)	05:54	06:25 (4)	06:47		07:36 (2)	07:39	07:37	08:23		
	21:40	05:53 (9)	20:51	15	06:40 (4)	19:41	8	07:44 (2)	18:29	16:27	16:00	
14	05:07	05:39 (9)	05:55	06:28 (4)	06:48			07:33 (2)	07:41	07:39	08:24	
	21:39	05:53 (9)	20:49	12	06:53 (3)	19:38	13	07:46 (2)	18:27	16:25	16:00	
15	05:09	05:40 (9)	05:57	06:46 (3)	06:50			07:31 (2)	07:43	07:41	08:25	
	21:38	05:52 (9)	20:47	10	06:56 (3)	19:36	16	07:47 (2)	18:24	16:24	16:00	
16	05:10	05:41 (9)	05:59	06:44 (3)	06:52			07:30 (2)	07:45	07:43	08:26	
	21:37	05:51 (9)	20:45	14	06:58 (3)	19:33	18	07:48 (2)	18:22	16:22	16:00	
17	05:11	05:43 (9)	06:00	06:43 (3)	06:54			07:29 (2)	07:46	07:44	08:27	
	21:36	05:51 (9)	20:43	16	06:59 (3)	19:31	19	07:48 (2)	18:20	16:21	16:01	
18	05:13	05:44 (9)	06:02	06:42 (3)	06:55			07:28 (2)	07:48	07:46	08:28	
	21:35	05:50 (9)	20:41	17	06:59 (3)	19:29	20	07:48 (2)	18:18	16:19	16:01	
19	05:14		06:04	06:41 (3)	06:57			07:28 (2)	07:50	07:48	08:28	
	21:34		20:39	19	07:00 (3)	19:26	20	07:48 (2)	18:15	16:18	16:01	
20	05:15		06:05	06:40 (3)	06:59			07:28 (2)	07:52	07:50	08:29	
	21:32		20:37	19	06:59 (3)	19:24	20	07:48 (2)	18:13	16:17	16:01	
21	05:17		06:07	06:40 (3)	07:00			07:27 (2)	07:54	07:51	08:30	
	21:31		20:34	20	07:00 (3)	19:21	19	07:46 (2)	18:11	16:15	16:02	
22	05:18	06:29 (4)	06:09	06:40 (3)	07:02			07:28 (2)	07:56	07:53	08:30	
	21:30	9	06:38 (4)	20:32	20	07:00 (3)	19:19	17	07:45 (2)	18:09	16:14	16:02
23	05:20	06:27 (4)	06:11	06:39 (3)	07:04			07:30 (2)	07:58	07:55	08:31	
	21:28	13	06:40 (4)	20:30	21	07:17 (1)	19:16	14	07:44 (2)	18:07	16:13	16:03
24	05:21	06:26 (4)	06:12	06:40 (3)	07:06			07:31 (2)	07:59	07:57	08:31	
	21:27	16	06:42 (4)	20:28	29	07:22 (1)	19:14	11	07:42 (2)	18:05	16:12	16:03
25	05:23	06:25 (4)	06:14	06:42 (3)	07:07			07:33 (2)	07:01	07:58	08:32	
	21:25	17	06:42 (4)	20:25	31	07:24 (1)	19:12	6	07:39 (2)	17:02	16:11	16:04
26	05:24	06:24 (4)	06:16	06:43 (3)	07:09			07:03	08:00	08:32		
	21:24	20	06:44 (4)	20:23	31	07:25 (1)	19:09		17:00	16:10	16:05	
27	05:26	06:23 (4)	06:18	06:45 (3)	07:11			07:05	08:02	08:32		
	21:22	21	06:44 (4)	20:21	30	07:26 (1)	19:07		16:58	16:09	16:06	
28	05:27	06:23 (4)	06:19	06:46 (3)	07:13			07:07	08:03	08:32		
	21:21	23	06:46 (4)	20:19	27	07:26 (1)	19:04		16:56	16:08	16:06	
29	05:29	06:22 (4)	06:21	07:04 (1)	07:14			07:09	08:05	08:32		
	21:19	24	06:46 (4)	20:16	23	07:27 (1)	19:02		16:54	16:07	16:07	
30	05:30	06:21 (4)	06:23	07:03 (1)	07:16			07:11	08:06	08:32		
	21:18	25	06:46 (4)	20:14	24	07:27 (1)	19:00		16:52	16:06	16:08	
31	05:32	06:21 (4)	06:24	07:02 (1)				07:13		08:32		
	21:16	26	06:47 (4)	20:12	24	07:26 (1)		16:50		16:09		
Sonnenscheinstunden	508		458		382			330		262		237
astr. max.mögl. Beschattung	473		691		358							
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met. wahrsch. Beschattung	124		202		85							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BW - IO75

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	05:46	06:17 (4)	04:59	05:32 (8)
	16:10	17:00	17:55	19:51	20:45	24	06:41 (4)	21:34 18 05:50 (9)
2	08:32	08:02	07:05	06:52	07:18 (1)	05:44	06:17 (4)	04:58 05:32 (8)
	16:12	17:02	17:57	19:53	6 07:24 (1)	20:47	24	06:41 (4) 21:35 19 05:51 (9)
3	08:32	08:00	07:03	06:49	07:14 (1)	05:42	06:16 (4)	04:57 05:32 (8)
	16:13	17:04	17:58	19:55	13 07:27 (1)	20:49	25	06:41 (4) 21:36 19 05:51 (9)
4	08:32	07:58	07:01	06:47	07:12 (1)	05:41	06:15 (4)	04:56 05:31 (8)
	16:14	17:06	18:00	19:57	16 07:28 (1)	20:50	26	06:41 (4) 21:37 19 05:50 (9)
5	08:32	07:57	06:58	06:45	07:10 (1)	05:39	06:15 (4)	04:55 05:31 (8)
	16:15	17:08	18:02	19:59	20 07:30 (1)	20:52	26	06:41 (4) 21:38 20 05:51 (9)
6	08:31	07:55	06:56	06:42	07:08 (1)	05:37	06:15 (4)	04:55 05:31 (8)
	16:16	17:10	18:04	20:00	22 07:30 (1)	20:54	25	06:40 (4) 21:39 20 05:51 (9)
7	08:31	07:53	06:54	06:40	07:08 (1)	05:35	06:15 (4)	04:54 05:31 (8)
	16:18	17:12	18:06	20:02	22 07:30 (1)	20:56	26	06:41 (4) 21:40 20 05:51 (9)
8	08:30	07:51	06:51	06:37	07:07 (1)	05:33	06:15 (4)	04:53 05:31 (8)
	16:19	17:14	18:08	20:04	24 07:31 (1)	20:57	25	06:40 (4) 21:41 20 05:51 (9)
9	08:30	07:49	06:49	06:35	07:07 (1)	05:31	06:15 (4)	04:53 05:31 (8)
	16:20	17:16	18:10	20:06	24 07:31 (1)	20:59	25	06:40 (4) 21:42 20 05:51 (9)
10	08:29	07:48	06:47	06:33	07:06 (1)	05:29	06:16 (4)	04:52 05:31 (8)
	16:22	17:18	18:11	20:08	24 07:30 (1)	21:01	24	06:40 (4) 21:43 20 05:51 (9)
11	08:29	07:46	06:44	06:30	07:06 (1)	05:27	06:16 (4)	04:52 05:31 (8)
	16:23	17:20	18:13	20:09	24 07:30 (1)	21:03	23	06:39 (4) 21:44 20 05:51 (9)
12	08:28	07:44	06:42	06:28	07:07 (1)	05:26	06:16 (4)	04:52 05:31 (8)
	16:25	17:22	18:15	20:11	22 07:29 (1)	21:04	22	06:38 (4) 21:44 20 05:51 (9)
13	08:27	07:42	06:40	06:26	06:49 (3)	05:24	06:18 (4)	04:51 05:32 (8)
	16:26	17:24	18:17	20:13	25 07:28 (1)	21:06	20	06:38 (4) 21:45 20 05:52 (8)
14	08:26	07:40	06:37	06:24	06:47 (3)	05:22	06:18 (4)	04:51 05:31 (8)
	16:28	17:26	18:19	20:15	28 07:27 (1)	21:08	18	06:36 (4) 21:46 20 05:51 (9)
15	08:25	07:38	06:35	06:21	06:45 (3)	05:21	06:20 (4)	04:51 05:31 (8)
	16:30	17:28	18:21	20:17	30 07:26 (1)	21:09	16	06:36 (4) 21:46 21 05:52 (8)
16	08:24	07:36	06:32	06:19	06:43 (3)	05:19	06:21 (4)	04:51 05:31 (8)
	16:31	17:30	18:23	20:18	29 07:24 (1)	21:11	13	06:34 (4) 21:47 21 05:52 (8)
17	08:23	07:34	06:30	06:17	06:40 (3)	05:17	06:23 (4)	04:51 05:32 (8)
	16:33	17:32	18:24	3 06:56 (2)	20:20	26 07:20 (1)	21:12	9 06:32 (4) 21:47 20 05:52 (8)
18	08:22	07:32	06:28	06:51 (2)	06:14	06:39 (3)	05:16	04:50 05:32 (8)
	16:35	17:34	18:26	9 07:00 (2)	20:22	19 06:58 (3)	21:14	04:50 21 05:53 (8)
19	08:21	07:29	06:25	06:49 (2)	06:12	06:39 (3)	05:14	04:50 05:32 (8)
	16:36	17:35	18:28	13 07:02 (2)	20:24	19 06:58 (3)	21:16	04:51 21 05:53 (8)
20	08:20	07:27	06:23	06:46 (2)	06:10	06:38 (3)	05:13	04:51 05:33 (8)
	16:38	17:37	18:30	16 07:02 (2)	20:26	20 06:58 (3)	21:17	04:51 21 05:54 (8)
21	08:19	07:25	06:20	06:44 (2)	06:08	06:39 (3)	05:12	04:51 05:33 (8)
	16:40	17:39	18:32	19 07:03 (2)	20:27	19 06:58 (3)	21:19	04:51 21 05:54 (8)
22	08:18	07:23	06:18	06:43 (2)	06:06	06:39 (3)	05:10	04:51 05:33 (8)
	16:42	17:41	18:33	19 07:02 (2)	20:29	18 06:57 (3)	21:20	6 05:44 (9) 21:49 21 05:54 (8)
23	08:17	07:21	06:16	06:43 (2)	06:03	06:39 (3)	05:09	05:37 (9) 04:51 05:33 (8)
	16:44	17:43	18:35	20 07:03 (2)	20:31	17 06:56 (3)	21:22	8 05:45 (9) 21:49 21 05:54 (8)
24	08:15	07:19	06:13	06:42 (2)	06:01	06:40 (3)	05:07	05:36 (9) 04:51 05:34 (8)
	16:45	17:45	18:37	20 07:02 (2)	20:33	15 06:55 (3)	21:23	11 05:47 (9) 21:49 21 05:55 (8)
25	08:14	07:16	06:11	06:43 (2)	05:59	06:41 (3)	05:06	05:35 (9) 04:52 05:34 (8)
	16:47	17:47	18:39	18 07:01 (2)	20:35	13 06:54 (3)	21:24	13 05:48 (9) 21:49 20 05:54 (8)
26	08:13	07:14	06:08	06:43 (2)	05:57	06:25 (4)	05:05	05:34 (9) 04:52 05:34 (8)
	16:49	17:49	18:41	18 07:01 (2)	20:36	17 06:51 (3)	21:26	14 05:48 (9) 21:49 20 05:54 (8)
27	08:11	07:12	06:06	06:43 (2)	05:55	06:22 (4)	05:04	05:34 (9) 04:53 05:34 (8)
	16:51	17:51	18:42	16 06:59 (2)	20:38	06:36 (4)	21:27	15 05:49 (9) 21:49 21 05:55 (8)
28	08:10	07:10	06:04	06:45 (2)	05:53	06:20 (4)	05:03	05:33 (9) 04:53 05:34 (8)
	16:53	17:53	18:44	12 06:57 (2)	20:40	17 06:37 (4)	21:29	16 05:49 (9) 21:49 21 05:55 (8)
29	08:08	07:01	06:01	07:47 (2)	05:51	06:19 (4)	05:02	05:33 (9) 04:54 05:35 (8)
	16:55	19:46	6 07:53 (2)	20:42	20 06:39 (4)	21:30	16 05:49 (9)	21:49 20 05:55 (9)
30	08:07	06:59	05:49	05:49	06:18 (4)	05:01	05:33 (9)	04:54 05:35 (8)
	16:57	19:48	20:43	22 06:40 (4)	21:31	17 05:50 (9)	21:48	21 05:56 (8)
31	08:05	06:56	05:50	05:00	05:00	05:33 (9)		
	16:58	19:50	21:32	17 05:50 (9)				
Sonnenscheinstunden	253	275	367	418	491		506	607
astr.max.mögl.Beschattung			189	585	504		607	0.39
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43		0.39	0.96
Reduktion Betriebsdauer			0.96	0.96	0.96		0.96	0.72
Reduktion Windrichtung			0.70	0.72	0.72		0.72	0.27
Gesamte Reduktion			0.19	0.26	0.30		0.27	162
Met.wahrsch.Beschattung			35	150	150		162	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattenende	

Projekt: 20190529_Bostelwiebeck II

Lizenzierter Anwender: I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
Dennis Kramer / dennis.kramer@i17-wind.de
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BW - IO75

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Table with columns for months (Juli, August, September, Oktober, November, Dezember) and rows for each day of the month, including times and shadow data. Summary rows at the bottom show total hours and reduction percentages.

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Summary table with columns: Tag im Monat, Sonnenaufgang (SS:MM), Sonnenuntergang (SS:MM), Minuten mit Schatten, Zeitpunkt (SS:MM), Schattenanfang (WEA mit erstem Schatten), Schattenende (WEA mit letztem Schatten).



Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BX - IO76

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:22 (1)	05:46	06:18 (4)	04:59
	16:10	17:00	17:55	19:51	2 07:24 (1)	20:45	24 06:42 (4)	21:34
2	08:32	08:02	07:05	06:52	07:17 (1)	05:44	06:17 (4)	04:58
	16:12	17:02	17:57	19:53	12 07:29 (1)	20:47	25 06:42 (4)	21:35
3	08:32	08:00	07:03	06:49	07:15 (1)	05:42	06:17 (4)	04:57
	16:13	17:04	17:58	19:55	16 07:31 (1)	20:49	25 06:42 (4)	21:36
4	08:32	07:58	07:01	06:47	07:12 (1)	05:41	06:16 (4)	04:56
	16:14	17:06	18:00	19:57	20 07:32 (1)	20:50	26 06:42 (4)	21:37
5	08:32	07:57	06:58	06:45	07:11 (1)	05:39	06:16 (4)	04:55
	16:15	17:08	18:02	19:59	22 07:33 (1)	20:52	26 06:42 (4)	21:38
6	08:31	07:55	06:56	06:42	07:10 (1)	05:37	06:16 (4)	04:55
	16:16	17:10	18:04	20:00	22 07:32 (1)	20:54	26 06:42 (4)	21:39
7	08:31	07:53	06:54	06:40	07:09 (1)	05:35	06:16 (4)	04:54
	16:18	17:12	18:06	20:02	24 07:33 (1)	20:56	26 06:42 (4)	21:40
8	08:30	07:51	06:51	06:37	07:09 (1)	05:33	06:16 (4)	04:53
	16:19	17:14	18:08	20:04	24 07:33 (1)	20:57	26 06:42 (4)	21:41
9	08:30	07:49	06:49	06:35	07:09 (1)	05:31	06:16 (4)	04:53
	16:20	17:16	18:10	20:06	24 07:33 (1)	20:59	25 06:41 (4)	21:42
10	08:29	07:48	06:47	06:33	07:08 (1)	05:29	06:17 (4)	04:52
	16:22	17:18	18:11	20:08	24 07:32 (1)	21:01	24 06:41 (4)	21:43
11	08:29	07:46	06:44	06:30	07:08 (1)	05:27	06:17 (4)	04:52
	16:23	17:20	18:13	20:09	24 07:32 (1)	21:03	23 06:40 (4)	21:44
12	08:28	07:44	06:42	06:28	07:09 (1)	05:26	06:17 (4)	04:52
	16:25	17:22	18:15	20:11	22 07:31 (1)	21:04	22 06:39 (4)	21:44
13	08:27	07:42	06:40	06:26	06:49 (3)	05:24	06:19 (4)	04:51
	16:26	17:24	18:17	20:13	26 07:29 (1)	21:06	20 06:39 (4)	21:45
14	08:26	07:40	06:37	06:24	06:47 (3)	05:22	06:19 (4)	04:51
	16:28	17:26	18:19	20:15	28 07:28 (1)	21:08	19 06:38 (4)	21:46
15	08:25	07:38	06:35	06:21	06:45 (3)	05:21	06:21 (4)	04:51
	16:30	17:28	18:21	20:17	30 07:27 (1)	21:09	16 06:37 (4)	21:46
16	08:24	07:36	06:32	06:19	06:43 (3)	05:19	06:22 (4)	04:51
	16:31	17:30	18:23	2 06:58 (2)	20:18	28 07:25 (1)	21:11	13 06:35 (4)
17	08:23	07:34	06:30	06:17	06:40 (3)	05:17	06:24 (4)	04:51
	16:33	17:32	18:24	9 07:02 (2)	20:20	23 07:20 (1)	21:12	9 06:33 (4)
18	08:22	07:32	06:28	06:14	06:40 (3)	05:16	04:50	05:32 (8)
	16:35	17:34	18:26	13 07:04 (2)	20:22	19 06:59 (3)	21:14	21 05:53 (8)
19	08:21	07:29	06:25	06:12	06:40 (3)	05:14	04:50	05:32 (8)
	16:36	17:35	18:28	16 07:05 (2)	20:24	19 06:59 (3)	21:16	21 05:53 (8)
20	08:20	07:27	06:23	06:10	06:40 (3)	05:13	04:51	05:33 (8)
	16:38	17:37	18:30	19 07:05 (2)	20:26	19 06:59 (3)	21:17	21 05:54 (8)
21	08:19	07:25	06:20	06:08	06:40 (3)	05:12	04:51	05:33 (8)
	16:40	17:39	18:32	19 07:05 (2)	20:27	19 06:59 (3)	21:19	21 05:54 (8)
22	08:18	07:23	06:18	06:06	06:40 (3)	05:10	06:22 (4)	04:51
	16:42	17:41	18:33	20 07:05 (2)	20:29	18 06:58 (3)	21:20	5 05:43 (9)
23	08:17	07:21	06:16	06:03	06:41 (3)	05:09	05:37 (9)	04:51
	16:43	17:43	18:35	20 07:05 (2)	20:31	16 06:57 (3)	21:22	8 05:45 (9)
24	08:15	07:19	06:13	06:01	06:42 (3)	05:07	05:36 (9)	04:51
	16:45	17:45	18:37	20 07:04 (2)	20:33	14 06:56 (3)	21:23	11 05:47 (9)
25	08:14	07:16	06:11	06:00	06:43 (3)	05:06	05:35 (9)	04:52
	16:47	17:47	18:39	18 07:03 (2)	20:35	12 06:55 (3)	21:24	13 05:48 (9)
26	08:13	07:14	06:08	06:00	06:25 (4)	05:05	05:34 (9)	04:52
	16:49	17:49	18:41	16 07:02 (2)	20:36	18 06:51 (3)	21:26	14 05:48 (9)
27	08:11	07:12	06:06	06:00	06:22 (4)	05:04	05:34 (9)	04:53
	16:50	17:51	18:42	14 07:00 (2)	20:38	16 06:38 (4)	21:27	15 05:49 (9)
28	08:10	07:10	06:04	06:00	06:20 (4)	05:03	05:33 (9)	04:53
	16:53	17:53	18:44	9 06:58 (2)	20:40	19 06:39 (4)	21:29	16 05:49 (9)
29	08:08	07:01	06:00	05:51	06:20 (4)	05:02	05:33 (9)	04:54
	16:55	19:46	19:46	20:42	21 06:41 (4)	21:30	17 05:50 (9)	21:49
30	08:07	06:59	05:49	05:49	06:19 (4)	05:01	05:33 (9)	04:54
	16:57	19:48	19:48	20:43	23 06:42 (4)	21:31	17 05:50 (9)	21:48
31	08:05	06:56	05:50	05:50	05:00	05:33 (9)	05:00	05:33 (9)
	16:58	19:50	19:50	418	491	17 05:50 (9)	506	610
Sonnenscheinstunden	253	275	367	418	491	17	506	610
astr.max.mögl.Beschattung			0.28	0.37	0.43			0.39
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96			0.96
Reduktion Betriebsdauer			0.70	0.72	0.72			0.72
Reduktion Windrichtung			0.18	0.26	0.30			0.27
Gesamte Reduktion			0.18	0.26	0.30			0.27
Met.wahrsch.Beschattung			36	155	151			163

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BX - IO76

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember		
1	04:55	05:35 (8) 05:34	06:28 (4) 06:26	07:07 (1) 07:18	07:14	08:08		
	20	05:55 (9) 21:14	22 06:50 (4) 20:09	24 07:31 (1) 18:57	16:48	16:05		
2	04:56	05:36 (8) 05:35	06:27 (4) 06:28	07:07 (1) 07:20	07:16	08:09		
	20	05:56 (9) 21:12	24 06:51 (4) 20:07	24 07:31 (1) 18:55	16:46	16:05		
3	04:56	05:36 (8) 05:37	06:26 (4) 06:30	07:06 (1) 07:21	07:18	08:11		
	21	05:57 (9) 21:11	25 06:51 (4) 20:05	24 07:30 (1) 18:52	16:44	16:04		
4	04:57	05:36 (8) 05:38	06:26 (4) 06:31	07:06 (1) 07:23	07:20	08:12		
	20	05:56 (9) 21:09	26 06:52 (4) 20:02	24 07:30 (1) 18:50	16:42	16:03		
5	04:58	05:37 (8) 05:40	06:27 (4) 06:33	07:06 (1) 07:25	07:22	08:14		
	20	05:57 (9) 21:07	25 06:52 (4) 20:00	24 07:30 (1) 18:48	16:41	16:03		
6	04:59	05:37 (8) 05:42	06:26 (4) 06:35	07:06 (1) 07:27	07:24	08:15		
	20	05:57 (9) 21:05	26 06:52 (4) 19:58	22 07:28 (1) 18:45	16:39	16:02		
7	05:00	05:38 (8) 05:43	06:26 (4) 06:36	07:07 (1) 07:28	07:26	08:16		
	20	05:58 (9) 21:03	26 06:52 (4) 19:55	21 07:28 (1) 18:43	16:37	16:02		
8	05:01	05:38 (8) 05:45	06:25 (4) 06:38	07:08 (1) 07:30	07:28	08:18		
	20	05:58 (9) 21:01	27 06:52 (4) 19:53	19 07:27 (1) 18:41	16:35	16:01		
9	05:02	05:39 (8) 05:47	06:26 (4) 06:40	07:08 (1) 07:32	07:30	08:19		
	19	05:58 (9) 20:59	26 06:52 (4) 19:50	16 07:24 (1) 18:38	16:33	16:01		
10	05:03	05:40 (8) 05:48	06:25 (4) 06:42	07:10 (1) 07:34	07:31	08:20		
	18	05:58 (9) 20:57	26 06:51 (4) 19:48	12 07:22 (1) 18:36	16:32	16:01		
11	05:04	05:40 (8) 05:50	06:26 (4) 06:43	07:14 (1) 07:36	07:33	08:21		
	18	05:58 (9) 20:55	25 06:51 (4) 19:46	4 07:18 (1) 18:34	16:30	16:01		
12	05:05	05:41 (9) 05:52	06:27 (4) 06:45		07:37	07:35	08:22	
	17	05:58 (9) 20:53	24 06:51 (4) 19:43		18:31	16:28	16:00	
13	05:06	05:41 (9) 05:54	06:27 (4) 06:47		07:39	07:37	08:23	
	17	05:58 (9) 20:51	22 06:49 (4) 19:41		18:29	16:27	16:00	
14	05:07	05:42 (9) 05:55	06:28 (4) 06:48		07:41	07:39	08:24	
	16	05:58 (9) 20:49	20 06:48 (4) 19:38		18:27	16:25	16:00	
15	05:09	05:42 (9) 05:57	06:28 (4) 06:50		07:39 (2) 07:43	07:41	08:25	
	16	05:58 (9) 20:47	18 06:46 (4) 19:36	7 07:46 (2) 18:24	16:24	16:00		
16	05:10	05:42 (9) 05:59	06:30 (4) 06:52		07:36 (2) 07:45	07:43	08:26	
	16	05:58 (9) 20:45	15 06:45 (4) 19:33	13 07:49 (2) 18:22	16:22	16:00		
17	05:11	05:43 (9) 06:00	06:33 (4) 06:54		07:35 (2) 07:46	07:44	08:27	
	15	05:58 (9) 20:43	18 06:59 (3) 19:31	15 07:50 (2) 18:20	16:21	16:01		
18	05:13	05:44 (9) 06:02	06:48 (3) 06:55		07:33 (2) 07:48	07:46	08:28	
	13	05:57 (9) 20:41	13 07:01 (3) 19:29	17 07:50 (2) 18:18	16:19	16:01		
19	05:14	05:45 (9) 06:04	06:47 (3) 06:57		07:32 (2) 07:50	07:48	08:28	
	12	05:57 (9) 20:39	15 07:02 (3) 19:26	19 07:51 (2) 18:15	16:18	16:01		
20	05:15	05:46 (9) 06:05	06:45 (3) 06:59		07:31 (2) 07:52	07:50	08:29	
	10	05:56 (9) 20:37	17 07:02 (3) 19:24	20 07:51 (2) 18:13	16:17	16:01		
21	05:17	05:48 (9) 06:07	06:45 (3) 07:00		07:30 (2) 07:54	07:51	08:30	
	7	05:55 (9) 20:34	18 07:03 (3) 19:21	20 07:50 (2) 18:11	16:15	16:02		
22	05:18	05:49 (9) 06:09	06:44 (3) 07:02		07:30 (2) 07:56	07:53	08:30	
	4	05:53 (9) 20:32	20 07:04 (3) 19:19	20 07:50 (2) 18:09	16:14	16:02		
23	05:20		06:11	06:43 (3) 07:04		07:31 (2) 07:58	07:55	08:31
			20 07:03 (3) 19:16	19 07:50 (2) 18:07	16:13	16:03		
24	05:21		06:12	06:43 (3) 07:06		07:31 (2) 07:59	07:57	08:31
			20 07:03 (3) 19:14	17 07:48 (2) 18:05	16:12	16:03		
25	05:23		06:14	06:44 (3) 07:07		07:33 (2) 07:01	07:58	08:32
			19 07:03 (3) 19:12	14 07:47 (2) 17:02	16:11	16:04		
26	05:24		06:16	06:43 (3) 07:09		07:35 (2) 07:03	08:00	08:32
		6 06:43 (4) 20:23	24 07:23 (1) 19:09	10 07:45 (2) 17:00	16:10	16:05		
27	05:26		06:33 (4) 06:18	06:45 (3) 07:11		07:37 (2) 07:05	08:02	08:32
		12 06:45 (4) 20:21	28 07:27 (1) 19:07	5 07:42 (2) 16:58	16:09	16:06		
28	05:27		06:32 (4) 06:19	06:46 (3) 07:13		07:07	08:03	08:32
		15 06:47 (4) 20:19	29 07:28 (1) 19:04		16:56	16:08	16:06	
29	05:29		06:31 (4) 06:21	06:48 (3) 07:14		07:09	08:05	08:32
		17 06:48 (4) 20:16	29 07:29 (1) 19:02		16:54	16:07	16:07	
30	05:30		06:29 (4) 06:23	06:50 (3) 07:16		07:11	08:06	08:32
		19 06:48 (4) 20:14	27 07:30 (1) 19:00		16:52	16:06	16:08	
31	05:32		06:29 (4) 06:24	07:08 (1)		07:13	08:06	08:32
		21 06:50 (4) 20:12	22 07:30 (1)		16:50	16:06	16:09	
Sonnenscheinstunden	508	458	382	330	262	237		
astr. max.mögl. Beschattung	449	696	410					
Red. Sonnenscheinwahrsch.	0.38	0.42	0.35					
Reduktion Betriebsdauer	0.96	0.96	0.96					
Reduktion Windrichtung	0.72	0.72	0.71					
Gesamte Reduktion	0.26	0.29	0.24					
Met. wahrsch. Beschattung	118	204	97					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BY - IO77

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:08	06:54	07:22 (1) 05:46	06:18 (4) 04:59
	16:10	17:00	17:55	19:51	3 07:25 (1) 20:45	24 06:42 (4) 21:34
2	08:32	08:02	07:05	06:52	07:17 (1) 05:44	06:17 (4) 04:58
	16:12	17:02	17:57	19:53	13 07:30 (1) 20:47	25 06:42 (4) 21:35
3	08:32	08:00	07:03	06:49	07:15 (1) 05:42	06:16 (4) 04:57
	16:13	17:04	17:58	19:55	17 07:32 (1) 20:49	26 06:42 (4) 21:36
4	08:32	07:58	07:01	06:47	07:13 (1) 05:41	06:16 (4) 04:56
	16:14	17:06	18:00	19:57	19 07:32 (1) 20:50	26 06:42 (4) 21:37
5	08:32	07:57	06:58	06:45	07:12 (1) 05:39	06:15 (4) 04:55
	16:15	17:08	18:02	19:59	21 07:33 (1) 20:52	27 06:42 (4) 21:38
6	08:31	07:55	06:56	06:42	07:10 (1) 05:37	06:15 (4) 04:55
	16:16	17:10	18:04	20:00	23 07:33 (1) 20:54	27 06:42 (4) 21:39
7	08:31	07:53	06:54	06:40	07:10 (1) 05:35	06:16 (4) 04:54
	16:18	17:12	18:06	20:02	24 07:34 (1) 20:56	27 06:43 (4) 21:40
8	08:30	07:51	06:51	06:37	07:09 (1) 05:33	06:15 (4) 04:53
	16:19	17:14	18:08	20:04	25 07:34 (1) 20:57	27 06:42 (4) 21:41
9	08:30	07:49	06:49	06:35	07:09 (1) 05:31	06:15 (4) 04:53
	16:20	17:16	18:10	20:06	25 07:34 (1) 20:59	26 06:41 (4) 21:42
10	08:29	07:48	06:47	06:33	07:08 (1) 05:29	06:16 (4) 04:52
	16:22	17:18	18:11	20:08	25 07:33 (1) 21:01	26 06:42 (4) 21:43
11	08:29	07:46	06:44	06:30	07:09 (1) 05:27	06:16 (4) 04:52
	16:23	17:20	18:13	20:09	24 07:33 (1) 21:03	25 06:41 (4) 21:44
12	08:28	07:44	06:42	06:28	07:09 (1) 05:26	06:16 (4) 04:52
	16:25	17:22	18:15	20:11	23 07:32 (1) 21:04	24 06:40 (4) 21:44
13	08:27	07:42	06:40	06:26	06:49 (3) 05:24	06:17 (4) 04:51
	16:26	17:24	18:17	20:13	26 07:30 (1) 21:06	23 06:40 (4) 21:45
14	08:26	07:40	06:37	06:24	06:47 (3) 05:22	06:18 (4) 04:51
	16:28	17:26	18:19	20:15	29 07:29 (1) 21:08	21 06:39 (4) 21:46
15	08:25	07:38	06:35	06:21	06:45 (3) 05:21	06:19 (4) 04:51
	16:30	17:28	18:21	20:17	30 07:28 (1) 21:09	19 06:38 (4) 21:46
16	08:24	07:36	06:32	06:19	07:26 (1) 21:11	16 06:36 (4) 21:47
	16:31	17:30	18:23	5 07:01 (2) 20:18	29 07:26 (1) 21:11	16 06:36 (4) 21:47
17	08:23	07:34	06:30	06:17	06:40 (3) 05:17	06:21 (4) 04:51
	16:33	17:32	18:24	10 07:03 (2) 20:20	26 07:22 (1) 21:12	15 06:36 (4) 21:47
18	08:22	07:32	06:28	06:14	06:40 (3) 05:16	06:24 (4) 04:50
	16:35	17:34	18:26	14 07:05 (2) 20:22	19 06:59 (3) 21:14	10 06:34 (4) 21:48
19	08:21	07:29	06:25	06:12	06:40 (3) 05:14	06:26 (4) 04:50
	16:36	17:35	18:28	17 07:06 (2) 20:24	20 07:00 (3) 21:16	4 06:30 (4) 21:48
20	08:20	07:27	06:23	06:10	06:39 (3) 05:13	04:51
	16:38	17:37	18:30	19 07:06 (2) 20:26	20 06:59 (3) 21:17	21:48
21	08:19	07:25	06:20	06:08	06:40 (3) 05:12	04:51
	16:40	17:39	18:32	20 07:07 (2) 20:27	19 06:59 (3) 21:19	21:49
22	08:18	07:23	06:18	06:06	06:40 (3) 05:10	04:51
	16:42	17:41	18:33	21 07:06 (2) 20:29	19 06:59 (3) 21:20	21:49
23	08:17	07:21	06:16	06:03	06:40 (3) 05:09	05:37 (9) 04:51
	16:43	17:43	18:35	20 07:06 (2) 20:31	18 06:58 (3) 21:22	6 05:43 (9) 21:49
24	08:15	07:19	06:13	06:01	06:41 (3) 05:07	05:36 (9) 04:51
	16:45	17:45	18:37	19 07:04 (2) 20:33	16 06:57 (3) 21:23	8 05:44 (9) 21:49
25	08:14	07:16	06:11	06:00	06:42 (3) 05:06	05:35 (9) 04:52
	16:47	17:47	18:39	18 07:04 (2) 20:35	13 06:55 (3) 21:24	11 05:46 (9) 21:49
26	08:13	07:14	06:08	06:00	06:26 (4) 05:05	05:34 (9) 04:52
	16:49	17:49	18:41	16 07:03 (2) 20:36	17 06:52 (3) 21:26	13 05:47 (9) 21:49
27	08:11	07:12	06:06	06:00	06:23 (4) 05:04	05:33 (9) 04:53
	16:51	17:51	18:42	14 07:01 (2) 20:38	14 06:57 (4) 21:27	14 05:47 (9) 21:49
28	08:10	07:10	06:04	06:00	06:21 (4) 05:03	05:33 (9) 04:53
	16:53	17:53	18:44	8 06:58 (2) 20:40	17 06:38 (4) 21:29	15 05:48 (9) 21:49
29	08:08	07:01	06:00	05:51	06:20 (4) 05:02	05:32 (9) 04:54
	16:55	19:46	19:46	20:42	20 06:40 (4) 21:30	16 05:48 (9) 21:49
30	08:07	06:59	05:49	05:49	06:19 (4) 05:01	05:32 (9) 04:54
	16:57	19:48	19:48	20:43	22 06:41 (4) 21:31	17 05:49 (9) 21:48
31	08:05	06:56	05:50	05:50	05:00	05:32 (9)
	16:58	19:50	19:50	21:32	17 05:49 (9)	
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			201	616	535	606
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.70	0.72	0.72	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.27
Met.wahrsch.Beschattung			37	158	160	162

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: **GBSchattenrezeptor: BY - IO77**
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November		Dezember	
1	04:55	05:34 (8)	05:34	06:26 (4)	06:26	07:08 (1)	07:18	07:14	08:08		
	21:48	05:55 (9)	21:14	06:51 (4)	20:09	24	07:32 (1)	18:57	16:48	16:05	
2	04:56	05:35 (8)	05:35	06:26 (4)	06:28		07:07 (1)	07:20	07:16	08:09	
	21:48	05:56 (9)	21:12	06:51 (4)	20:07	25	07:32 (1)	18:55	16:46	16:05	
3	04:56	05:36 (8)	05:37	06:25 (4)	06:30		07:06 (1)	07:21	07:18	08:11	
	21:47	05:56 (9)	21:11	06:51 (4)	20:05	25	07:31 (1)	18:52	16:44	16:04	
4	04:57	05:35 (8)	05:38	06:26 (4)	06:31		07:06 (1)	07:23	07:20	08:12	
	21:47	05:56 (9)	21:09	06:52 (4)	20:02	25	07:31 (1)	18:50	16:42	16:03	
5	04:58	05:36 (8)	05:40	06:26 (4)	06:33		07:07 (1)	07:25	07:22	08:14	
	21:46	05:56 (9)	21:07	06:53 (4)	20:00	24	07:31 (1)	18:48	16:41	16:03	
6	04:59	05:37 (8)	05:42	06:25 (4)	06:35		07:06 (1)	07:27	07:24	08:15	
	21:46	05:56 (9)	21:05	06:52 (4)	19:58	23	07:29 (1)	18:45	16:39	16:02	
7	05:00	05:37 (8)	05:43	06:25 (4)	06:36		07:07 (1)	07:28	07:26	08:16	
	21:45	05:57 (9)	21:03	06:52 (4)	19:55	22	07:29 (1)	18:43	16:37	16:02	
8	05:01	05:38 (8)	05:45	06:25 (4)	06:38		07:08 (1)	07:30	07:28	08:18	
	21:45	05:57 (9)	21:01	06:52 (4)	19:53	20	07:28 (1)	18:41	16:35	16:01	
9	05:02	05:39 (8)	05:47	06:25 (4)	06:40		07:08 (1)	07:32	07:30	08:19	
	21:44	05:57 (9)	20:59	06:52 (4)	19:50	17	07:25 (1)	18:38	16:33	16:01	
10	05:03	05:40 (9)	05:48	06:25 (4)	06:42		07:10 (1)	07:34	07:31	08:20	
	21:43	05:57 (9)	20:57	06:51 (4)	19:48	13	07:23 (1)	18:36	16:32	16:01	
11	05:04	05:40 (9)	05:50	06:26 (4)	06:43		07:14 (1)	07:36	07:33	08:21	
	21:42	05:57 (9)	20:55	06:50 (4)	19:46	5	07:19 (1)	18:34	16:30	16:01	
12	05:05	05:40 (9)	05:52	06:27 (4)	06:45			07:37	07:35	08:22	
	21:41	05:57 (9)	20:53	06:50 (4)	19:43			18:31	16:28	16:00	
13	05:06	05:41 (9)	05:54	06:27 (4)	06:47			07:39	07:37	08:23	
	21:40	05:57 (9)	20:51	06:48 (4)	19:41			18:29	16:27	16:00	
14	05:07	05:41 (9)	05:55	06:28 (4)	06:48			07:41	07:39	08:24	
	21:39	05:57 (9)	20:49	06:48 (4)	19:38			18:27	16:25	16:00	
15	05:09	05:41 (9)	05:57	06:29 (4)	06:50		07:40 (2)	07:43	07:41	08:25	
	21:38	05:57 (9)	20:47	06:45 (4)	19:36	7	07:47 (2)	18:24	16:24	16:00	
16	05:10	05:41 (9)	05:59	06:31 (4)	06:52		07:37 (2)	07:45	07:43	08:26	
	21:37	05:56 (9)	20:45	06:56 (3)	19:33	13	07:50 (2)	18:22	16:22	16:00	
17	05:11	05:43 (9)	06:00	06:35 (4)	06:54		07:36 (2)	07:46	07:44	08:27	
	21:36	05:57 (9)	20:43	07:00 (3)	19:31	15	07:51 (2)	18:20	16:21	16:01	
18	05:13	05:44 (9)	06:02	06:48 (3)	06:55		07:34 (2)	07:48	07:46	08:28	
	21:35	05:56 (9)	20:41	07:01 (3)	19:29	17	07:51 (2)	18:18	16:19	16:01	
19	05:14	05:45 (9)	06:04	06:47 (3)	06:57		07:33 (2)	07:50	07:48	08:28	
	21:34	05:55 (9)	20:39	07:03 (3)	19:26	19	07:52 (2)	18:15	16:18	16:01	
20	05:15	05:46 (9)	06:05	06:45 (3)	06:59		07:32 (2)	07:52	07:50	08:29	
	21:32	05:53 (9)	20:37	07:03 (3)	19:24	20	07:52 (2)	18:13	16:17	16:01	
21	05:17	05:48 (9)	06:07	06:44 (3)	07:00		07:31 (2)	07:54	07:51	08:30	
	21:31	05:52 (9)	20:34	07:03 (3)	19:21	20	07:51 (2)	18:11	16:15	16:02	
22	05:18		06:09	06:44 (3)	07:02		07:31 (2)	07:56	07:53	08:30	
	21:30		20:32	07:04 (3)	19:19	20	07:51 (2)	18:09	16:14	16:02	
23	05:20		06:11	06:43 (3)	07:04		07:31 (2)	07:58	07:55	08:31	
	21:28		20:30	07:03 (3)	19:16	20	07:51 (2)	18:07	16:13	16:03	
24	05:21		06:12	06:43 (3)	07:06		07:31 (2)	07:59	07:57	08:31	
	21:27		20:28	07:03 (3)	19:14	18	07:49 (2)	18:05	16:12	16:03	
25	05:23	06:35 (4)	06:14	06:44 (3)	07:07		07:33 (2)	07:01	07:58	08:32	
	21:25	06:42 (4)	20:25	07:03 (3)	19:12	15	07:48 (2)	17:02	16:11	16:04	
26	05:24	06:33 (4)	06:16	06:43 (3)	07:09		07:35 (2)	07:03	08:00	08:32	
	21:24	06:45 (4)	20:23	07:25 (1)	19:09	12	07:47 (2)	17:00	16:10	16:05	
27	05:26	06:31 (4)	06:18	06:45 (3)	07:11		07:37 (2)	07:05	08:02	08:32	
	21:22	06:47 (4)	20:21	07:28 (1)	19:07	7	07:44 (2)	16:58	16:09	16:06	
28	05:27	06:30 (4)	06:19	06:46 (3)	07:13			07:07	08:03	08:32	
	21:21	06:48 (4)	20:19	07:29 (1)	19:04			16:56	16:08	16:06	
29	05:29	06:29 (4)	06:21	06:48 (3)	07:14			07:09	08:05	08:32	
	21:19	06:49 (4)	20:16	07:30 (1)	19:02			16:54	16:07	16:07	
30	05:30	06:28 (4)	06:23	06:50 (3)	07:16			07:11	08:06	08:32	
	21:18	06:49 (4)	20:14	07:31 (1)	19:00			16:52	16:06	16:08	
31	05:32	06:28 (4)	06:24	07:08 (1)				07:13		08:32	
	21:16	06:50 (4)	20:12	07:31 (1)				16:50		16:09	
Sonnenscheinstunden	508		458		382		330		262		237
astr.max.mögl.Beschattung	456		707		426						
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35						
Reduktion Betriebsdauer	0.96		0.96		0.96						
Reduktion Windrichtung	0.72		0.72		0.71						
Gesamte Reduktion	0.26		0.29		0.24						
Met.wahrsch.Beschattung	119		207		101						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BZ - IO78

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Ma	Juni
1	08:32 16:10	08:03 17:00	07:08 17:55	06:54 19:51	07:19 (1) 07:33 (1)	05:46 26 06:46 (4)
2	08:32 16:12	08:02 17:02	07:05 17:57	06:52 19:53	07:17 (1) 07:35 (1)	05:44 26 06:46 (4)
3	08:32 16:13	08:00 17:04	07:03 17:58	06:49 19:55	07:16 (1) 07:36 (1)	05:42 27 06:46 (4)
4	08:32 16:14	07:58 17:06	07:01 18:00	06:47 19:57	07:14 (1) 07:36 (1)	05:41 27 06:46 (4)
5	08:32 16:15	07:57 17:08	06:58 18:02	06:45 19:59	07:14 (1) 07:37 (1)	05:39 26 06:45 (4)
6	08:31 16:16	07:55 17:10	06:56 18:04	06:42 20:00	07:12 (1) 07:36 (1)	05:37 26 06:45 (4)
7	08:31 16:18	07:53 17:12	06:54 18:06	06:40 20:02	07:12 (1) 07:36 (1)	05:35 25 06:45 (4)
8	08:30 16:19	07:51 17:14	06:51 18:08	06:37 20:04	07:12 (1) 07:36 (1)	05:33 24 06:44 (4)
9	08:30 16:20	07:49 17:16	06:49 18:10	06:35 20:06	07:12 (1) 07:36 (1)	05:31 24 06:44 (4)
10	08:29 16:22	07:48 17:18	06:47 18:11	06:33 20:08	07:12 (1) 07:35 (1)	05:29 23 06:44 (4)
11	08:29 16:23	07:46 17:20	06:44 18:13	06:30 20:09	07:12 (1) 07:34 (1)	05:27 21 06:42 (4)
12	08:28 16:25	07:44 17:22	06:42 18:15	06:28 20:11	06:52 (3) 07:33 (1)	05:26 19 06:41 (4)
13	08:27 16:26	07:42 17:24	06:40 18:17	06:26 20:13	06:49 (3) 07:31 (1)	05:24 17 06:40 (4)
14	08:26 16:28	07:40 17:26	06:37 18:19	06:24 20:15	06:47 (3) 07:29 (1)	05:22 15 06:39 (4)
15	08:25 16:30	07:38 17:28	06:35 18:21	06:21 20:17	06:45 (3) 07:27 (1)	05:21 10 06:37 (4)
16	08:24 16:31	07:36 17:30	06:32 18:23	06:19 20:18	06:44 (3) 07:03 (3)	05:19 3 06:33 (4)
17	08:23 16:33	07:34 17:32	06:30 18:24	06:17 20:20	06:42 (3) 07:02 (3)	05:17 20 07:02 (3)
18	08:22 16:35	07:32 17:34	06:28 18:26	06:14 20:22	06:42 (3) 07:02 (3)	05:16 20 07:02 (3)
19	08:21 16:36	07:29 17:35	06:25 18:28	06:12 20:24	06:42 (3) 07:02 (3)	05:14 20 07:02 (3)
20	08:20 16:38	07:27 17:37	06:23 18:30	06:10 20:26	06:42 (3) 07:01 (3)	05:13 19 07:01 (3)
21	08:19 16:40	07:25 17:39	06:20 18:32	06:08 20:27	06:43 (3) 07:01 (3)	05:12 7 05:40 (9)
22	08:18 16:42	07:23 17:41	06:18 18:33	06:06 20:29	06:43 (3) 07:00 (3)	05:10 9 05:47 (9)
23	08:17 16:43	07:21 17:43	06:16 18:35	06:03 20:31	06:44 (3) 06:59 (3)	05:09 12 05:49 (9)
24	08:15 16:45	07:19 17:45	06:13 18:37	06:01 20:33	06:31 (4) 06:57 (3)	05:07 14 05:50 (9)
25	08:14 16:47	07:16 17:47	06:11 18:39	05:59 20:35	06:28 (4) 06:54 (3)	05:06 15 05:50 (9)
26	08:13 16:49	07:14 17:49	06:08 18:41	05:57 20:36	06:24 (4) 06:42 (4)	05:05 16 05:51 (9)
27	08:11 16:51	07:12 17:51	06:06 18:42	05:55 20:38	06:23 (4) 06:43 (4)	05:04 16 05:51 (9)
28	08:10 16:53	07:10 17:53	06:04 18:44	05:53 20:40	06:22 (4) 06:44 (4)	05:03 17 05:52 (9)
29	08:08 16:55	07:07 19:46	05:59 19:46	05:51 20:42	06:22 (4) 06:45 (4)	05:02 17 05:52 (9)
30	08:07 16:57	06:59 19:48	05:59 19:48	05:49 20:43	06:21 (4) 06:46 (4)	05:01 17 05:52 (9)
31	08:05 16:58	06:56 19:50	05:56 20:23	07:23 (1) 07:31 (1)	05:00 21:32	05:34 (8) 18 05:52 (9)
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			0.28	0.37	0.43	0.39
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96
Reduktion Betriebsdauer			0.70	0.72	0.72	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.27
Met.wahrsch.Beschattung			38	165	148	168

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: BZ - IO78
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:37 (8)	05:34	06:32 (4)	06:26	07:11 (1)	07:18	07:14	08:08			
	21	05:58 (8)	21:14	20	06:52 (4)	20:09	22	07:33 (1)	18:57	16:48	16:05	
2	04:56	05:38 (8)	05:35	06:31 (4)	06:28	07:11 (1)	07:20	07:16	08:09			
	21	05:59 (8)	21:12	22	06:53 (4)	20:07	23	07:34 (1)	18:55	16:46	16:05	
3	04:56	05:38 (8)	05:37	06:30 (4)	06:30	07:09 (1)	07:21	07:18	08:11			
	21	05:59 (8)	21:11	23	06:53 (4)	20:05	24	07:33 (1)	18:52	16:44	16:04	
4	04:57	05:38 (8)	05:38	06:30 (4)	06:31	07:09 (1)	07:23	07:20	08:12			
	21	05:59 (9)	21:09	24	06:54 (4)	20:02	24	07:33 (1)	18:50	16:42	16:03	
5	04:58	05:38 (8)	05:40	06:30 (4)	06:33	07:09 (1)	07:25	07:22	08:14			
	21	05:58 (9)	21:07	25	06:55 (4)	20:00	24	07:33 (1)	18:48	16:41	16:03	
6	04:59	05:39 (8)	05:42	06:29 (4)	06:35	07:08 (1)	07:27	07:24	08:15			
	21	05:59 (9)	21:05	26	06:55 (4)	19:58	24	07:32 (1)	18:45	16:39	16:02	
7	05:00	05:39 (8)	05:43	06:29 (4)	06:36	07:09 (1)	07:28	07:26	08:16			
	21	05:59 (9)	21:03	26	06:55 (4)	19:55	23	07:32 (1)	18:43	16:37	16:02	
8	05:01	05:40 (8)	05:45	06:28 (4)	06:38	07:09 (1)	07:30	07:28	08:18			
	21	05:59 (9)	21:01	27	06:55 (4)	19:53	22	07:31 (1)	18:41	16:35	16:01	
9	05:02	05:40 (8)	05:47	06:29 (4)	06:40	07:09 (1)	07:32	07:30	08:19			
	21	06:00 (9)	20:59	26	06:55 (4)	19:50	20	07:29 (1)	18:38	16:33	16:01	
10	05:03	05:41 (8)	05:48	06:28 (4)	06:42	07:10 (1)	07:34	07:31	08:20			
	21	06:00 (9)	20:57	26	06:54 (4)	19:48	18	07:28 (1)	18:36	16:32	16:01	
11	05:04	05:41 (8)	05:50	06:28 (4)	06:43	07:12 (1)	07:36	07:33	08:21			
	21	06:00 (9)	20:55	26	06:54 (4)	19:46	15	07:27 (1)	18:34	16:30	16:01	
12	05:05	05:42 (8)	05:52	06:29 (4)	06:45	07:14 (1)	07:37	07:35	08:22			
	21	06:01 (9)	20:53	25	06:54 (4)	19:43	9	07:23 (1)	18:31	16:28	16:00	
13	05:06	05:43 (9)	05:54	06:29 (4)	06:47			07:37	08:23			
	21	06:01 (9)	20:51	24	06:53 (4)	19:41		18:29	16:27	16:00		
14	05:07	05:43 (9)	05:55	06:30 (4)	06:48			07:41	08:24			
	21	06:00 (9)	20:49	23	06:53 (4)	19:38		18:27	16:25	16:00		
15	05:09	05:43 (9)	05:57	06:30 (4)	06:50			07:43	08:25			
	21	06:00 (9)	20:47	21	06:51 (4)	19:36		18:24	16:24	16:00		
16	05:10	05:43 (9)	05:59	06:31 (4)	06:52	07:43 (2)	07:45	07:43	08:26			
	21	06:00 (9)	20:45	19	06:50 (4)	19:33	5	07:48 (2)	18:22	16:22	16:00	
17	05:11	05:45 (9)	06:00	06:32 (4)	06:54	07:39 (2)	07:46	07:44	08:27			
	21	06:01 (9)	20:43	17	06:49 (4)	19:31	12	07:51 (2)	18:20	16:21	16:01	
18	05:13	05:45 (9)	06:02	06:34 (4)	06:55	07:37 (2)	07:48	07:46	08:28			
	21	06:00 (9)	20:41	19	07:00 (3)	19:29	15	07:52 (2)	18:18	16:19	16:01	
19	05:14	05:45 (9)	06:04	06:37 (4)	06:57	07:35 (2)	07:50	07:48	08:28			
	21	06:00 (9)	20:39	18	07:03 (3)	19:26	18	07:53 (2)	18:15	16:18	16:01	
20	05:15	05:46 (9)	06:05	06:49 (3)	06:59	07:35 (2)	07:52	07:50	08:29			
	21	06:00 (9)	20:37	15	07:04 (3)	19:24	18	07:53 (2)	18:13	16:17	16:01	
21	05:17	05:48 (9)	06:07	06:48 (3)	07:00	07:33 (2)	07:54	07:51	08:30			
	21	05:59 (9)	20:34	17	07:05 (3)	19:21	20	07:53 (2)	18:11	16:15	16:02	
22	05:18	05:49 (9)	06:09	06:47 (3)	07:02	07:33 (2)	07:56	07:53	08:30			
	21	06:00 (9)	20:32	19	07:06 (3)	19:19	20	07:53 (2)	18:09	16:14	16:02	
23	05:20	05:50 (9)	06:11	06:46 (3)	07:04	07:33 (2)	07:58	07:55	08:31			
	21	06:00 (9)	20:30	19	07:05 (3)	19:16	20	07:53 (2)	18:07	16:13	16:03	
24	05:21		06:12	06:46 (3)	07:06	07:32 (2)	07:59	07:57	08:31			
	21	06:00 (9)	20:28	19	07:05 (3)	19:14	19	07:51 (2)	18:05	16:12	16:03	
25	05:23		06:14	06:46 (3)	07:07	07:33 (2)	07:01	07:58	08:32			
	21	06:00 (9)	20:25	20	07:06 (3)	19:12	18	07:51 (2)	17:02	16:11	16:04	
26	05:24		06:16	06:45 (3)	07:09	07:35 (2)	07:03	08:00	08:32			
	21	06:00 (9)	20:23	20	07:05 (3)	19:09	15	07:50 (2)	17:00	16:10	16:05	
27	05:26		06:18	06:45 (3)	07:11	07:37 (2)	07:05	08:02	08:32			
	21	06:00 (9)	20:21	19	07:04 (3)	19:07	11	07:48 (2)	16:58	16:09	16:06	
28	05:27	06:39 (4)	06:19	06:46 (3)	07:13	07:38 (2)	07:07	08:03	08:32			
	21	06:46 (4)	20:19	27	07:28 (1)	19:04	7	07:45 (2)	16:56	16:08	16:06	
29	05:29	06:36 (4)	06:21	06:48 (3)	07:14			07:09	08:05	08:07		
	21	06:48 (4)	20:16	28	07:30 (1)	19:02		16:54	16:07	16:07	16:02	
30	05:30	06:34 (4)	06:23	06:50 (3)	07:16			07:11	08:06	08:32		
	21	06:50 (4)	20:14	29	07:32 (1)	19:00		16:52	16:06	16:08	16:08	
31	05:32	06:33 (4)	06:24	06:51 (3)				07:13	08:32			
	21	06:51 (4)	20:12	27	07:32 (1)			16:50	16:09	16:10	16:06	
Sonnenscheinstunden	508		458		382			330	262		237	
astr. max. mögl. Beschattung		445		696		446						
Red. Sonnenscheinwahrsch.		0.38		0.42		0.35						
Reduktion Betriebsdauer		0.96		0.96		0.96						
Reduktion Winrichtung		0.72		0.72		0.71						
Gesamte Reduktion		0.26		0.29		0.24						
Met. wahrsch. Beschattung		117		204		105						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schatteneinfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattende	



Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: **GBSchattenrezeptor: CA - IO79**

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	June	
1	08:32 16:10	08:03 17:00	07:08 17:55	06:54 19:51	07:20 (1) 20:45	05:46 26	06:26 (4) 21:34 21
2	08:32 16:12	08:02 17:02	07:05 17:57	06:52 19:53	07:19 (1) 20:47	05:44 25	06:26 (4) 21:35 22
3	08:32 16:13	08:00 17:04	07:03 17:58	06:49 19:55	07:18 (1) 20:49	05:42 25	06:26 (4) 21:36 22
4	08:32 16:14	07:58 17:06	07:01 18:00	06:47 19:57	07:17 (1) 20:50	05:41 24	06:26 (4) 21:37 21
5	08:32 16:15	07:57 17:08	06:58 18:02	06:45 19:59	07:17 (1) 20:52	05:39 23	06:26 (4) 21:38 21
6	08:31 16:16	07:55 17:10	06:56 18:04	06:42 20:00	07:16 (1) 20:54	05:37 21	06:27 (4) 21:39 21
7	08:31 16:18	07:53 17:12	06:54 18:06	06:40 20:02	07:17 (1) 20:56	05:35 20	06:28 (4) 21:40 22
8	08:30 16:19	07:51 17:14	06:51 18:08	06:37 20:04	07:17 (1) 20:57	05:33 17	06:29 (4) 21:41 21
9	08:30 16:20	07:49 17:16	06:49 18:10	06:35 20:06	07:18 (1) 20:59	05:31 14	06:30 (4) 21:42 21
10	08:29 16:22	07:48 17:18	06:47 18:11	06:33 20:08	07:38 (1) 21:01	05:29 10	06:33 (4) 21:43 21
11	08:29 16:23	07:46 17:20	06:44 18:13	06:30 20:09	07:36 (1) 21:03	05:27 25	06:43 (4) 21:44 21
12	08:28 16:25	07:44 17:22	06:42 18:15	06:28 20:11	07:34 (1) 21:04	05:26 24	06:44 (4) 21:45 21
13	08:27 16:26	07:42 17:24	06:40 18:17	06:26 20:13	07:32 (1) 21:06	05:24 17	06:45 (4) 21:46 20
14	08:26 16:28	07:40 17:26	06:37 18:19	06:24 20:15	07:30 (3) 21:08	05:22 18	06:46 (3) 21:47 21
15	08:25 16:30	07:38 17:28	06:35 18:21	06:21 20:17	07:28 (2) 21:09	05:21 20	06:47 (3) 21:48 20
16	08:24 16:31	07:36 17:30	06:32 18:23	06:19 20:18	07:27 (2) 21:11	05:19 3	06:48 (3) 21:49 20
17	08:23 16:33	07:34 17:32	06:30 18:24	06:17 20:19	07:26 (2) 21:12	05:17 7	06:49 (3) 21:50 20
18	08:22 16:35	07:32 17:34	06:28 18:26	06:14 20:22	07:25 (3) 21:14	05:16 10	06:50 (3) 21:51 21
19	08:21 16:36	07:29 17:35	06:25 18:28	06:12 20:24	07:24 (3) 21:16	05:14 12	06:51 (3) 21:52 20
20	08:20 16:38	07:27 17:37	06:23 18:30	06:10 20:26	07:23 (3) 21:17	05:13 14	06:52 (3) 21:53 20
21	08:19 16:40	07:25 17:39	06:20 18:32	06:08 20:27	07:22 (3) 21:19	05:12 15	06:53 (3) 21:54 20
22	08:18 16:42	07:23 17:41	06:18 18:33	06:06 20:29	07:21 (2) 21:20	05:10 16	06:54 (3) 21:55 20
23	08:17 16:43	07:21 17:43	06:16 18:35	06:03 20:31	07:20 (2) 21:22	05:09 16	06:55 (3) 21:56 20
24	08:15 16:45	07:19 17:45	06:13 18:37	06:01 20:33	07:19 (2) 21:23	05:07 17	06:56 (3) 21:57 21
25	08:14 16:47	07:16 17:47	06:11 18:39	05:59 20:35	07:18 (2) 21:24	05:05 17	06:57 (3) 21:58 20
26	08:13 16:49	07:14 17:49	06:08 18:41	05:57 20:36	07:17 (2) 21:26	05:03 18	06:58 (3) 21:59 20
27	08:11 16:51	07:12 17:51	06:06 18:42	05:55 20:38	07:16 (2) 21:27	05:01 18	06:59 (3) 21:59 20
28	08:10 16:53	07:10 17:53	06:04 18:44	05:53 20:40	07:15 (2) 21:29	05:00 19	07:00 (3) 22:00 21
29	08:08 16:55	07:08 17:55	06:01 18:46	05:51 20:42	07:14 (1) 21:30	04:58 20	07:01 (3) 22:01 21
30	08:07 16:57	07:06 17:57	05:59 18:48	05:49 20:43	07:13 (1) 21:31	04:56 20	07:02 (3) 22:02 21
31	08:05 16:58	07:04 17:58	05:56 18:50	05:47 20:44	07:12 (1) 21:32	04:54 20	07:03 (3) 22:03 21
Sonnenscheinstunden	253	275	367	418	491	506	621
astr. max. mögl. Beschattung			0.22	0.28	0.37	0.43	0.39
Red. Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96	0.96
Reduktion Betriebsdauer			0.70	0.72	0.72	0.72	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.27	0.27
Met. wahrsch. Beschattung			41	167	133	167	167

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattende	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CA - IO79

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November		Dezember	
1	04:55	05:44 (8)	05:34		06:26	06:53 (3)	07:18	07:14	08:08		
	21:48	21 06:05 (8)	21:14		20:09	26 07:33 (1)	18:57	16:48	16:05		
2	04:56	05:44 (8)	05:35	06:46 (4)	06:28	06:55 (3)	07:20	07:16	08:09		
	21:48	21 06:05 (8)	21:12	4 06:50 (4)	20:07	25 07:35 (1)	18:55	16:46	16:05		
3	04:56	05:45 (8)	05:37	06:42 (4)	06:30	07:15 (1)	07:21	07:18	08:11		
	21:47	21 06:06 (8)	21:11	11 06:53 (4)	20:05	20 07:35 (1)	18:52	16:44	16:04		
4	04:57	05:44 (8)	05:38	06:40 (4)	06:31	07:14 (1)	07:23	07:20	08:12		
	21:47	21 06:05 (8)	21:09	15 06:55 (4)	20:02	22 07:36 (1)	18:50	16:42	16:03		
5	04:58	05:45 (8)	05:40	06:39 (4)	06:33	07:14 (1)	07:25	07:22	08:14		
	21:46	21 06:06 (8)	21:07	18 06:57 (4)	20:00	22 07:36 (1)	18:48	16:41	16:03		
6	04:59	05:45 (8)	05:42	06:38 (4)	06:35	07:12 (1)	07:27	07:24	08:15		
	21:46	21 06:06 (8)	21:05	19 06:57 (4)	19:58	24 07:36 (1)	18:45	16:39	16:02		
7	05:00	05:45 (8)	05:43	06:37 (4)	06:36	07:12 (1)	07:28	07:26	08:16		
	21:45	21 06:06 (8)	21:03	22 06:59 (4)	19:55	24 07:36 (1)	18:43	16:37	16:02		
8	05:01	05:45 (8)	05:45	06:36 (4)	06:38	07:12 (1)	07:30	07:28	08:18		
	21:45	22 06:07 (8)	21:01	23 06:59 (4)	19:53	24 07:36 (1)	18:41	16:35	16:01		
9	05:02	05:46 (8)	05:47	06:35 (4)	06:40	07:12 (1)	07:32	07:30	08:19		
	21:44	21 06:07 (8)	20:59	24 06:59 (4)	19:50	22 07:34 (1)	18:38	16:33	16:01		
10	05:03	05:46 (8)	05:48	06:34 (4)	06:42	07:12 (1)	07:34	07:31	08:20		
	21:43	21 06:07 (8)	20:57	25 06:59 (4)	19:48	22 07:34 (1)	18:36	16:32	16:01		
11	05:04	05:46 (8)	05:50	06:34 (4)	06:43	07:13 (1)	07:36	07:33	08:21		
	21:42	21 06:07 (8)	20:55	26 07:00 (4)	19:46	20 07:33 (1)	18:34	16:30	16:01		
12	05:05	05:46 (8)	05:52	06:34 (4)	06:45	07:13 (1)	07:37	07:35	08:22		
	21:41	21 06:07 (8)	20:53	26 07:00 (4)	19:43	18 07:31 (1)	18:31	16:28	16:00		
13	05:06	05:47 (8)	05:54	06:34 (4)	06:47	07:14 (1)	07:39	07:37	08:23		
	21:40	20 06:07 (8)	20:51	25 06:59 (4)	19:41	16 07:30 (1)	18:29	16:27	16:00		
14	05:07	05:47 (8)	05:55	06:34 (4)	06:48	07:16 (1)	07:41	07:39	08:24		
	21:39	20 06:07 (8)	20:49	26 07:00 (4)	19:38	11 07:27 (1)	18:27	16:25	16:00		
15	05:09	05:47 (8)	05:57	06:33 (4)	06:50		07:43	07:41	08:25		
	21:38	19 06:06 (9)	20:47	26 06:59 (4)	19:36		18:24	16:24	16:00		
16	05:10	05:47 (8)	05:59	06:34 (4)	06:52		07:45	07:43	08:26		
	21:37	19 06:06 (9)	20:45	25 06:59 (4)	19:33		18:22	16:22	16:00		
17	05:11	05:49 (8)	06:00	06:35 (4)	06:54		07:46	07:44	08:27		
	21:36	18 06:07 (9)	20:43	23 06:58 (4)	19:31		18:20	16:21	16:01		
18	05:13	05:49 (9)	06:02	06:35 (4)	06:55	07:43 (2)	07:48	07:46	08:28		
	21:35	18 06:07 (9)	20:41	22 06:57 (4)	19:29	7 07:50 (2)	18:18	16:19	16:01		
19	05:14	05:49 (9)	06:04	06:36 (4)	06:57	07:40 (2)	07:50	07:48	08:28		
	21:34	17 06:06 (9)	20:39	20 06:56 (4)	19:26	13 07:53 (2)	18:15	16:18	16:01		
20	05:15	05:49 (9)	06:05	06:36 (4)	06:59	07:39 (2)	07:52	07:50	08:29		
	21:32	17 06:06 (9)	20:37	18 06:54 (4)	19:24	15 07:54 (2)	18:13	16:17	16:01		
21	05:17	05:50 (9)	06:07	06:38 (4)	07:00	07:37 (2)	07:54	07:51	08:30		
	21:31	17 06:07 (9)	20:34	22 07:04 (3)	19:21	17 07:54 (2)	18:11	16:15	16:02		
22	05:18	05:50 (9)	06:09	06:41 (4)	07:02	07:36 (2)	07:56	07:53	08:30		
	21:30	16 06:06 (9)	20:32	22 07:07 (3)	19:19	19 07:55 (2)	18:09	16:14	16:02		
23	05:20	05:50 (9)	06:11	06:52 (3)	07:04	07:36 (2)	07:58	07:55	08:31		
	21:28	15 06:05 (9)	20:30	15 07:07 (3)	19:16	19 07:55 (2)	18:07	16:13	16:03		
24	05:21	05:52 (9)	06:12	06:51 (3)	07:06	07:35 (2)	07:59	07:57	08:31		
	21:27	13 06:05 (9)	20:28	17 07:08 (3)	19:14	20 07:55 (2)	18:05	16:12	16:03		
25	05:23	05:53 (9)	06:14	06:50 (3)	07:07	07:34 (2)	07:01	07:58	08:32		
	21:25	11 06:04 (9)	20:25	19 07:09 (3)	19:12	20 07:54 (2)	17:02	16:11	16:04		
26	05:24	05:55 (9)	06:16	06:49 (3)	07:09	07:35 (2)	07:03	08:00	08:32		
	21:24	9 06:04 (9)	20:23	19 07:08 (3)	19:09	18 07:53 (2)	17:00	16:10	16:05		
27	05:26	05:56 (9)	06:18	06:49 (3)	07:11	07:37 (2)	07:05	08:02	08:32		
	21:22	6 06:02 (9)	20:21	19 07:08 (3)	19:07	15 07:52 (2)	16:58	16:09	16:06		
28	05:27		06:19	06:48 (3)	07:13	07:38 (2)	07:07	08:03	08:32		
	21:21		20:19	19 07:07 (3)	19:04	12 07:50 (2)	16:56	16:08	16:06		
29	05:29		06:21	06:49 (3)	07:14	07:40 (2)	07:09	08:05	08:32		
	21:19		20:16	18 07:07 (3)	19:02	8 07:48 (2)	16:54	16:07	16:07		
30	05:30		06:23	06:50 (3)	07:16	07:42 (2)	07:11	08:06	08:32		
	21:18		20:14	17 07:07 (3)	19:00	2 07:44 (2)	16:52	16:06	16:08		
31	05:32		06:24	06:51 (3)			07:13		08:32		
	21:16		20:12	24 07:31 (1)			16:50		16:09		
Sonnenscheinstunden		508	458		382		330	262	237		
astr.max.mögl.Beschattung		488	609		481						
Red.Sonnenscheinwahrsch.		0.38	0.42		0.35						
Reduktion Betriebsdauer		0.96	0.96		0.96						
Reduktion Windrichtung		0.72	0.72		0.71						
Gesamte Reduktion		0.26	0.29		0.24						
Met.wahrsch.Beschattung		128	178		113						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt

-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CB - IO80

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
302	339	467	706	786	617	554	815	1,348	1,328	721	398	8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:32	08:03	07:08	06:54	05:46	06:17 (4)	04:59
	16:10	17:00	17:55	19:51	20:45	20	06:37 (4)
2	08:32	08:02	07:05	06:52	07:20 (1)	05:44	21
	16:12	17:02	17:57	19:53	20:47	22	06:38 (4)
3	08:32	08:00	07:03	06:49	07:16 (1)	05:42	23
	16:13	17:04	17:58	19:55	20:49	24	06:39 (4)
4	08:32	07:58	07:01	06:47	07:13 (1)	05:41	25
	16:14	17:06	18:00	19:57	20:50	25	06:39 (4)
5	08:32	07:57	06:58	06:45	07:12 (1)	05:39	26
	16:15	17:08	18:02	19:59	20:52	26	06:39 (4)
6	08:31	07:55	06:56	06:42	07:10 (1)	05:37	27
	16:16	17:10	18:04	20:00	22	07:32 (1)	20:54
7	08:31	07:53	06:54	06:40	07:09 (1)	05:35	28
	16:18	17:12	18:06	20:02	23	07:32 (1)	20:56
8	08:30	07:51	06:51	06:37	07:08 (1)	05:33	29
	16:19	17:14	18:08	20:04	25	07:33 (1)	20:57
9	08:30	07:49	06:49	06:35	07:07 (1)	05:31	30
	16:20	17:16	18:10	20:06	25	07:32 (1)	20:59
10	08:29	07:48	06:47	06:33	07:07 (1)	05:29	31
	16:22	17:18	18:11	20:08	25	07:32 (1)	21:01
11	08:29	07:46	06:44	06:30	07:07 (1)	05:27	32
	16:23	17:20	18:13	20:09	25	07:32 (1)	21:03
12	08:28	07:44	06:42	06:28	07:07 (1)	05:26	33
	16:25	17:22	18:15	20:11	25	07:32 (1)	21:04
13	08:27	07:42	06:40	06:26	07:07 (1)	05:24	34
	16:26	17:24	18:17	20:13	24	07:31 (1)	21:06
14	08:26	07:40	06:37	06:24	06:47 (3)	05:22	35
	16:28	17:26	18:19	20:15	29	07:30 (1)	21:08
15	08:25	07:38	06:35	06:21	06:45 (3)	05:21	36
	16:30	17:28	18:21	20:17	31	07:29 (1)	21:09
16	08:24	07:36	06:32	06:19	06:43 (3)	05:19	37
	16:31	17:30	18:23	1	06:58 (2)	20:18	33
17	08:23	07:34	06:30	06:17	06:40 (3)	05:17	34
	16:33	17:32	18:24	9	07:02 (2)	20:20	33
18	08:22	07:32	06:28	06:14	06:38 (3)	05:16	35
	16:35	17:34	18:26	14	07:05 (2)	20:22	30
19	08:21	07:29	06:25	06:12	06:38 (3)	05:14	36
	16:36	17:35	18:28	17	07:06 (2)	20:24	20
20	08:20	07:27	06:23	06:10	06:38 (3)	05:13	37
	16:38	17:37	18:30	19	07:06 (2)	20:26	20
21	08:19	07:25	06:20	06:08	06:37 (3)	05:12	38
	16:40	17:39	18:32	21	07:07 (2)	20:27	21
22	08:18	07:23	06:18	06:06	06:37 (3)	05:10	39
	16:42	17:41	18:33	21	07:06 (2)	20:29	21
23	08:17	07:21	06:16	06:03	06:38 (3)	05:09	40
	16:43	17:43	18:35	21	07:06 (2)	20:31	19
24	08:15	07:19	06:13	06:01	06:38 (3)	05:07	41
	16:45	17:45	18:37	20	07:05 (2)	20:33	19
25	08:14	07:16	06:11	06:00	06:39 (3)	05:06	42
	16:47	17:47	18:39	19	07:04 (2)	20:35	17
26	08:13	07:14	06:08	06:00	06:39 (3)	05:05	43
	16:49	17:49	18:41	18	07:04 (2)	20:36	14
27	08:11	07:12	06:06	06:00	06:40 (3)	05:04	44
	16:51	17:51	18:42	16	07:02 (2)	20:38	12
28	08:10	07:10	06:04	06:00	06:41 (3)	05:03	45
	16:53	17:53	18:44	12	07:00 (2)	20:40	14
29	08:08	07:01	06:00	06:00	06:42 (3)	05:02	46
	16:55	19:46	5	07:56 (2)	20:42	13	06:34 (4)
30	08:07	06:59	05:49	05:49	06:18 (4)	05:01	47
	16:57	19:48	20:43	18	06:36 (4)	21:31	14
31	08:05	06:56	05:48	05:48	05:00	05:00	48
	16:58	19:50	21:32	14	05:44 (9)	05:44 (9)	49
Sonnenscheinstunden	253	275	367	418	491	506	586
astr.max.mögl.Beschattung			213	613	580		586
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43		0.39
Reduktion Betriebsdauer			0.96	0.96	0.96		0.96
Reduktion Windrichtung			0.70	0.72	0.73		0.72
Gesamte Reduktion			0.18	0.26	0.30		0.27
Met.wahrsch.Beschattung			39	157	173		156

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CB - IO80

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember			
1	04:55	05:33 (8)	05:34	06:22 (4)	06:26	07:06 (1) 07:18	07:14	08:08	
	19	05:52 (9) 21:14	27	06:49 (4) 20:09	25	07:31 (1) 18:57	16:48	16:05	
2	04:56	05:34 (8) 05:35	06:22 (4) 06:28	07:06 (1) 07:20	07:16	08:09			
	19	05:53 (9) 21:12	28	06:50 (4) 20:07	25	07:31 (1) 18:55	16:46	16:05	
3	04:56	05:35 (9) 05:37	06:22 (4) 06:30	07:05 (1) 07:21	07:18	08:11			
	18	05:53 (9) 21:11	27	06:49 (4) 20:05	25	07:30 (1) 18:52	16:44	16:04	
4	04:57	05:35 (9) 05:38	06:22 (4) 06:31	07:05 (1) 07:23	07:20	08:12			
	18	05:53 (9) 21:09	28	06:50 (4) 20:02	25	07:30 (1) 18:50	16:42	16:03	
5	04:58	05:35 (9) 05:40	06:23 (4) 06:33	07:06 (1) 07:25	07:22	08:14			
	17	05:53 (9) 21:07	27	06:50 (4) 20:00	23	07:29 (1) 18:48	16:41	16:03	
6	04:59	05:36 (9) 05:42	06:22 (4) 06:35	07:06 (1) 07:27	07:24	08:15			
	17	05:53 (9) 21:05	27	06:49 (4) 19:58	22	07:28 (1) 18:45	16:39	16:02	
7	05:00	05:36 (9) 05:43	06:23 (4) 06:36	07:07 (1) 07:28	07:26	08:16			
	17	05:53 (9) 21:03	26	06:49 (4) 19:55	20	07:27 (1) 18:43	16:37	16:02	
8	05:01	05:36 (9) 05:45	06:22 (4) 06:38	07:08 (1) 07:30	07:28	08:18			
	17	05:53 (9) 21:01	26	06:48 (4) 19:53	17	07:25 (1) 18:41	16:35	16:01	
9	05:02	05:37 (9) 05:47	06:23 (4) 06:40	07:09 (1) 07:32	07:30	08:19			
	17	05:54 (9) 20:59	25	06:48 (4) 19:50	13	07:22 (1) 18:38	16:33	16:01	
10	05:03	05:37 (9) 05:48	06:23 (4) 06:42	07:13 (1) 07:34	07:31	08:20			
	16	05:53 (9) 20:57	24	06:47 (4) 19:48	6	07:19 (1) 18:36	16:32	16:01	
11	05:04	05:37 (9) 05:50	06:24 (4) 06:43	07:14 (1) 07:35	07:33	08:21			
	16	05:53 (9) 20:55	22	06:46 (4) 19:46		18:34	16:30	16:01	
12	05:05	05:38 (9) 05:52	06:26 (4) 06:45	07:15 (1) 07:36	07:35	08:22			
	15	05:53 (9) 20:53	19	06:45 (4) 19:43		18:31	16:28	16:00	
13	05:06	05:38 (9) 05:54	06:26 (4) 06:47	07:16 (1) 07:37	07:37	08:23			
	15	05:53 (9) 20:51	17	06:43 (4) 19:41		18:29	16:27	16:00	
14	05:07	05:39 (9) 05:55	06:29 (4) 06:48	07:17 (1) 07:41	07:39	08:24			
	13	05:52 (9) 20:49	12	06:41 (4) 19:38	3	07:46 (2) 18:27	16:25	16:00	
15	05:09	05:40 (9) 05:57	06:32 (4) 06:50	07:18 (1) 07:43	07:41	08:25			
	11	05:51 (9) 20:47	13	06:57 (3) 19:36	11	07:49 (2) 18:24	16:24	16:00	
16	05:10	05:41 (9) 05:59	06:47 (3) 06:52	07:36 (2) 07:45	07:43	08:26			
	9	05:50 (9) 20:45	13	07:00 (3) 19:33	15	07:51 (2) 18:22	16:22	16:00	
17	05:11	05:43 (9) 06:00	06:46 (3) 06:54	07:35 (2) 07:46	07:44	08:27			
	7	05:50 (9) 20:43	15	07:01 (3) 19:31	17	07:52 (2) 18:20	16:21	16:01	
18	05:13	05:45 (9) 06:02	06:44 (3) 06:55	07:33 (2) 07:48	07:46	08:28			
	2	05:47 (9) 20:41	18	07:02 (3) 19:29	19	07:52 (2) 18:18	16:19	16:01	
19	05:14	06:04	06:44 (3) 06:57	07:32 (2) 07:50	07:48	08:28			
	20	05:15	20:39	18	07:02 (3) 19:26	20	07:52 (2) 18:15	16:18	16:01
	20	05:15	06:05	18	06:42 (3) 06:59	20	07:32 (2) 07:52	07:50	08:29
	21	05:17	20:37	20	07:02 (3) 19:24	21	07:53 (2) 18:13	16:17	16:01
21	05:17	06:32 (4) 06:07	06:42 (3) 07:00	07:31 (2) 07:54	07:51	08:30			
	8	06:40 (4) 20:34	20	07:02 (3) 19:21	20	07:51 (2) 18:11	16:15	16:02	
22	05:18	06:29 (4) 06:09	06:42 (3) 07:02	07:31 (2) 07:56	07:53	08:30			
	13	06:42 (4) 20:32	21	07:03 (3) 19:19	20	07:51 (2) 18:09	16:14	16:02	
23	05:20	06:28 (4) 06:11	06:41 (3) 07:04	07:31 (2) 07:58	07:55	08:31			
	15	06:43 (4) 20:30	21	07:02 (3) 19:16	20	07:51 (2) 18:07	16:13	16:03	
24	05:21	06:27 (4) 06:12	06:42 (3) 07:06	07:31 (2) 07:59	07:57	08:31			
	18	06:45 (4) 20:28	23	07:22 (1) 19:14	18	07:49 (2) 18:05	16:12	16:03	
25	05:23	06:26 (4) 06:14	06:42 (3) 07:07	07:33 (2) 07:01	07:58	08:31			
	20	06:46 (4) 20:25	31	07:27 (1) 19:12	15	07:48 (2) 17:02	16:11	16:04	
26	05:24	06:26 (4) 06:16	06:43 (3) 07:09	07:35 (2) 07:03	08:00	08:32			
	21	06:47 (4) 20:23	33	07:28 (1) 19:09	11	07:46 (2) 17:00	16:10	16:05	
27	05:26	06:25 (4) 06:18	06:45 (3) 07:11	07:37 (2) 07:05	08:02	08:32			
	23	06:48 (4) 20:21	33	07:30 (1) 19:07	6	07:43 (2) 16:58	16:09	16:06	
28	05:27	06:25 (4) 06:19	06:46 (3) 07:13		07:07	08:03	08:32		
	24	06:49 (4) 20:19	31	07:30 (1) 19:04		16:56	16:08	16:06	
29	05:29	06:24 (4) 06:21	06:48 (3) 07:14		07:09	08:05	08:32		
	25	06:49 (4) 20:16	28	07:31 (1) 19:02		16:54	16:07	16:07	
30	05:30	06:23 (4) 06:23	07:07 (1) 07:16		07:11	08:06	08:32		
	26	06:49 (4) 20:14	24	07:31 (1) 19:00		16:52	16:06	16:08	
31	05:32	06:23 (4) 06:24	07:06 (1)		07:13	08:32			
	27	06:50 (4) 20:12	25	07:31 (1)		16:50	16:09		
Sonnenscheinstunden	508	458	382	330	262	237			
astr.max.mögl.Beschattung	484	722	417						
Red.Sonnenscheinwahrsch.	0.38	0.42	0.35						
Reduktion Betriebsdauer	0.96	0.96	0.96						
Reduktion Windrichtung	0.72	0.72	0.71						
Gesamte Reduktion	0.26	0.29	0.24						
Met.wahrsch.Beschattung	127	211	98						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CC - IO81

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Junii		
1	08:32	08:03	07:08	06:54	05:46	06:19 (4)	04:59	05:29 (9)
	16:10	17:00	17:55	19:51	20:45	14	06:33 (4)	21:34
2	08:32	08:02	07:05	06:52	07:22 (1)	05:44	06:16 (4)	04:58
	16:12	17:02	17:57	19:53	4	07:26 (1)	20:47	18
3	08:32	08:00	07:03	06:49	07:18 (1)	05:42	06:34 (4)	21:35
	16:13	17:04	17:58	19:55	13	07:31 (1)	20:49	20
4	08:32	07:58	07:01	06:47	07:15 (1)	05:41	06:35 (4)	21:36
	16:14	17:06	18:00	19:57	17	07:32 (1)	20:50	23
5	08:32	07:57	06:58	06:45	07:13 (1)	05:39	06:36 (4)	21:37
	16:15	17:08	18:02	19:59	21	07:34 (1)	20:52	25
6	08:31	07:55	06:56	06:42	07:11 (1)	05:37	06:11 (4)	04:55
	16:16	17:10	18:04	20:00	23	07:34 (1)	20:54	26
7	08:31	07:53	06:54	06:40	07:10 (1)	05:35	06:11 (4)	04:54
	16:18	17:12	18:06	20:02	25	07:35 (1)	20:56	28
8	08:30	07:51	06:51	06:37	07:10 (1)	05:33	06:10 (4)	04:53
	16:19	17:14	18:08	20:04	25	07:35 (1)	20:57	29
9	08:30	07:49	06:49	06:35	07:08 (1)	05:31	06:10 (4)	04:53
	16:20	17:16	18:10	20:06	27	07:35 (1)	20:59	29
10	08:29	07:48	06:47	06:33	07:08 (1)	05:29	06:10 (4)	04:52
	16:22	17:18	18:11	20:08	27	07:35 (1)	21:01	29
11	08:29	07:46	06:44	06:30	07:08 (1)	05:27	06:09 (4)	04:52
	16:23	17:20	18:13	20:09	27	07:35 (1)	21:03	30
12	08:28	07:44	06:42	06:28	07:08 (1)	05:26	06:09 (4)	04:52
	16:25	17:22	18:15	20:11	27	07:35 (1)	21:04	30
13	08:27	07:42	06:40	06:26	07:07 (1)	05:24	06:10 (4)	04:51
	16:26	17:24	18:17	20:13	27	07:34 (1)	21:06	29
14	08:26	07:40	06:37	06:23	07:08 (1)	05:22	06:09 (4)	04:51
	16:28	17:26	18:19	20:15	25	07:33 (1)	21:08	30
15	08:25	07:38	06:35	06:21	06:45 (3)	05:21	06:10 (4)	04:51
	16:30	17:28	18:21	20:17	33	07:32 (1)	21:09	29
16	08:24	07:36	06:32	06:56 (2)	06:19	06:43 (3)	05:19	06:09 (4)
	16:31	17:30	18:23	10	07:06 (2)	20:18	35	07:31 (1)
17	08:23	07:34	06:30	06:53 (2)	06:17	06:40 (3)	05:17	06:10 (4)
	16:33	17:32	18:24	15	07:08 (2)	20:20	36	07:29 (1)
18	08:22	07:32	06:28	06:51 (2)	06:14	06:39 (3)	05:16	06:11 (4)
	16:35	17:34	18:26	18	07:09 (2)	20:22	35	07:28 (1)
19	08:21	07:29	06:25	06:50 (2)	06:12	06:38 (3)	05:14	06:11 (4)
	16:36	17:35	18:28	20	07:10 (2)	20:24	32	07:25 (1)
20	08:20	07:27	06:23	06:49 (2)	06:10	06:37 (3)	05:13	06:11 (4)
	16:38	17:37	18:30	21	07:10 (2)	20:26	25	07:21 (1)
21	08:19	07:25	06:20	06:49 (2)	06:08	06:37 (3)	05:12	06:12 (4)
	16:40	17:39	18:32	21	07:10 (2)	20:27	21	06:58 (3)
22	08:18	07:23	06:18	06:48 (2)	06:06	06:37 (3)	05:10	06:12 (4)
	16:42	17:41	18:33	22	07:10 (2)	20:29	21	06:58 (3)
23	08:17	07:21	06:16	06:48 (2)	06:03	06:37 (3)	05:09	06:13 (4)
	16:43	17:43	18:35	22	07:10 (2)	20:31	21	06:58 (3)
24	08:15	07:19	06:13	06:47 (2)	06:01	06:37 (3)	05:07	06:14 (4)
	16:45	17:45	18:37	21	07:08 (2)	20:33	21	06:58 (3)
25	08:14	07:16	06:11	06:48 (2)	05:59	06:36 (3)	05:06	06:15 (4)
	16:47	17:47	18:39	20	07:08 (2)	20:35	20	06:56 (3)
26	08:13	07:14	06:08	06:49 (2)	05:57	06:37 (3)	05:05	06:16 (4)
	16:49	17:49	18:41	18	07:07 (2)	20:36	18	06:55 (3)
27	08:11	07:12	06:06	06:49 (2)	05:55	06:37 (3)	05:04	06:18 (4)
	16:51	17:51	18:42	16	07:05 (2)	20:38	17	06:54 (3)
28	08:10	07:10	06:04	06:51 (2)	05:53	06:39 (3)	05:03	06:19 (4)
	16:53	17:53	18:44	12	07:03 (2)	20:40	14	06:53 (3)
29	08:08	07:01	06:51 (2)	05:51	06:41 (3)	05:02	06:21 (4)	04:54
	16:55	19:46	2	07:57 (2)	20:42	11	06:52 (3)	21:30
30	08:07	06:59	05:49	06:22 (4)	05:00	06:22 (4)	05:00	04:54
	16:57	19:48	20:43	9	06:47 (3)	21:31	06:29 (4)	21:48
31	08:05	06:56	05:50	05:00	05:30 (9)	7	05:30 (9)	
	16:58	19:50	21:32	7	05:37 (9)		05:37 (9)	
Sonnenscheinstunden	253	275	367	418	491	506		
astr.max.mögl.Beschattung			238	657	695	504		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.70	0.72	0.73	0.72		
Gesamte Reduktion			0.18	0.26	0.30	0.27		
Met.wahrsch.Beschattung			44	168	208	134		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CC - IO81
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:31 (9)	05:34	06:19 (4)	06:26	07:07 (1)	07:18	07:14	08:08			
	21:48	05:48 (9)	21:14	06:49 (4)	20:09	07:34 (1)	18:57	16:48	16:05			
2	04:56	05:31 (9)	05:35	06:20 (4)	06:28	07:07 (1)	07:20	07:16	08:09			
	21:48	05:49 (9)	21:12	06:50 (4)	20:07	07:34 (1)	18:55	16:46	16:05			
3	04:56	05:32 (9)	05:37	06:20 (4)	06:30	07:06 (1)	07:21	07:18	08:11			
	21:47	05:49 (9)	21:11	06:49 (4)	20:05	07:33 (1)	18:52	16:44	16:04			
4	04:57	05:32 (9)	05:38	06:20 (4)	06:31	07:07 (1)	07:23	07:20	08:12			
	21:47	05:48 (9)	21:09	06:49 (4)	20:02	07:32 (1)	18:50	16:42	16:03			
5	04:58	05:32 (9)	05:40	06:21 (4)	06:33	07:07 (1)	07:25	07:22	08:14			
	21:46	05:48 (9)	21:07	06:49 (4)	20:00	07:32 (1)	18:48	16:41	16:03			
6	04:59	05:33 (9)	05:42	06:21 (4)	06:35	07:07 (1)	07:27	07:24	08:15			
	21:46	05:48 (9)	21:05	06:48 (4)	19:57	07:30 (1)	18:45	16:39	16:02			
7	05:00	05:34 (9)	05:43	06:22 (4)	06:36	07:08 (1)	07:28	07:26	08:16			
	21:45	05:48 (9)	21:03	06:48 (4)	19:55	07:29 (1)	18:43	16:37	16:02			
8	05:01	05:34 (9)	05:45	06:22 (4)	06:38	07:10 (1)	07:30	07:28	08:18			
	21:45	05:48 (9)	21:01	06:46 (4)	19:53	07:27 (1)	18:41	16:35	16:01			
9	05:02	05:35 (9)	05:47	06:23 (4)	06:40	07:11 (1)	07:32	07:30	08:19			
	21:44	05:48 (9)	20:59	06:45 (4)	19:50	07:24 (1)	18:38	16:33	16:01			
10	05:03	05:36 (9)	05:48	06:24 (4)	06:42	07:15 (1)	07:34	07:31	08:20			
	21:43	05:49 (9)	20:57	06:44 (4)	19:48	07:20 (1)	18:36	16:32	16:01			
11	05:04	05:37 (9)	05:50	06:25 (4)	06:43			07:36	07:33	08:21		
	21:42	05:47 (9)	20:55	06:42 (4)	19:46			18:34	16:30	16:01		
12	05:05	05:38 (9)	05:52	06:28 (4)	06:45			07:37	07:35	08:22		
	21:41	05:46 (9)	20:53	06:40 (4)	19:43			18:31	16:28	16:00		
13	05:06	05:40 (9)	05:54	06:32 (4)	06:47			07:39	07:37	08:23		
	21:40	05:44 (9)	20:51	06:57 (3)	19:41			18:29	16:27	16:00		
14	05:07	06:31 (4)	05:55	06:48 (3)	06:48			07:41	07:39	08:24		
	21:39	06:36 (4)	20:49	07:00 (3)	19:38			18:27	16:25	16:00		
15	05:09	06:29 (4)	05:57	06:46 (3)	06:50		07:41 (2)	07:43	07:41	08:25		
	21:38	06:38 (4)	20:47	07:01 (3)	19:36	11	07:52 (2)	18:24	16:24	16:00		
16	05:10	06:27 (4)	05:59	06:45 (3)	06:52		07:39 (2)	07:45	07:42	08:26		
	21:37	06:40 (4)	20:45	07:02 (3)	19:33	15	07:54 (2)	18:22	16:22	16:00		
17	05:11	06:26 (4)	06:00	06:44 (3)	06:54		07:38 (2)	07:46	07:44	08:27		
	21:36	06:42 (4)	20:43	07:03 (3)	19:31	17	07:55 (2)	18:20	16:21	16:01		
18	05:13	06:25 (4)	06:02	06:43 (3)	06:55		07:36 (2)	07:48	07:46	08:28		
	21:35	06:43 (4)	20:41	07:03 (3)	19:29	19	07:55 (2)	18:18	16:19	16:01		
19	05:14	06:24 (4)	06:04	06:42 (3)	06:57		07:35 (2)	07:50	07:48	08:28		
	21:34	06:44 (4)	20:39	07:03 (3)	19:26	21	07:56 (2)	18:15	16:18	16:01		
20	05:15	06:23 (4)	06:05	06:41 (3)	06:59		07:34 (2)	07:52	07:50	08:29		
	21:32	06:45 (4)	20:37	07:03 (3)	19:24	22	07:56 (2)	18:13	16:17	16:01		
21	05:17	06:23 (4)	06:07	06:41 (3)	07:00		07:33 (2)	07:54	07:51	08:30		
	21:31	06:46 (4)	20:34	07:03 (3)	19:21	22	07:55 (2)	18:11	16:15	16:02		
22	05:18	06:22 (4)	06:09	06:42 (3)	07:02		07:33 (2)	07:56	07:53	08:30		
	21:30	06:46 (4)	20:32	07:03 (3)	19:19	22	07:55 (2)	18:09	16:14	16:02		
23	05:20	06:21 (4)	06:11	06:41 (3)	07:04		07:33 (2)	07:58	07:55	08:31		
	21:28	06:47 (4)	20:30	07:26 (1)	19:16	22	07:55 (2)	18:07	16:13	16:03		
24	05:21	06:22 (4)	06:12	06:42 (3)	07:06		07:33 (2)	07:59	07:57	08:31		
	21:27	06:48 (4)	20:28	07:29 (1)	19:14	20	07:53 (2)	18:05	16:12	16:03		
25	05:23	06:21 (4)	06:14	06:42 (3)	07:07		07:34 (2)	07:01	07:58	08:31		
	21:25	06:48 (4)	20:25	07:32 (1)	19:12	18	07:52 (2)	17:02	16:11	16:04		
26	05:24	06:21 (4)	06:16	06:43 (3)	07:09		07:35 (2)	07:03	08:00	08:32		
	21:24	06:49 (4)	20:23	07:32 (1)	19:09	16	07:51 (2)	17:00	16:10	16:05		
27	05:26	06:20 (4)	06:18	06:45 (3)	07:11		07:37 (2)	07:05	08:02	08:32		
	21:22	06:49 (4)	20:21	07:33 (1)	19:07	12	07:49 (2)	16:58	16:09	16:06		
28	05:27	06:21 (4)	06:19	06:46 (3)	07:13		07:39 (2)	07:07	08:03	08:32		
	21:21	06:50 (4)	20:19	07:33 (1)	19:04	5	07:44 (2)	16:56	16:08	16:06		
29	05:29	06:20 (4)	06:21	07:09 (1)	07:14			07:09	08:05	08:32		
	21:19	06:50 (4)	20:16	07:34 (1)	19:02			16:54	16:07	16:07		
30	05:30	06:19 (4)	06:23	07:08 (1)	07:16			07:11	08:06	08:32		
	21:18	06:49 (4)	20:14	07:34 (1)	19:00			16:52	16:06	16:08		
31	05:32	06:20 (4)	06:24	07:07 (1)				07:13		08:32		
	21:16	06:50 (4)	20:12	07:34 (1)				16:50		16:09		
Sonnenscheinstunden 508 458 382 330 262 237												
astr.max.mögl.Beschattung 578 751 452												
Red.Sonnenscheinwahrsch. 0.38 0.42 0.35												
Reduktion Betriebsdauer 0.96 0.96 0.96												
Reduktion Windrichtung 0.72 0.72 0.71												
Gesamte Reduktion 0.26 0.29 0.24												
Met.wahrsch.Beschattung 152 220 106												

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CD - IO82

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
302	339	467	706	786	617	554	815	1,348	1,328	721	398	8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni					
1	08:32 16:10	08:03 17:00	07:08 17:55	06:54 19:51	05:46 20:45	06:18 (4) 04:59 05:29 (9)	06:38 (4) 21:34 14	05:43 (9)			
2	08:32 16:12	08:02 17:02	07:05 17:57	06:52 19:53	07:19 (1) 07:31 (1) 05:44 20:47	06:16 (4) 04:58 05:29 (9)	06:39 (4) 21:35 15	05:44 (9)			
3	08:32 16:13	08:00 17:04	07:03 17:58	06:49 19:55	07:17 (1) 07:33 (1) 05:42 20:49	06:15 (4) 04:57 05:29 (9)	06:39 (4) 21:36 16	05:45 (9)			
4	08:32 16:14	07:58 17:06	07:01 18:00	06:47 19:57	07:14 (1) 07:34 (1) 05:41 20:50	06:14 (4) 04:56 05:28 (9)	06:40 (4) 21:37 17	05:45 (9)			
5	08:32 16:15	07:57 17:08	06:58 18:02	06:45 19:59	07:13 (1) 07:35 (1) 05:39 20:52	06:13 (4) 04:55 05:28 (9)	06:40 (4) 21:38 17	05:46 (9)			
6	08:31 16:16	07:55 17:10	06:56 18:04	06:42 20:00	07:11 (1) 07:35 (1) 05:37 20:54	06:13 (4) 04:55 05:28 (9)	06:40 (4) 21:39 18	05:46 (9)			
7	08:31 16:18	07:53 17:12	06:54 18:06	06:40 20:02	07:11 (1) 07:36 (1) 05:35 20:56	06:13 (4) 04:54 05:29 (9)	06:41 (4) 21:40 17	05:46 (9)			
8	08:30 16:19	07:51 17:14	06:51 18:08	06:37 20:04	07:10 (1) 07:36 (1) 05:33 20:57	06:12 (4) 04:53 05:28 (9)	06:41 (4) 21:41 18	05:46 (9)			
9	08:30 16:20	07:49 17:16	06:49 18:10	06:35 20:06	07:09 (1) 07:35 (1) 05:31 20:59	06:12 (4) 04:53 05:29 (9)	06:41 (4) 21:42 18	05:47 (9)			
10	08:29 16:22	07:48 17:18	06:47 18:11	06:33 20:08	07:09 (1) 07:35 (1) 05:29 21:01	06:12 (4) 04:52 05:28 (9)	06:41 (4) 21:43 19	05:47 (9)			
11	08:29 16:23	07:46 17:20	06:44 18:13	06:30 20:09	07:09 (1) 07:35 (1) 05:27 21:03	06:12 (4) 04:52 05:29 (9)	06:41 (4) 21:44 18	05:47 (9)			
12	08:28 16:25	07:44 17:22	06:42 18:15	06:28 20:11	07:09 (1) 07:35 (1) 05:26 21:04	06:12 (4) 04:52 05:29 (9)	06:40 (4) 21:44 19	05:48 (9)			
13	08:27 16:26	07:42 17:24	06:40 18:17	06:26 20:13	07:09 (1) 07:33 (1) 05:24 21:06	06:12 (4) 04:51 05:30 (9)	06:41 (4) 21:45 18	05:48 (9)			
14	08:26 16:28	07:40 17:26	06:37 18:19	06:23 20:15	06:47 (3) 07:33 (1) 05:22 21:08	06:12 (4) 04:51 05:29 (9)	06:40 (4) 21:46 19	05:48 (9)			
15	08:25 16:30	07:38 17:28	06:35 18:21	06:21 20:17	06:45 (3) 07:32 (1) 05:21 21:09	06:13 (4) 04:51 05:29 (9)	06:40 (4) 21:46 19	05:48 (9)			
16	08:24 16:31	07:36 17:30	06:32 18:23	06:19 20:18	06:43 (3) 07:30 (1) 05:19 21:11	06:13 (4) 04:51 05:29 (9)	06:39 (4) 21:47 19	05:48 (9)			
17	08:23 16:33	07:34 17:32	06:30 18:24	06:17 20:20	06:40 (3) 07:28 (1) 05:17 21:12	06:14 (4) 04:50 05:29 (9)	06:39 (4) 21:47 19	05:48 (9)			
18	08:22 16:35	07:32 17:34	06:28 18:26	06:14 20:22	06:39 (3) 07:25 (1) 05:16 21:14	06:15 (4) 04:50 05:29 (9)	06:39 (4) 21:48 20	05:49 (9)			
19	08:21 16:36	07:29 17:35	06:25 18:28	06:12 20:24	06:39 (3) 07:23 (1) 05:14 21:16	06:15 (4) 04:50 05:29 (9)	06:37 (4) 21:48 20	05:49 (9)			
20	08:20 16:38	07:27 17:37	06:23 18:30	06:10 20:26	06:38 (3) 07:21 (2) 05:13 21:17	06:16 (4) 04:51 05:30 (9)	06:37 (4) 21:48 20	05:50 (9)			
21	08:19 16:40	07:25 17:39	06:20 18:32	06:08 20:27	06:38 (3) 07:20 (2) 05:12 21:19	06:17 (4) 04:51 05:30 (9)	06:36 (4) 21:49 20	05:50 (9)			
22	08:18 16:42	07:23 17:41	06:18 18:33	06:06 20:29	06:38 (3) 07:19 (2) 05:10 21:20	06:18 (4) 04:51 05:30 (9)	06:34 (4) 21:49 20	05:50 (9)			
23	08:17 16:43	07:21 17:43	06:16 18:35	06:03 20:31	06:38 (3) 07:19 (2) 05:09 21:22	06:19 (4) 04:51 05:30 (9)	06:33 (4) 21:49 20	05:50 (9)			
24	08:15 16:45	07:19 17:45	06:13 18:37	06:01 20:33	06:39 (3) 07:18 (2) 05:07 21:23	06:21 (4) 04:51 05:31 (9)	06:32 (4) 21:49 20	05:51 (9)			
25	08:14 16:47	07:16 17:47	06:11 18:39	05:59 20:35	06:38 (3) 07:17 (2) 05:06 21:24	06:24 (4) 04:52 05:31 (9)	06:29 (4) 21:49 19	05:50 (9)			
26	08:13 16:49	07:14 17:49	06:08 18:41	05:57 20:36	06:39 (3) 07:16 (2) 05:05 21:26	06:25 (4) 04:52 05:31 (9)	06:29 (4) 21:49 19	05:50 (9)			
27	08:11 16:51	07:12 17:51	06:06 18:42	05:55 20:38	06:40 (3) 07:15 (2) 05:04 21:27	06:26 (4) 04:53 05:32 (9)	06:28 (4) 21:49 19	05:51 (9)			
28	08:10 16:53	07:10 17:53	06:04 18:44	05:53 20:40	06:40 (3) 07:14 (2) 05:03 21:29	06:27 (4) 04:53 05:32 (9)	06:27 (4) 21:49 19	05:51 (9)			
29	08:08 16:55	07:07 17:55	06:01 18:46	05:51 20:42	06:41 (3) 07:13 (2) 05:02 21:30	06:28 (4) 04:54 05:33 (9)	06:26 (4) 21:49 18	05:51 (9)			
30	08:07 16:57	07:05 17:57	05:59 18:48	05:49 20:43	06:42 (3) 07:12 (2) 05:01 21:31	06:29 (4) 04:54 05:33 (9)	06:25 (4) 21:48 19	05:51 (9)			
31	08:05 16:58	07:03 17:59	05:56 18:50	05:47 20:44	06:43 (3) 07:11 (2) 05:00 21:32	06:30 (4) 04:55 05:34 (9)	06:24 (4) 21:48 19	05:51 (9)			
	Sonnenscheinstunden	253	275	367	418	491	506				
	astr.max.mögl.Beschattung			228	649	628	553				
	Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39				
	Reduktion Betriebsdauer			0.96	0.96	0.96	0.96				
	Reduktion Windrichtung			0.70	0.72	0.73	0.72				
	Gesamte Reduktion			0.18	0.26	0.30	0.27				
	Met.wahrsch.Beschattung			42	166	188	147				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Minuten mit Schatten	Zeitpunkt (SS:MM)		Schattenanfang		(WEA mit erstem Schatten)	
	Sonnennuntergang (SS:MM)			Zeitpunkt (SS:MM)		Schattenende		(WEA mit letztem Schatten)	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CD - IO82

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November		Dezember	
1	04:55	05:33 (9)	05:34	06:22 (4)	06:26	07:08 (1)	07:18	07:14	08:08		
	21:48	18 05:51 (9)	21:14	29 06:51 (4)	20:09	26 07:34 (1)	18:57	16:48	16:05		
2	04:56	05:34 (9)	05:35	06:22 (4)	06:28	07:08 (1)	07:20	07:16	08:09		
	21:48	18 05:52 (9)	21:12	29 06:51 (4)	20:07	26 07:34 (1)	18:55	16:46	16:05		
3	04:56	05:34 (9)	05:37	06:22 (4)	06:30	07:07 (1)	07:21	07:18	08:11		
	21:47	18 05:52 (9)	21:11	29 06:51 (4)	20:05	26 07:33 (1)	18:52	16:44	16:04		
4	04:57	05:34 (9)	05:38	06:22 (4)	06:31	07:07 (1)	07:23	07:20	08:12		
	21:47	18 05:52 (9)	21:09	29 06:51 (4)	20:02	26 07:33 (1)	18:50	16:42	16:03		
5	04:58	05:34 (9)	05:40	06:23 (4)	06:33	07:08 (1)	07:25	07:22	08:14		
	21:46	18 05:52 (9)	21:07	28 06:51 (4)	20:00	25 07:33 (1)	18:48	16:41	16:03		
6	04:59	05:35 (9)	05:42	06:22 (4)	06:35	07:07 (1)	07:27	07:24	08:15		
	21:46	17 05:52 (9)	21:05	28 06:50 (4)	19:57	24 07:31 (1)	18:45	16:39	16:02		
7	05:00	05:35 (9)	05:43	06:23 (4)	06:36	07:08 (1)	07:28	07:26	08:16		
	21:45	17 05:52 (9)	21:03	27 06:50 (4)	19:55	22 07:30 (1)	18:43	16:37	16:02		
8	05:01	05:36 (9)	05:45	06:23 (4)	06:38	07:09 (1)	07:30	07:28	08:18		
	21:45	16 05:52 (9)	21:01	26 06:49 (4)	19:53	20 07:29 (1)	18:41	16:35	16:01		
9	05:02	05:36 (9)	05:47	06:24 (4)	06:40	07:10 (1)	07:32	07:30	08:19		
	21:44	16 05:52 (9)	20:59	25 06:49 (4)	19:50	17 07:27 (1)	18:38	16:33	16:01		
10	05:03	05:37 (9)	05:48	06:24 (4)	06:42	07:12 (1)	07:34	07:31	08:20		
	21:43	15 05:52 (9)	20:57	24 06:48 (4)	19:48	12 07:24 (1)	18:36	16:32	16:01		
11	05:04	05:37 (9)	05:50	06:25 (4)	06:43		07:36	07:33	08:21		
	21:42	15 05:52 (9)	20:55	22 06:47 (4)	19:46		18:34	16:30	16:01		
12	05:05	05:38 (9)	05:52	06:27 (4)	06:45		07:37	07:35	08:22		
	21:41	13 05:51 (9)	20:53	19 06:46 (4)	19:43		18:31	16:28	16:00		
13	05:06	05:38 (9)	05:54	06:28 (4)	06:47		07:39	07:37	08:23		
	21:40	13 05:51 (9)	20:51	15 06:43 (4)	19:41		18:29	16:27	16:00		
14	05:07	05:39 (9)	05:55	06:30 (4)	06:48		07:41	07:39	08:24		
	21:39	11 05:50 (9)	20:49	11 06:41 (4)	19:38		18:27	16:25	16:00		
15	05:09	05:40 (9)	05:57	06:49 (3)	06:50	07:43 (2)	07:43	07:41	08:25		
	21:38	9 05:49 (9)	20:47	10 06:59 (3)	19:36	6 07:49 (2)	18:24	16:24	16:00		
16	05:10	05:42 (9)	05:59	06:48 (3)	06:52	07:40 (2)	07:45	07:42	08:26		
	21:37	5 05:47 (9)	20:45	13 07:01 (3)	19:33	13 07:53 (2)	18:22	16:22	16:00		
17	05:11		06:00	06:47 (3)	06:54	07:38 (2)	07:46	07:44	08:27		
	21:36		20:43	16 07:03 (3)	19:31	16 07:54 (2)	18:20	16:21	16:01		
18	05:13		06:02	06:45 (3)	06:55	07:36 (2)	07:48	07:46	08:28		
	21:35		20:41	18 07:03 (3)	19:29	18 07:54 (2)	18:18	16:19	16:01		
19	05:14	06:32 (4)	06:04	06:44 (3)	06:57	07:35 (2)	07:50	07:48	08:28		
	21:34	8 06:40 (4)	20:39	20 07:04 (3)	19:26	20 07:55 (2)	18:15	16:18	16:01		
20	05:15	06:30 (4)	06:05	06:43 (3)	06:59	07:35 (2)	07:52	07:50	08:29		
	21:32	12 06:42 (4)	20:37	20 07:03 (3)	19:24	20 07:55 (2)	18:13	16:17	16:01		
21	05:17	06:29 (4)	06:07	06:43 (3)	07:00	07:33 (2)	07:54	07:51	08:30		
	21:31	15 06:44 (4)	20:34	21 07:04 (3)	19:21	22 07:55 (2)	18:11	16:15	16:02		
22	05:18	06:28 (4)	06:09	06:43 (3)	07:02	07:33 (2)	07:56	07:53	08:30		
	21:30	17 06:45 (4)	20:32	21 07:04 (3)	19:19	22 07:55 (2)	18:09	16:14	16:02		
23	05:20	06:26 (4)	06:11	06:42 (3)	07:04	07:33 (2)	07:58	07:55	08:31		
	21:28	20 06:46 (4)	20:30	21 07:03 (3)	19:16	21 07:54 (2)	18:07	16:13	16:03		
24	05:21	06:26 (4)	06:12	06:43 (3)	07:06	07:33 (2)	07:59	07:57	08:31		
	21:27	22 06:48 (4)	20:28	20 07:03 (3)	19:14	20 07:53 (2)	18:05	16:12	16:03		
25	05:23	06:25 (4)	06:14	06:43 (3)	07:07	07:33 (2)	07:01	07:58	08:31		
	21:25	23 06:48 (4)	20:25	31 07:29 (1)	19:12	19 07:52 (2)	17:02	16:11	16:04		
26	05:24	06:25 (4)	06:16	06:43 (3)	07:09	07:35 (2)	07:03	08:00	08:32		
	21:24	24 06:49 (4)	20:23	34 07:31 (1)	19:09	16 07:51 (2)	17:00	16:10	16:05		
27	05:26	06:24 (4)	06:18	06:45 (3)	07:11	07:37 (2)	07:05	08:02	08:32		
	21:22	26 06:50 (4)	20:21	34 07:32 (1)	19:07	12 07:49 (2)	16:58	16:09	16:06		
28	05:27	06:24 (4)	06:19	06:46 (3)	07:13	07:38 (2)	07:07	08:03	08:32		
	21:21	27 06:51 (4)	20:19	34 07:33 (1)	19:04	7 07:45 (2)	16:56	16:08	16:06		
29	05:29	06:23 (4)	06:21	06:48 (3)	07:14		07:09	08:05	08:32		
	21:19	28 06:51 (4)	20:16	30 07:33 (1)	19:02		16:54	16:07	16:07		
30	05:30	06:22 (4)	06:23	07:10 (1)	07:16		07:11	08:06	08:32		
	21:18	28 06:50 (4)	20:14	24 07:34 (1)	19:00		16:52	16:06	16:08		
31	05:32	06:23 (4)	06:24	07:08 (1)			07:13		08:32		
	21:16	28 06:51 (4)	20:12	26 07:34 (1)			16:50		16:09		
Sonnenscheinstunden	508		458		382		330		262		237
astr.max.mögl.Beschattung	515		734		456						
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35						
Reduktion Betriebsdauer	0.96		0.96		0.96						
Reduktion Windrichtung	0.72		0.72		0.71						
Gesamte Reduktion	0.26		0.29		0.24						
Met.wahrsch.Beschattung	135		215		107						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CE - IO83

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:20 (1)	05:46	06:19 (4)	04:59
	16:10	17:00	17:55	19:51	14 07:34 (1)	20:45	25 06:44 (4)	21:34
2	08:32	08:02	07:05	06:52	07:18 (1)	05:44	06:18 (4)	04:58
	16:12	17:02	17:57	19:53	18 07:36 (1)	20:47	26 06:44 (4)	21:35
3	08:32	08:00	07:03	06:49	07:17 (1)	05:42	06:18 (4)	04:57
	16:13	17:04	17:58	19:55	21 07:38 (1)	20:49	27 06:45 (4)	21:36
4	08:32	07:58	07:01	06:47	07:15 (1)	05:41	06:17 (4)	04:56
	16:14	17:06	18:00	19:57	23 07:38 (1)	20:50	28 06:45 (4)	21:37
5	08:32	07:57	06:58	06:45	07:14 (1)	05:39	06:17 (4)	04:55
	16:15	17:08	18:02	19:59	24 07:38 (1)	20:52	28 06:45 (4)	21:38
6	08:31	07:55	06:56	06:42	07:13 (1)	05:37	06:16 (4)	04:55
	16:16	17:10	18:04	20:00	25 07:38 (1)	20:54	28 06:44 (4)	21:39
7	08:31	07:53	06:54	06:40	07:13 (1)	05:35	06:17 (4)	04:54
	16:18	17:12	18:06	20:02	25 07:38 (1)	20:56	28 06:45 (4)	21:40
8	08:30	07:51	06:51	06:37	07:13 (1)	05:33	06:17 (4)	04:53
	16:19	17:14	18:08	20:04	25 07:38 (1)	20:57	28 06:45 (4)	21:41
9	08:30	07:49	06:49	06:35	07:12 (1)	05:31	06:16 (4)	04:53
	16:20	17:16	18:10	20:06	25 07:37 (1)	20:59	28 06:44 (4)	21:42
10	08:29	07:48	06:47	06:33	07:12 (1)	05:29	06:17 (4)	04:52
	16:22	17:18	18:11	20:08	25 07:37 (1)	21:01	27 06:44 (4)	21:43
11	08:29	07:46	06:44	06:30	07:12 (1)	05:27	06:17 (4)	04:52
	16:23	17:20	18:13	20:09	24 07:36 (1)	21:03	27 06:44 (4)	21:44
12	08:28	07:44	06:42	06:28	06:52 (3)	05:26	06:17 (4)	04:52
	16:25	17:22	18:15	20:11	27 07:36 (1)	21:04	26 06:43 (4)	21:44
13	08:27	07:42	06:40	06:26	06:49 (3)	05:24	06:18 (4)	04:51
	16:26	17:24	18:17	20:13	30 07:34 (1)	21:06	25 06:43 (4)	21:45
14	08:26	07:40	06:37	06:23	06:47 (3)	05:22	06:18 (4)	04:51
	16:28	17:26	18:19	20:15	31 07:32 (1)	21:08	23 06:41 (4)	21:46
15	08:25	07:38	06:35	06:21	06:45 (3)	05:21	06:20 (4)	04:51
	16:30	17:28	18:21	9 07:07 (2)	20:17	31 07:31 (1)	21:09	21 06:41 (4)
16	08:24	07:36	06:32	06:19	07:07 (2)	05:19	06:20 (4)	04:51
	16:31	17:30	18:23	13 07:09 (2)	20:18	29 07:28 (1)	21:11	20 06:40 (4)
17	08:23	07:34	06:30	06:17	06:53 (2)	05:17	06:22 (4)	04:50
	16:33	17:32	18:24	17 07:10 (2)	20:20	29 07:02 (3)	21:12	17 06:39 (4)
18	08:22	07:32	06:28	06:14	06:41 (3)	05:16	06:23 (4)	04:50
	16:35	17:34	18:26	19 07:11 (2)	20:22	21 07:02 (3)	21:14	15 06:38 (4)
19	08:21	07:29	06:25	06:12	06:41 (3)	05:14	06:24 (4)	04:50
	16:36	17:35	18:28	20 07:11 (2)	20:24	21 07:02 (3)	21:16	12 06:36 (4)
20	08:20	07:27	06:23	06:10	06:41 (3)	05:13	06:28 (4)	04:51
	16:38	17:37	18:30	21 07:11 (2)	20:26	21 07:02 (3)	21:17	5 06:33 (4)
21	08:19	07:25	06:20	06:08	06:41 (3)	05:12	06:29 (4)	04:51
	16:40	17:39	18:32	21 07:11 (2)	20:27	20 07:01 (3)	21:19	21 06:35 (9)
22	08:18	07:23	06:18	06:06	06:42 (3)	05:10	06:20 (4)	04:51
	16:42	17:41	18:33	21 07:10 (2)	20:29	19 07:01 (3)	21:20	21 06:34 (9)
23	08:17	07:21	06:16	06:03	06:42 (3)	05:09	06:21 (4)	04:51
	16:43	17:43	18:35	20 07:10 (2)	20:31	18 07:00 (3)	21:22	21 06:33 (9)
24	08:15	07:19	06:13	06:01	06:43 (3)	05:07	06:22 (4)	04:51
	16:45	17:45	18:37	18 07:08 (2)	20:33	16 06:59 (3)	21:23	6 05:42 (9)
25	08:14	07:16	06:11	05:59	06:44 (3)	05:06	06:23 (4)	04:52
	16:47	17:47	18:39	16 07:07 (2)	20:35	13 06:57 (3)	21:24	9 05:44 (9)
26	08:13	07:14	06:08	05:57	06:27 (4)	05:05	06:24 (4)	04:52
	16:49	17:49	18:41	12 07:05 (2)	20:36	19 06:54 (3)	21:26	11 05:45 (9)
27	08:11	07:12	06:06	05:55	06:24 (4)	05:04	06:25 (4)	04:53
	16:50	17:51	18:42	6 07:01 (2)	20:38	15 06:59 (4)	21:27	13 05:46 (9)
28	08:10	07:10	06:04	05:53	06:22 (4)	05:03	06:26 (4)	04:53
	16:53	17:53	18:44	20:40	19 06:41 (4)	21:29	14 05:47 (9)	21 05:54 (9)
29	08:08	07:01	06:00	05:51	06:21 (4)	05:02	06:27 (4)	04:54
	16:55	17:46	18:37	20:42	22 06:43 (4)	21:30	16 05:48 (9)	21 05:55 (9)
30	08:07	06:59	06:00	05:49	06:20 (4)	05:01	06:28 (4)	04:54
	16:57	17:48	18:39	20:43	24 06:44 (4)	21:31	16 05:48 (9)	21 05:55 (9)
31	08:05	06:56	06:00	05:47	07:24 (1)	05:00	06:29 (4)	04:54
	16:58	17:50	18:41	8 07:32 (1)	20:43	16 06:44 (4)	21:32	16 05:48 (9)
Sonnenscheinstunden	253	275	367	418	491	565	620	620
astr. max.mögl. Beschattung			0.28	0.37	0.43	0.43	0.39	0.39
Red. Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96	0.96	0.96
Reduktion Betriebsdauer			0.69	0.72	0.72	0.72	0.72	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.30	0.27	0.27
Met. wahrsch. Beschattung			41	170	168	166	166	166

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CE - IO83

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November Dezember				
1	04:55	05:34 (8)	05:34	06:27 (4)	06:26	07:11 (1)	07:18	07:14	08:08			
	21:48	05:55 (9)	21:14	26	06:53 (4)	20:09	24	07:35 (1)	18:57	16:48	16:05	
2	04:56	05:35 (8)	05:35	06:27 (4)	06:28	07:11 (1)	07:20	07:16	08:09			
	21:48	21	05:56 (9)	21:12	27	06:54 (4)	20:07	25	07:36 (1)	18:55	16:46	16:05
3	04:56	05:36 (8)	05:37	06:26 (4)	06:30	07:10 (1)	07:21	07:18	08:11			
	21:47	20	05:56 (9)	21:11	28	06:54 (4)	20:05	25	07:35 (1)	18:52	16:44	16:04
4	04:57	05:36 (8)	05:38	06:27 (4)	06:31	07:10 (1)	07:23	07:20	08:12			
	21:47	20	05:56 (9)	21:09	28	06:55 (4)	20:02	25	07:35 (1)	18:50	16:42	16:03
5	04:58	05:36 (8)	05:40	06:27 (4)	06:33	07:10 (1)	07:25	07:22	08:14			
	21:46	20	05:56 (9)	21:07	28	06:55 (4)	20:00	25	07:35 (1)	18:48	16:41	16:03
6	04:59	05:37 (8)	05:42	06:26 (4)	06:35	07:09 (1)	07:27	07:24	08:15			
	21:46	19	05:56 (9)	21:05	28	06:54 (4)	19:58	25	07:34 (1)	18:45	16:39	16:02
7	05:00	05:38 (9)	05:43	06:27 (4)	06:36	07:09 (1)	07:28	07:26	08:16			
	21:45	19	05:57 (9)	21:03	28	06:55 (4)	19:55	24	07:33 (1)	18:43	16:37	16:02
8	05:01	05:39 (9)	05:45	06:26 (4)	06:38	07:10 (1)	07:30	07:28	08:18			
	21:45	18	05:57 (9)	21:01	28	06:54 (4)	19:53	23	07:33 (1)	18:41	16:35	16:01
9	05:02	05:39 (9)	05:47	06:27 (4)	06:40	07:10 (1)	07:32	07:30	08:19			
	21:44	18	05:57 (9)	20:59	27	06:54 (4)	19:50	21	07:31 (1)	18:38	16:33	16:01
10	05:03	05:39 (9)	05:48	06:26 (4)	06:42	07:11 (1)	07:34	07:31	08:20			
	21:43	18	05:57 (9)	20:57	27	06:53 (4)	19:48	18	07:29 (1)	18:36	16:32	16:01
11	05:04	05:40 (9)	05:50	06:27 (4)	06:43	07:13 (1)	07:36	07:33	08:21			
	21:42	17	05:57 (9)	20:55	26	06:53 (4)	19:46	15	07:28 (1)	18:34	16:30	16:01
12	05:05	05:40 (9)	05:52	06:28 (4)	06:45	07:15 (1)	07:37	07:35	08:22			
	21:41	17	05:57 (9)	20:53	24	06:52 (4)	19:43	9	07:24 (1)	18:31	16:28	16:00
13	05:06	05:40 (9)	05:54	06:28 (4)	06:47		07:39	07:37	08:23			
	21:40	17	05:57 (9)	20:51	23	06:51 (4)	19:41		18:29	16:27	16:00	
14	05:07	05:41 (9)	05:55	06:29 (4)	06:48		07:41	07:39	08:24			
	21:39	15	05:56 (9)	20:49	21	06:50 (4)	19:38		18:27	16:25	16:00	
15	05:09	05:41 (9)	05:57	06:30 (4)	06:50		07:43	07:41	08:25			
	21:38	15	05:56 (9)	20:47	18	06:48 (4)	19:36		18:24	16:24	16:00	
16	05:10	05:41 (9)	05:59	06:32 (4)	06:52	07:45 (2)	07:45	07:43	08:26			
	21:37	14	05:55 (9)	20:45	14	06:46 (4)	19:33	5	07:50 (2)	18:22	16:22	16:00
17	05:11	05:43 (9)	06:00	06:35 (4)	06:54	07:41 (2)	07:46	07:44	08:27			
	21:36	12	05:55 (9)	20:43	18	07:02 (3)	19:31	12	07:53 (2)	18:20	16:21	16:01
18	05:13	05:44 (9)	06:02	06:50 (3)	06:55	07:39 (2)	07:48	07:46	08:28			
	21:35	10	05:54 (9)	20:41	13	07:03 (3)	19:29	15	07:54 (2)	18:18	16:19	16:01
19	05:14	05:45 (9)	06:04	06:49 (3)	06:57	07:37 (2)	07:50	07:48	08:28			
	21:34	8	05:53 (9)	20:39	16	07:05 (3)	19:26	18	07:55 (2)	18:15	16:18	16:01
20	05:15	05:47 (9)	06:05	06:47 (3)	06:59	07:37 (2)	07:52	07:50	08:29			
	21:32	3	05:50 (9)	20:37	18	07:05 (3)	19:24	19	07:56 (2)	18:13	16:17	16:01
21	05:17		06:07	06:46 (3)	07:00	07:35 (2)	07:54	07:51	08:30			
	21:31		20:34	20	07:06 (3)	19:21	20	07:55 (2)	18:11	16:15	16:02	
22	05:18		06:09	06:46 (3)	07:02	07:35 (2)	07:56	07:53	08:30			
	21:30		20:32	20	07:06 (3)	19:19	21	07:56 (2)	18:09	16:14	16:02	
23	05:20		06:11	06:45 (3)	07:04	07:35 (2)	07:58	07:55	08:31			
	21:28		20:30	20	07:05 (3)	19:16	20	07:55 (2)	18:07	16:13	16:03	
24	05:21	06:36 (4)	06:12	06:45 (3)	07:06	07:34 (2)	07:59	07:57	08:31			
	21:27	9	06:45 (4)	20:28	21	07:06 (3)	19:14	20	07:54 (2)	18:05	16:12	16:03
25	05:23	06:34 (4)	06:14	06:45 (3)	07:07	07:34 (2)	07:01	07:58	08:31			
	21:25	13	06:47 (4)	20:25	21	07:06 (3)	19:12	20	07:54 (2)	17:02	16:11	16:04
26	05:24	06:33 (4)	06:16	06:45 (3)	07:09	07:35 (2)	07:03	08:00	08:32			
	21:24	16	06:49 (4)	20:23	19	07:04 (3)	19:09	18	07:53 (2)	17:00	16:10	16:05
27	05:26	06:31 (4)	06:18	06:45 (3)	07:11	07:37 (2)	07:05	08:02	08:32			
	21:22	19	06:50 (4)	20:21	29	07:30 (1)	19:07	15	07:52 (2)	16:58	16:09	16:06
28	05:27	06:31 (4)	06:19	06:46 (3)	07:13	07:38 (2)	07:07	08:03	08:32			
	21:21	20	06:51 (4)	20:19	32	07:32 (1)	19:04	11	07:49 (2)	16:56	16:08	16:06
29	05:29	06:30 (4)	06:21	06:48 (3)	07:14	07:40 (2)	07:09	08:05	08:32			
	21:19	22	06:52 (4)	20:16	31	07:33 (1)	19:02	5	07:45 (2)	16:54	16:07	16:07
30	05:30	06:28 (4)	06:23	06:50 (3)	07:16		07:11	08:06	08:32			
	21:18	24	06:52 (4)	20:14	30	07:35 (1)	19:00		16:52	16:06	16:08	
31	05:32	06:28 (4)	06:24	06:51 (3)			07:13	08:32				
	21:16	25	06:53 (4)	20:12	26	07:35 (1)		16:50	16:09			
	Sonnenscheinstunden	508	458		382		330	262	237			
	astr. max. mögl. Beschattung	470		735		478						
	Red. Sonnenscheinwahrsch.	0.38		0.42		0.35						
	Reduktion Betriebsdauer	0.96		0.96		0.96						
	Reduktion Windrichtung	0.72		0.72		0.71						
	Gesamte Reduktion	0.26		0.29		0.24						
	Met. wahrsch. Beschattung	123		215		113						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattende	(WEA mit letztem Schatten)

Projekt: 20190529_Bostelwiebeck II

Lizenzierter Anwender: I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt

Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet: 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CF - IO84

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Main data table with columns for months (Januar to Juni) and rows for individual days, providing sunrise/sunset times and shadow start/end times.

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Summary table for daily data including: Tag im Monat, Sonnenaufgang, Sonnenuntergang, Minuten mit Schatten, Zeitpunkt, Schattenanfang, Schattenende.

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CG - IO85
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni					
1	08:32	08:03	07:08	06:54	07:22 (1) 05:46	06:28 (4) 04:59	05:39 (8)				
	16:10	17:00	17:55	19:51	22 07:44 (1) 20:45	26 06:54 (4) 21:34	21 06:00 (8)				
2	08:32	08:02	07:05	06:52	07:21 (1) 05:44	06:28 (4) 04:58	05:40 (8)				
	16:12	17:02	17:57	19:53	23 07:44 (1) 20:47	26 06:54 (4) 21:35	21 06:01 (8)				
3	08:32	08:00	07:03	06:49	07:21 (1) 05:42	06:29 (4) 04:57	05:39 (8)				
	16:13	17:04	17:58	19:55	24 07:45 (1) 20:49	24 06:53 (4) 21:36	22 06:01 (8)				
4	08:32	07:58	07:01	06:47	07:20 (1) 05:41	06:29 (4) 04:56	05:39 (8)				
	16:14	17:06	18:00	19:57	24 07:44 (1) 20:50	23 06:52 (4) 21:37	22 06:01 (8)				
5	08:32	07:57	06:58	06:45	07:20 (1) 05:39	06:29 (4) 04:55	05:40 (8)				
	16:15	17:08	18:02	19:59	24 07:44 (1) 20:52	22 06:51 (4) 21:38	22 06:02 (8)				
6	08:31	07:55	06:56	06:42	07:20 (1) 05:37	06:30 (4) 04:55	05:40 (8)				
	16:16	17:10	18:04	20:00	22 07:42 (1) 20:54	20 06:50 (4) 21:39	22 06:02 (8)				
7	08:31	07:53	06:54	06:40	07:20 (1) 05:35	06:32 (4) 04:54	05:40 (8)				
	16:18	17:12	18:06	20:02	22 07:42 (1) 20:56	17 06:49 (4) 21:40	22 06:02 (8)				
8	08:30	07:51	06:51	06:37	07:21 (1) 05:33	06:33 (4) 04:53	05:40 (8)				
	16:19	17:14	18:08	20:04	20 07:41 (1) 20:57	14 06:47 (4) 21:41	22 06:02 (8)				
9	08:30	07:49	06:49	06:35	06:59 (3) 05:31	11 06:34 (4) 04:53	05:41 (8)				
	16:20	17:16	18:10	20:06	25 07:40 (1) 20:59	11 06:45 (4) 21:42	21 06:02 (8)				
10	08:29	07:48	06:47	06:33	06:56 (3) 05:29	04:52	05:40 (8)				
	16:22	17:18	18:11	20:08	25 07:37 (1) 21:01	21:43	22 06:02 (8)				
11	08:29	07:46	06:44	06:30	06:54 (3) 05:27	04:52	05:41 (8)				
	16:23	17:20	18:13	20:09	24 07:35 (1) 21:03	21:44	21 06:02 (8)				
12	08:28	07:44	06:42	06:28	06:52 (3) 05:26	04:52	05:41 (8)				
	16:25	17:22	18:15	20:11	17 07:09 (3) 21:04	21:44	22 06:03 (8)				
13	08:27	07:42	06:40	06:26	06:50 (3) 05:24	04:51	05:42 (8)				
	16:26	17:24	18:17	8 07:11 (2) 20:13	19 07:09 (3) 21:06	21:45	21 06:03 (8)				
14	08:26	07:40	06:37	07:01 (2) 06:24	06:49 (3) 05:22	04:51	05:41 (8)				
	16:28	17:26	18:19	12 07:13 (2) 20:15	20 07:09 (3) 21:08	21:46	21 06:02 (8)				
15	08:25	07:38	06:35	06:58 (2) 06:21	06:49 (3) 05:21	04:51	05:42 (8)				
	16:30	17:28	18:21	15 07:13 (2) 20:17	20 07:09 (3) 21:09	21:46	21 06:03 (8)				
16	08:24	07:36	06:32	06:56 (2) 06:19	06:49 (3) 05:19	04:51	05:42 (8)				
	16:31	17:30	18:23	18 07:14 (2) 20:18	20 07:09 (3) 21:11	6 05:52 (9) 21:47	21 06:03 (8)				
17	08:23	07:34	06:30	06:54 (2) 06:17	06:49 (3) 05:17	04:51	05:42 (8)				
	16:33	17:32	18:24	20 07:14 (2) 20:20	18 07:07 (3) 21:12	9 05:54 (9) 21:47	21 06:03 (8)				
18	08:22	07:32	06:28	06:54 (2) 06:14	06:49 (3) 05:16	04:51	05:43 (8)				
	16:35	17:34	18:26	20 07:14 (2) 20:22	18 07:07 (3) 21:14	12 05:56 (9) 21:48	20 06:03 (8)				
19	08:21	07:29	06:25	06:54 (2) 06:12	06:50 (3) 05:14	04:51	05:43 (8)				
	16:36	17:35	18:28	20 07:14 (2) 20:24	16 07:06 (3) 21:16	14 05:56 (9) 21:48	20 06:03 (8)				
20	08:20	07:27	06:23	06:54 (2) 06:10	06:38 (4) 05:13	04:51	05:44 (8)				
	16:38	17:37	18:30	19 07:13 (2) 20:26	23 07:04 (3) 21:17	15 05:57 (9) 21:48	20 06:04 (8)				
21	08:19	07:25	06:20	06:55 (2) 06:08	06:35 (4) 05:12	04:51	05:44 (8)				
	16:40	17:39	18:32	17 07:12 (2) 20:27	25 07:02 (3) 21:19	16 05:58 (9) 21:49	20 06:04 (8)				
22	08:18	07:23	06:18	06:55 (2) 06:06	06:34 (4) 05:10	04:51	05:44 (8)				
	16:42	17:41	18:33	16 07:11 (2) 20:29	18 06:52 (4) 21:20	16 05:57 (9) 21:49	20 06:04 (8)				
23	08:17	07:21	06:16	06:56 (2) 06:03	06:32 (4) 05:09	04:51	05:44 (8)				
	16:43	17:43	18:35	13 07:09 (2) 20:31	21 06:53 (4) 21:22	17 05:58 (9) 21:49	20 06:04 (8)				
24	08:15	07:19	06:13	06:58 (2) 06:01	06:31 (4) 05:07	04:51	05:45 (8)				
	16:45	17:45	18:37	8 07:06 (2) 20:33	23 06:54 (4) 21:23	17 05:58 (9) 21:49	20 06:05 (8)				
25	08:14	07:16	06:11	05:59	06:30 (4) 05:06	04:51	05:44 (8)				
	16:47	17:47	18:39	20:35	25 06:55 (4) 21:24	17 05:58 (9) 21:49	21 06:05 (8)				
26	08:13	07:14	06:08	05:57	06:29 (4) 05:05	04:51	05:44 (8)				
	16:49	17:49	18:41	20:36	25 06:54 (4) 21:26	18 05:58 (9) 21:49	21 06:05 (8)				
27	08:11	07:12	06:06	05:55	06:28 (4) 05:04	04:51	05:45 (8)				
	16:51	17:51	18:42	20:38	26 06:54 (4) 21:27	19 05:59 (9) 21:49	21 06:06 (8)				
28	08:10	07:10	06:04	06:29 (1) 05:53	06:28 (4) 05:03	04:51	05:45 (8)				
	16:53	17:53	18:44	11 06:40 (1) 20:40	26 06:54 (4) 21:29	19 05:59 (9) 21:49	20 06:05 (8)				
29	08:08	07:01	05:51	07:26 (1) 05:51	06:29 (4) 05:02	04:51	05:45 (8)				
	16:55	19:46	16 07:42 (1) 20:42	26 06:55 (4) 21:30	21 06:00 (8) 21:49	21 06:06 (8)					
30	08:07	06:59	07:24 (1) 05:49	06:28 (4) 05:01	05:39 (8) 04:54	05:45 (8)					
	16:57	19:48	19 07:43 (1) 20:43	27 06:55 (4) 21:31	21 06:00 (8) 21:48	21 06:06 (8)					
31	08:05	06:56	07:23 (1) 05:48	05:00	05:39 (8) 04:54						
	16:58	19:50	21 07:44 (1) 20:44	21:32	21 06:00 (8) 21:48						
Sonnenscheinstunden	253	275	367	418	491	506					
astr. max.mögl. Beschattung			253	668	441	630					
Red. Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39					
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96					
Reduktion Windrichtung			0.70	0.72	0.72	0.72					
Gesamte Reduktion			0.18	0.26	0.30	0.27					
Met. wahrsch. Beschattung			47	171	131	169					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt

-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBShadowrezeptor: CG - IO85
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55 21:48	05:45 (8) 06:06 (8)	05:34 21:14	06:26 20:09	06:53 (3) 07:34 (1)	07:18 18:57
2	04:56 21:48	05:46 (8) 06:07 (8)	05:35 21:12	06:28 20:07	06:55 (3) 07:36 (1)	07:20 18:55
3	04:56 21:47	05:46 (8) 06:08 (8)	05:37 21:11	06:30 20:05	06:56 (3) 07:37 (1)	07:21 18:52
4	04:57 21:47	05:45 (8) 06:07 (8)	05:38 21:09	06:31 20:02	06:44 (4) 07:39 (1)	06:31 18:50
5	04:58 21:46	05:46 (8) 06:07 (8)	05:40 21:07	06:33 20:00	06:43 (4) 07:17 (1)	06:33 18:48
6	04:59 21:46	05:46 (8) 06:08 (8)	05:42 21:05	06:35 19:58	06:41 (4) 07:16 (1)	06:35 18:45
7	05:00 21:45	05:46 (8) 06:08 (8)	05:43 21:03	06:36 19:55	06:40 (4) 07:01 (4)	06:36 18:43
8	05:01 21:45	05:47 (8) 06:08 (8)	05:45 21:01	06:39 (4) 19:53	06:38 (4) 07:01 (4)	06:40 18:41
9	05:02 21:44	05:47 (8) 06:09 (8)	05:47 20:59	06:40 19:50	06:38 (4) 07:02 (4)	06:40 18:38
10	05:03 21:43	05:47 (8) 06:09 (8)	05:48 20:57	06:42 19:48	06:37 (4) 07:02 (4)	06:42 18:36
11	05:04 21:42	05:47 (8) 06:09 (8)	05:50 20:55	06:43 19:46	06:37 (4) 07:02 (4)	06:43 18:34
12	05:05 21:41	05:47 (8) 06:09 (8)	05:52 20:53	06:45 19:43	06:37 (4) 07:03 (4)	06:45 18:31
13	05:06 21:40	05:48 (8) 06:09 (8)	05:54 20:51	06:47 19:41	06:36 (4) 07:02 (4)	06:47 18:29
14	05:07 21:39	05:48 (8) 06:08 (8)	05:55 20:49	06:48 19:38	06:36 (4) 07:02 (4)	06:48 18:27
15	05:09 21:38	05:48 (8) 06:08 (8)	05:57 20:47	06:50 19:36	06:35 (4) 07:02 (4)	06:50 18:24
16	05:10 21:37	05:48 (8) 06:08 (8)	05:59 20:45	06:52 19:33	06:36 (4) 07:02 (4)	06:52 18:22
17	05:11 21:36	05:50 (8) 06:08 (8)	06:00 20:43	06:54 19:31	06:36 (4) 07:01 (4)	06:54 18:20
18	05:13 21:35	05:50 (9) 06:08 (9)	06:02 20:41	06:55 19:29	06:36 (4) 07:00 (4)	06:55 18:18
19	05:14 21:34	05:50 (9) 06:08 (9)	06:04 20:39	06:57 19:26	06:37 (4) 07:00 (4)	06:57 18:15
20	05:15 21:32	05:50 (9) 06:07 (9)	06:05 20:37	06:59 19:24	06:37 (4) 06:58 (4)	06:59 18:13
21	05:17 21:31	05:51 (9) 06:08 (9)	06:07 20:34	07:00 19:21	06:38 (4) 06:57 (4)	07:00 18:11
22	05:18 21:30	05:51 (9) 06:07 (9)	06:09 20:32	07:02 19:19	06:40 (4) 07:07 (3)	07:39 (2) 18:09
23	05:20 21:28	05:51 (9) 06:07 (9)	06:11 20:30	07:04 19:16	06:42 (4) 07:08 (3)	07:39 (2) 18:07
24	05:21 21:27	05:52 (9) 06:07 (9)	06:12 20:28	07:06 19:14	06:54 (3) 07:10 (3)	07:38 (2) 18:05
25	05:23 21:25	05:53 (9) 06:06 (9)	06:14 20:25	07:07 19:12	06:53 (3) 07:10 (3)	07:37 (2) 18:03
26	05:24 21:24	05:55 (9) 06:06 (9)	06:16 20:23	07:09 19:09	06:51 (3) 07:10 (3)	07:37 (2) 18:00
27	05:26 21:22	05:56 (9) 06:04 (9)	06:18 20:21	07:11 19:07	06:51 (3) 07:11 (3)	07:37 (2) 17:58
28	05:27 21:21	05:58 (9) 06:02 (9)	06:19 20:19	07:13 19:04	06:50 (3) 07:10 (3)	07:38 (2) 17:56
29	05:29 21:19	06:01 (9) 20:16	06:21 20:16	07:14 19:02	07:40 (2) 07:53 (2)	17:54 17:52
30	05:30 21:18	06:02 (9) 20:14	06:23 20:14	07:16 19:00	07:42 (2) 07:51 (2)	17:52 17:50
31	05:32 21:16	06:24 20:12	06:51 (3) 17:08 (3)	07:13 16:50	07:51 (2) 16:50	17:50 16:48
Sonnenscheinstunden 508 458 382 330 262 237						
astr. max. mögl. Beschattung 512 607 518 4 262 237						
Red. Sonnenscheinwahrsch. 0.38 0.42 0.35 0.29 0.31 0.29						
Reduktion Betriebsdauer 0.96 0.96 0.96 0.96 0.96 0.96						
Reduktion Windrichtung 0.73 0.72 0.71 0.69 0.71 0.69						
Gesamte Reduktion 0.26 0.29 0.24 0.19 0.26 0.26						
Met. wahrsch. Beschattung 135 177 122 1 135 135						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM) Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Zeitpunkt (SS:MM)	Schattenanfang Schattenende	(WEA mit erstem Schatten) (WEA mit letztem Schatten)
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Projekt: 20190529_Bostelwiebeck II

Lizenzierter Anwender: I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
Dennis Kramer / dennis.kramer@i17-wind.de
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CH - IO86

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Table with columns for months (Januar to Juni) and time slots (08:32 to 16:58). It contains shadow data for various rows, including solar hours and reduction percentages.

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Table with 6 columns: Tag im Monat, Sonnenaufgang (SS:MM), Sonnenuntergang (SS:MM), Minuten mit Schatten, Zeitpunkt (SS:MM), Schattenanfang (WEA mit erstem Schatten), Schattende (WEA mit letztem Schatten).



Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CI - IO87

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
302	339	467	706	786	617	554	815	1,348	1,328	721	398	8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März		April		Mai		Juni		
1	08:32 08:03 07:08 16:10 17:00 17:55				06:54 19:51	23	07:24 (1) 05:46 07:47 (1) 20:45	20	06:37 (4) 04:59 06:57 (4) 21:34	05:47 (8) 20 06:07 (8)	
2	08:32 08:02 07:05 16:12 17:02 17:57				06:52 19:53	23	07:24 (1) 05:44 07:47 (1) 20:47	18	06:37 (4) 04:58 06:55 (4) 21:35	05:48 (8) 19 06:07 (8)	
3	08:32 08:00 07:03 16:13 17:04 17:58				06:49 19:55	22	07:25 (1) 05:42 07:47 (1) 20:49	16	06:38 (4) 04:57 06:54 (4) 21:36	05:48 (8) 19 06:07 (8)	
4	08:32 07:58 07:01 16:14 17:06 18:00				06:47 19:57	22	07:24 (1) 05:41 07:46 (1) 20:50	11	06:40 (4) 04:56 06:51 (4) 21:37	05:48 (8) 18 06:06 (8)	
5	08:32 07:57 06:58 16:15 17:08 18:02				06:45 19:59	20	07:25 (1) 05:39 07:45 (1) 20:52	3	06:44 (4) 04:55 06:47 (4) 21:38	05:49 (8) 18 06:07 (8)	
6	08:31 07:55 06:56 16:16 17:10 18:04				06:42 20:00	18	07:25 (1) 05:37 07:43 (1) 20:54		04:55 21:39	05:49 (8) 17 06:06 (8)	
7	08:31 07:53 06:54 16:18 17:12 18:06				06:40 20:02	22	07:03 (3) 05:35 07:42 (1) 20:56		04:54 21:40	05:50 (8) 17 06:07 (8)	
8	08:30 07:51 06:51 16:19 17:14 18:08				06:37 20:04	22	07:01 (3) 05:33 07:40 (1) 20:57		04:53 21:41	05:50 (8) 16 06:06 (8)	
9	08:30 07:49 06:49 16:20 17:16 18:10				06:35 20:06	15	06:59 (3) 05:31 07:35 (1) 20:59		04:53 21:42	05:51 (8) 15 06:06 (8)	
10	08:29 07:48 06:47 16:22 17:18 18:12				06:33 20:08	16	06:56 (3) 05:29 07:12 (3) 21:01		04:52 21:43	05:51 (8) 14 06:05 (8)	
11	08:29 07:46 06:44 16:23 17:20 18:13		1	07:08 (2)	06:30 20:09	19	06:54 (3) 05:27 07:13 (3) 21:03		04:52 21:44	05:52 (8) 14 06:06 (8)	
12	08:28 07:44 06:42 16:25 17:22 18:15		7	07:09 (2)	06:28 20:11	19	06:54 (3) 05:26 07:13 (3) 21:04	6	05:52 (9) 04:52 05:58 (9) 21:44	05:53 (8) 13 06:06 (8)	
13	08:27 07:42 06:40 16:26 17:24 18:17		11	07:13 (2)	06:26 20:13	19	06:53 (3) 05:24 07:12 (3) 21:06	9	05:51 (9) 04:51 06:00 (9) 21:45	05:53 (8) 13 06:06 (8)	
14	08:26 07:40 06:37 16:28 17:26 18:19		15	07:14 (2)	06:24 20:15	19	06:53 (3) 05:22 07:12 (3) 21:08	12	05:49 (9) 04:51 06:01 (9) 21:46	05:53 (8) 12 06:05 (8)	
15	08:25 07:38 06:35 16:30 17:28 18:21		17	07:16 (2)	06:21 20:17	17	06:54 (3) 05:21 07:11 (3) 21:09	14	05:48 (9) 04:51 06:02 (9) 21:46	05:54 (8) 11 06:05 (8)	
16	08:24 07:36 06:32 16:31 17:30 18:23		19	07:15 (2)	06:19 20:18	17	06:54 (3) 05:19 07:11 (3) 21:11	15	05:47 (9) 04:51 06:02 (9) 21:47	05:54 (8) 11 06:05 (8)	
17	08:23 07:34 06:30 16:33 17:32 18:24		19	07:16 (2)	06:17 20:20	25	06:43 (4) 05:17 07:08 (3) 21:12	16	05:47 (9) 04:51 06:03 (9) 21:47	05:55 (8) 11 06:05 (8)	
18	08:22 07:32 06:28 16:35 17:34 18:26		19	07:15 (2)	06:14 20:22	27	06:40 (4) 05:16 07:07 (3) 21:14	17	05:46 (9) 04:50 06:04 (8) 21:48	05:55 (8) 10 06:05 (8)	
19	08:21 07:29 06:25 16:36 17:35 18:28		18	07:15 (2)	06:12 20:24	23	06:39 (4) 05:14 07:03 (3) 21:16	18	05:46 (9) 04:50 06:04 (8) 21:48	05:55 (8) 10 06:05 (8)	
20	08:20 07:27 06:23 16:38 17:37 18:30		16	07:15 (2)	06:10 20:26	21	06:38 (4) 05:13 06:59 (4) 21:17	19	05:46 (9) 04:51 06:05 (8) 21:48	05:57 (8) 9 06:06 (8)	
21	08:19 07:25 06:20 16:40 17:39 18:32		14	07:13 (2)	06:08 20:27	23	06:37 (4) 05:12 07:00 (4) 21:19	19	05:47 (9) 04:51 06:06 (8) 21:49	05:57 (8) 9 06:06 (8)	
22	08:18 07:23 06:18 16:42 17:41 18:33		11	07:12 (2)	06:06 20:29	24	06:36 (4) 05:10 07:00 (4) 21:20	19	05:46 (9) 04:51 06:05 (8) 21:49	05:57 (8) 9 06:06 (8)	
23	08:17 07:21 06:16 16:43 17:43 18:35		3	07:03 (2)	06:03 20:31	24	06:36 (4) 05:09 07:00 (4) 21:22	20	05:46 (8) 04:51 06:06 (8) 21:49	05:57 (8) 9 06:06 (8)	
24	08:15 07:19 06:13 16:45 17:45 18:37			07:06 (2)	06:01 20:33	25	06:35 (4) 05:07 07:00 (4) 21:23	20	05:46 (8) 04:51 06:06 (8) 21:49	05:57 (8) 10 06:07 (8)	
25	08:14 07:16 06:11 16:47 17:47 18:39				05:59 20:35	25	06:35 (4) 05:06 07:00 (4) 21:24	21	05:46 (8) 04:52 06:07 (8) 21:49	05:57 (8) 10 06:07 (8)	
26	08:13 07:14 06:08 16:49 17:49 18:41		11	06:33 (1)	05:57 20:36	25	06:34 (4) 05:05 06:59 (4) 21:26	21	05:46 (8) 04:52 06:07 (8) 21:49	05:56 (8) 11 06:07 (8)	
27	08:11 07:12 06:06 16:50 17:39 18:32		15	06:44 (1)	05:55 20:38	25	06:34 (4) 05:04 07:00 (4) 21:27	21	05:46 (8) 04:53 06:07 (8) 21:49	05:57 (8) 11 06:08 (8)	
28	08:10 07:10 06:04 16:51 17:51 18:42			06:30 (1)	05:53 20:40	24	06:36 (4) 05:03 06:58 (4) 21:29	21	05:46 (8) 04:53 06:07 (8) 21:49	05:56 (8) 12 06:08 (8)	
29	08:08 07:07 06:01 16:53 17:53 18:44		19	06:47 (1)	05:51 20:42	24	06:35 (4) 05:02 06:59 (4) 21:30	21	05:46 (8) 04:54 06:07 (8) 21:49	05:57 (8) 12 06:09 (8)	
30	08:07 06:59 06:59 16:57 19:48 22:07		22	07:26 (1)	05:49 20:43	22	06:36 (4) 05:01 06:58 (4) 21:31	21	05:46 (8) 04:54 06:07 (8) 21:48	05:57 (8) 13 06:10 (8)	
31	08:05 06:56 06:56 16:58 19:50 22:07		22	07:26 (1)	05:48 (1)		05:00 21:32	20	05:47 (8) 06:07 (8)		
	Sonnenscheinstunden	253	275	367	418		491		506		
	astr. max. mögl. Beschattung			279	650		418		392		
	Red. Sonnenscheinwahrsch.			0.28	0.37		0.43		0.39		
	Reduktion Betriebsdauer			0.96	0.96		0.96		0.96		
	Reduktion Windrichtung			0.70	0.72		0.73		0.73		
	Gesamte Reduktion			0.18	0.26		0.30		0.27		
	Met. wahrsch. Beschattung			51	166		125		106		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt: **20190529_Bostelwiebeck II**

Lizenzierter Anwender: **I17-Wind GmbH & Co. KG**
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: **GBSchattenrezeptor: CJ - IO88**

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:32 08:03 07:08 06:54 07:28 (1) 05:46 06:44 (4) 04:59 05:53 (8)						
16:10 17:00 17:55 19:51 23 07:51 (1) 20:45 13 06:57 (4) 21:34 16 06:09 (8)						
2 08:32 08:02 07:05 06:52 07:29 (1) 05:44 06:47 (4) 04:58 05:54 (8)						
16:12 17:02 17:57 19:53 21 07:50 (1) 20:47 7 06:54 (4) 21:35 16 06:10 (8)						
3 08:32 08:00 07:03 06:49 07:29 (1) 05:42 07:29 (1) 05:42 04:57 (8)						
16:13 17:04 17:58 19:55 21 07:50 (1) 20:49 21:36 15 06:09 (8)						
4 08:32 07:58 07:01 06:47 07:29 (1) 05:41 06:47 (4) 04:56 05:55 (8)						
16:14 17:06 18:00 19:57 19 07:48 (1) 20:50 07:48 (1) 05:39 21:37 13 06:08 (8)						
5 08:32 07:57 06:58 06:45 07:08 (3) 05:39 06:45 (4) 04:55 05:56 (8)						
16:15 17:08 18:02 19:59 19 07:47 (1) 20:52 07:47 (1) 04:53 21:38 13 06:09 (8)						
6 08:31 07:55 06:56 06:42 07:05 (3) 05:37 07:05 (3) 04:55 05:56 (8)						
16:16 17:10 18:04 20:00 21 07:44 (1) 20:54 21:39 12 06:08 (8)						
7 08:31 07:53 06:54 06:40 07:03 (3) 05:35 07:03 (3) 04:54 05:58 (8)						
16:18 17:12 18:06 20:02 17 07:40 (1) 20:56 07:40 (1) 21:40 10 06:08 (8)						
8 08:30 07:51 06:51 06:37 07:01 (3) 05:33 07:01 (3) 04:53 05:58 (8)						
16:19 17:14 18:08 20:04 15 07:16 (3) 20:57 07:16 (3) 21:41 8 06:06 (8)						
9 08:30 07:49 06:49 06:35 06:59 (3) 05:31 06:59 (3) 04:53 06:00 (8)						
16:20 17:16 18:10 20:06 18 07:17 (3) 20:59 07:17 (3) 21:42 6 06:06 (8)						
10 08:29 07:48 06:47 07:10 (2) 06:33 06:57 (3) 05:29 05:56 (9) 04:52 05:24 (7)						
16:22 17:18 18:12 3 07:13 (2) 20:08 19 07:16 (3) 21:01 6 06:02 (9) 21:43 2 06:03 (8)						
11 08:29 07:46 06:44 07:08 (2) 06:30 06:57 (3) 05:27 05:54 (9) 04:52 05:23 (7)						
16:23 17:20 18:13 8 07:16 (2) 20:09 19 07:16 (3) 21:03 10 06:04 (9) 21:44 4 05:27 (7)						
12 08:28 07:44 06:42 07:06 (2) 06:28 06:57 (3) 05:26 05:52 (9) 04:52 05:23 (7)						
16:25 17:22 18:15 12 07:18 (2) 20:11 19 07:16 (3) 21:04 12 06:04 (9) 21:44 6 05:29 (7)						
13 08:27 07:42 06:40 07:03 (2) 06:26 06:57 (3) 05:24 05:51 (9) 04:51 05:23 (7)						
16:26 17:24 18:17 15 07:18 (2) 20:13 18 07:15 (3) 21:06 15 06:06 (9) 21:45 7 05:30 (7)						
14 08:26 07:40 06:37 07:01 (2) 06:24 06:53 (4) 05:22 05:50 (9) 04:51 05:22 (7)						
16:28 17:26 18:19 18 07:19 (2) 20:15 19 07:14 (3) 21:08 16 06:06 (9) 21:46 8 05:30 (7)						
15 08:25 07:38 06:35 07:00 (2) 06:21 06:48 (4) 05:21 05:50 (9) 04:51 05:22 (7)						
16:30 17:28 18:21 19 07:19 (2) 20:17 25 07:13 (3) 21:09 18 06:08 (8) 21:46 8 05:30 (7)						
16 08:24 07:36 06:32 07:00 (2) 06:19 06:46 (4) 05:19 05:50 (9) 04:51 05:22 (7)						
16:31 17:30 18:23 19 07:19 (2) 20:18 26 07:12 (3) 21:11 18 06:08 (8) 21:47 9 05:31 (7)						
17 08:23 07:34 06:30 06:59 (2) 06:17 06:43 (4) 05:17 05:50 (9) 04:51 05:22 (7)						
16:33 17:32 18:24 19 07:18 (2) 20:20 25 07:08 (3) 21:12 19 06:09 (8) 21:47 9 05:31 (7)						
18 08:22 07:32 06:28 07:00 (2) 06:14 06:42 (4) 05:16 05:50 (9) 04:50 05:22 (7)						
16:35 17:34 18:26 17 07:17 (2) 20:22 21 07:03 (4) 21:14 20 06:10 (8) 21:48 9 05:31 (7)						
19 08:21 07:29 06:25 07:01 (2) 06:12 06:41 (4) 05:14 05:50 (9) 04:50 05:22 (7)						
16:36 17:35 18:28 16 07:17 (2) 20:24 23 07:04 (4) 21:16 20 06:10 (8) 21:48 10 05:32 (7)						
20 08:20 07:27 06:23 07:01 (2) 06:10 06:41 (4) 05:13 05:50 (9) 04:51 05:23 (7)						
16:38 17:37 18:30 13 07:14 (2) 20:26 24 07:05 (4) 21:17 21 06:11 (8) 21:48 10 05:33 (7)						
21 08:19 07:25 06:21 07:03 (2) 06:08 06:40 (4) 05:12 05:50 (8) 04:51 05:23 (7)						
16:40 17:39 18:32 9 07:12 (2) 20:27 25 07:05 (4) 21:19 21 06:11 (8) 21:49 10 05:33 (7)						
22 08:18 07:23 06:18 07:00 (2) 06:06 06:40 (4) 05:10 05:49 (8) 04:51 05:23 (7)						
16:42 17:41 18:33 20:29 25 07:05 (4) 21:20 21 06:10 (8) 21:49 10 05:33 (7)						
23 08:17 07:21 06:16 06:03 06:40 (4) 05:09 06:40 (4) 05:09 05:50 (8) 04:51 05:23 (7)						
16:43 17:43 18:35 20:31 25 07:05 (4) 21:22 21 06:11 (8) 21:49 10 05:33 (7)						
24 08:15 07:19 06:13 06:38 (1) 06:01 06:40 (4) 05:07 05:50 (8) 04:51 05:24 (7)						
16:45 17:45 18:37 8 06:46 (1) 20:33 25 07:05 (4) 21:23 21 06:11 (8) 21:49 10 05:34 (7)						
25 08:14 07:16 06:11 06:35 (1) 05:59 06:40 (4) 05:06 05:50 (8) 04:52 05:24 (7)						
16:47 17:47 18:39 14 06:49 (1) 20:35 24 07:04 (4) 21:24 21 06:11 (8) 21:49 9 05:33 (7)						
26 08:13 07:14 06:08 06:33 (1) 05:57 06:39 (4) 05:05 05:51 (8) 04:52 05:24 (7)						
16:49 17:49 18:41 18 06:51 (1) 20:36 24 07:03 (4) 21:26 20 06:11 (8) 21:49 9 05:33 (7)						
27 08:11 07:12 06:06 06:31 (1) 05:55 06:39 (4) 05:04 05:51 (8) 04:53 05:25 (7)						
16:50 17:51 18:42 20 06:51 (1) 20:38 23 07:02 (4) 21:27 20 06:11 (8) 21:49 8 05:33 (7)						
28 08:10 07:10 06:04 06:31 (1) 05:53 06:40 (4) 05:03 05:51 (8) 04:53 05:25 (7)						
16:53 17:53 18:44 21 06:52 (1) 20:40 21 07:01 (4) 21:29 20 06:11 (8) 21:49 8 05:33 (7)						
29 08:08 07:01 06:51 07:29 (1) 05:51 06:42 (4) 05:02 05:52 (8) 04:54 05:26 (7)						
16:55 17:55 18:46 22 07:51 (1) 20:42 19 07:01 (4) 21:30 19 06:11 (8) 21:49 7 05:33 (7)						
30 08:07 06:59 07:29 (1) 05:49 06:43 (4) 05:01 05:52 (8) 04:54 05:27 (7)						
16:57 17:57 18:48 23 07:52 (1) 20:43 16 06:59 (4) 21:31 18 06:10 (8) 21:48 6 05:33 (7)						
31 08:05 06:56 07:29 (1) 05:47 06:42 (4) 05:00 05:52 (8) 04:53 05:27 (7)						
16:58 17:58 18:49 23 07:52 (1) 20:44 18 06:59 (4) 21:32 18 06:10 (8) 21:48 6 05:33 (7)						
Sonnenscheinstunden 253 275 367 418 491 506 278						
astr.max.mögl.Beschattung 0.28						
Red.Sonnenscheinwahrsch. 0.37						
Reduktion Betriebsdauer 0.96						
Reduktion Windrichtung 0.70						
Gesamte Reduktion 0.18						
Met.wahrsch.Beschattung 0.26						
163						
415						
0.43						
0.96						
0.73						
0.30						
124						
74						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CJ - IO88

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S [Mittlere tägliche Sonnenstunden] [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor

N	NO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
302	339	467	706	786	617	554	815	1,348	1,328	721	398	8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember				
1	04:55	05:27 (7)	05:34	06:03 (9)	06:26	06:56 (3)	07:18	07:44 (2)	07:14	08:08
	21:48	5 05:32 (7)	21:14	11 06:14 (9)	20:09	19 07:15 (3)	18:57	14 07:58 (2)	16:48	16:05
2	04:56	05:28 (7)	05:35	06:05 (9)	06:28	06:56 (3)	07:20	07:46 (2)	07:16	08:09
	21:48	3 05:31 (7)	21:12	8 06:13 (9)	20:07	19 07:15 (3)	18:55	10 07:56 (2)	16:46	16:05
3	04:56	06:06 (8)	05:37	06:06 (9)	06:30	06:56 (3)	07:21	07:47 (2)	07:18	08:11
	21:47	4 06:10 (8)	21:11	4 06:10 (9)	20:05	18 07:14 (3)	18:52	6 07:53 (2)	16:44	16:04
4	04:57	06:04 (8)	05:38		06:31	06:58 (3)	07:23		07:20	08:12
	21:47	7 06:11 (8)	21:09		20:02	15 07:13 (3)	18:50		16:42	16:03
5	04:58	06:04 (8)	05:40		06:33	07:00 (3)	07:25		07:22	08:14
	21:46	8 06:12 (8)	21:07		20:00	17 07:37 (1)	18:48		16:41	16:03
6	04:59	06:03 (8)	05:42		06:35	07:01 (3)	07:27		07:24	08:15
	21:46	11 06:14 (8)	21:05		19:58	21 07:40 (1)	18:45		16:39	16:02
7	05:00	06:03 (8)	05:43		06:36	07:03 (3)	07:28		07:26	08:16
	21:45	12 06:15 (8)	21:03		19:55	20 07:42 (1)	18:43		16:37	16:02
8	05:01	06:02 (8)	05:45		06:38	07:24 (1)	07:30		07:28	08:18
	21:45	14 06:16 (8)	21:01		19:53	19 07:43 (1)	18:41		16:35	16:01
9	05:02	06:02 (8)	05:47		06:40	07:23 (1)	07:32		07:30	08:19
	21:44	14 06:16 (8)	20:59		19:50	20 07:43 (1)	18:38		16:33	16:01
10	05:03	06:02 (8)	05:48		06:42	07:22 (1)	07:34		07:31	08:20
	21:43	15 06:17 (8)	20:57		19:48	21 07:43 (1)	18:36		16:32	16:01
11	05:04	06:01 (8)	05:50	06:54 (4)	06:43	07:21 (1)	07:36		07:33	08:21
	21:42	17 06:18 (8)	20:55	10 07:04 (4)	19:46	23 07:44 (1)	18:34		16:30	16:01
12	05:05	06:01 (8)	05:52	06:52 (4)	06:45	07:20 (1)	07:37		07:35	08:22
	21:41	17 06:18 (8)	20:53	14 07:06 (4)	19:43	23 07:43 (1)	18:31		16:28	16:00
13	05:06	06:01 (8)	05:54	06:50 (4)	06:47	07:20 (1)	07:39		07:37	08:23
	21:40	18 06:19 (8)	20:51	17 07:07 (4)	19:41	23 07:43 (1)	18:29		16:27	16:00
14	05:07	06:00 (8)	05:55	06:49 (4)	06:48	07:20 (1)	07:41		07:39	08:24
	21:39	19 06:19 (8)	20:49	20 07:09 (4)	19:38	23 07:43 (1)	18:27		16:25	16:00
15	05:09	06:00 (8)	05:57	06:47 (4)	06:50	07:20 (1)	07:43		07:41	08:25
	21:38	19 06:19 (8)	20:47	22 07:09 (4)	19:36	21 07:41 (1)	18:24		16:24	16:00
16	05:10	06:00 (8)	05:59	06:47 (4)	06:52	07:21 (1)	07:45		07:43	08:26
	21:37	19 06:19 (8)	20:45	23 07:10 (4)	19:33	19 07:40 (1)	18:22		16:22	16:00
17	05:11	06:00 (8)	06:00	06:46 (4)	06:54	07:22 (1)	07:46		07:44	08:27
	21:36	21 06:21 (8)	20:43	24 07:10 (4)	19:31	17 07:39 (1)	18:20		16:21	16:01
18	05:13	06:00 (8)	06:02	06:45 (4)	06:55	07:22 (1)	07:48		07:46	08:28
	21:35	21 06:21 (8)	20:41	25 07:10 (4)	19:29	15 07:37 (1)	18:18		16:19	16:01
19	05:14	06:00 (8)	06:04	06:45 (4)	06:57	07:24 (1)	07:50		07:48	08:28
	21:34	21 06:21 (8)	20:39	25 07:10 (4)	19:26	10 07:34 (1)	18:15		16:18	16:01
20	05:15	05:59 (8)	06:05	06:44 (4)	06:59		07:52		07:50	08:29
	21:32	21 06:20 (8)	20:37	25 07:09 (4)	19:24		18:13		16:17	16:01
21	05:17	06:00 (8)	06:07	06:45 (4)	07:00		07:54		07:51	08:30
	21:31	21 06:21 (8)	20:34	25 07:10 (4)	19:21		18:11		16:15	16:02
22	05:18	06:00 (8)	06:09	06:45 (4)	07:02	07:49 (2)	07:56		07:53	08:30
	21:30	21 06:21 (8)	20:32	24 07:09 (4)	19:19	7 07:56 (2)	18:09		16:14	16:02
23	05:20	06:00 (9)	06:11	06:44 (4)	07:04	07:46 (2)	07:58		07:55	08:31
	21:28	20 06:20 (8)	20:30	24 07:08 (4)	19:16	13 07:59 (2)	18:07		16:13	16:03
24	05:21	06:01 (9)	06:12	06:45 (4)	07:06	07:45 (2)	07:59		07:57	08:31
	21:27	20 06:21 (8)	20:28	23 07:08 (4)	19:14	15 08:00 (2)	18:05		16:12	16:03
25	05:23	06:00 (9)	06:14	06:46 (4)	07:07	07:43 (2)	07:01		07:58	08:32
	21:25	20 06:20 (8)	20:25	21 07:07 (4)	19:12	17 08:00 (2)	17:02		16:11	16:04
26	05:24	06:01 (9)	06:16	06:46 (4)	07:09	07:42 (2)	07:03		08:00	08:32
	21:24	19 06:20 (8)	20:23	25 07:11 (3)	19:09	18 08:00 (2)	17:00		16:10	16:05
27	05:26	06:00 (9)	06:18	06:48 (4)	07:11	07:42 (2)	07:05		08:02	08:32
	21:22	19 06:19 (8)	20:21	26 07:14 (3)	19:07	18 08:00 (2)	16:58		16:09	16:06
28	05:27	06:01 (9)	06:19	06:49 (4)	07:13	07:41 (2)	07:07		08:03	08:32
	21:21	18 06:19 (8)	20:19	25 07:14 (3)	19:04	18 07:59 (2)	16:56		16:08	16:06
29	05:29	06:01 (9)	06:21	06:58 (3)	07:14	07:41 (2)	07:09		08:05	08:32
	21:19	17 06:18 (8)	20:16	17 07:15 (3)	19:02	18 07:59 (2)	16:54		16:07	16:07
30	05:30	06:01 (9)	06:23	06:58 (3)	07:16	07:42 (2)	07:11		08:06	08:32
	21:18	15 06:16 (9)	20:14	18 07:16 (3)	19:00	16 07:58 (2)	16:52		16:06	16:08
31	05:32	06:02 (9)	06:24	06:56 (3)			07:13			08:32
	21:16	14 06:16 (9)	20:12	19 07:15 (3)			16:50			16:09
Sonnenscheinstunden	508	458	475	382	503	330	262	237		
astr.max.mögl.Beschattung	490		475		503		30			
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29			
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96			
Reduktion Windrichtung	0.73		0.72		0.70		0.68			
Gesamte Reduktion	0.26		0.29		0.23		0.19			
Met.wahrsch.Beschattung	129		138		118		6			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)			Zeitpunkt (SS:MM)	Schattende	(WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CL - IO90

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32 16:10	08:03 17:00	07:08 17:55	06:54 19:51	07:29 (1) 05:46 21 07:50 (1) 20:45	04:59 21:34	7	06:01 (8) 06:08 (8)
2	08:32 16:12	08:02 17:02	07:05 17:57	06:52 19:53	07:30 (1) 05:44 20 07:50 (1) 20:47	04:58 21:35	2	06:04 (8) 06:06 (8)
3	08:32 16:13	08:00 17:04	07:03 17:58	06:49 19:55	07:31 (1) 05:42 18 07:49 (1) 20:49	04:57 21:36		
4	08:32 16:14	07:58 17:06	07:01 18:00	06:47 19:57	07:31 (1) 05:41 16 07:47 (1) 20:50	04:56 21:37	3	05:26 (7) 05:29 (7)
5	08:32 16:15	07:57 17:08	06:58 18:02	06:45 19:59	07:33 (1) 05:39 12 07:45 (1) 20:52	04:55 21:38	5	05:26 (7) 05:31 (7)
6	08:31 16:16	07:55 17:10	06:56 18:04	06:42 20:00	07:35 (1) 05:37 5 07:40 (1) 20:54	04:55 21:39	7	05:25 (7) 05:32 (7)
7	08:31 16:18	07:53 17:12	06:54 18:06	06:40 20:02	05:35 20:56	04:54 21:40	8	05:25 (7) 05:33 (7)
8	08:30 16:19	07:51 17:14	06:51 18:08	06:37 20:04	05:33 20:57	04:53 21:41	9	05:24 (7) 05:33 (7)
9	08:30 16:20	07:49 17:16	06:49 18:10	06:35 20:06	05:31 20:59	04:53 21:42	10	05:24 (7) 05:34 (7)
10	08:29 16:22	07:48 17:18	06:47 18:12	06:33 20:08	05:29 21:01	04:52 21:43	11	05:23 (7) 05:34 (7)
11	08:29 16:23	07:46 17:20	06:44 18:13	06:30 20:09	05:27 21:03	04:52 21:44	12	05:23 (7) 05:35 (7)
12	08:28 16:25	07:44 17:22	06:42 18:15	06:28 20:11	05:26 21:04	04:52 21:44	13	05:23 (7) 05:36 (7)
13	08:27 16:26	07:42 17:24	06:40 18:17	06:26 20:13	06:52 (4) 05:24 7 06:59 (4) 21:06	04:51 21:45	13	05:23 (7) 05:36 (7)
14	08:26 16:28	07:40 17:26	06:37 18:19	06:24 20:15	06:49 (4) 05:22 13 07:02 (4) 21:08	04:51 21:46	14	05:22 (7) 05:36 (7)
15	08:25 16:30	07:38 17:28	06:35 18:21	06:21 20:17	06:47 (4) 05:21 17 07:04 (4) 21:09	04:51 21:46	14	05:22 (7) 05:36 (7)
16	08:24 16:31	07:36 17:30	06:32 18:23	06:19 20:18	06:46 (4) 05:19 19 07:05 (4) 21:11	04:51 21:47	15	05:22 (7) 05:37 (7)
17	08:23 16:33	07:34 17:32	06:30 18:24	06:17 20:20	06:44 (4) 05:17 21 07:05 (4) 21:12	04:51 21:47	15	05:22 (7) 05:37 (7)
18	08:22 16:35	07:32 17:34	06:28 18:26	06:14 20:22	06:43 (4) 05:16 23 07:06 (4) 21:14	04:50 21:48	14	05:23 (7) 05:37 (7)
19	08:21 16:36	07:29 17:35	06:25 18:28	06:12 20:24	06:43 (4) 05:14 23 07:06 (4) 21:16	04:50 21:48	14	05:23 (7) 05:37 (7)
20	08:20 16:38	07:27 17:37	06:23 18:30	06:10 20:26	06:42 (4) 05:13 24 07:06 (4) 21:17	04:51 21:48	15	05:24 (7) 05:39 (7)
21	08:19 16:40	07:25 17:39	06:21 18:32	06:08 20:27	06:42 (4) 05:12 24 07:06 (4) 21:19	04:51 21:49	15	05:24 (7) 05:39 (7)
22	08:18 16:42	07:23 17:41	06:18 18:33	06:06 20:29	06:42 (4) 05:10 24 07:06 (4) 21:20	04:51 21:49	15	05:24 (7) 05:39 (7)
23	08:17 16:44	07:21 17:43	06:16 18:35	06:03 20:31	06:42 (4) 05:09 24 07:06 (4) 21:22	04:51 21:49	14	05:24 (7) 05:38 (7)
24	08:15 16:45	07:19 17:45	06:13 18:37	06:01 20:33	06:42 (4) 05:07 23 07:05 (4) 21:23	04:51 21:49	14	05:25 (7) 05:39 (7)
25	08:14 16:47	07:16 17:47	06:11 18:39	06:34 (1) 05:59 16 06:50 (1) 20:35	06:43 (4) 05:06 22 07:05 (4) 21:24	04:52 21:49	14	05:25 (7) 05:39 (7)
26	08:13 16:49	07:14 17:49	06:08 18:41	06:33 (1) 05:57 18 06:51 (1) 20:36	06:42 (4) 05:05 21 07:03 (4) 21:26	04:52 21:49	15	05:24 (7) 05:39 (7)
27	08:11 16:51	07:12 17:51	06:06 18:42	06:31 (1) 05:55 20 06:51 (1) 20:38	06:43 (4) 05:04 18 07:01 (4) 21:27	04:53 21:49	14	05:25 (7) 05:39 (7)
28	08:10 16:53	07:10 17:53	06:04 18:44	06:31 (1) 05:53 21 06:52 (1) 20:40	06:44 (4) 05:03 16 07:00 (4) 21:29	04:53 21:49	14	05:25 (7) 05:39 (7)
29	08:08 16:55	07:08 17:55	06:02 18:46	06:29 20:42	06:47 (4) 05:02 12 06:59 (4) 21:30	04:54 21:49	14	05:26 (7) 05:40 (7)
30	08:07 16:57	07:07 17:56	06:01 18:47	06:28 20:43	06:50 (4) 05:01 5 06:55 (4) 21:31	04:54 21:48	13	05:27 (7) 05:40 (7)
31	08:05 16:58	07:06 17:57	06:00 18:48	06:27 20:44	06:51 (4) 05:00 10 06:56 (4) 21:32	04:54 21:48	13	05:27 (7) 05:40 (7)
	Sonnenscheinstunden	253	275	367	418	491	506	
	astr.max.mögl.Beschattung			152	428	399	343	
	Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39	
	Reduktion Betriebsdauer			0.96	0.96	0.96	0.96	
	Reduktion Windrichtung			0.71	0.72	0.73	0.72	
	Gesamte Reduktion			0.19	0.26	0.30	0.27	
	Met.wahrsch.Beschattung			29	109	120	91	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CL - IO90

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55	05:27 (7) 05:34	06:04 (9) 06:26	07:18	07:14	08:08
	21:48	12 05:39 (7) 21:14	16 06:20 (8) 20:09	18:57	16:48	16:05
2	04:56	05:28 (7) 05:35	06:05 (9) 06:28	07:20	07:16	08:09
	21:48	12 05:40 (7) 21:12	14 06:19 (8) 20:07	18:55	16:46	16:05
3	04:56	05:29 (7) 05:37	06:06 (9) 06:30	07:21	07:18	08:11
	21:47	11 05:40 (7) 21:11	11 06:17 (9) 20:05	18:52	16:44	16:04
4	04:57	05:29 (7) 05:38	06:08 (9) 06:31	07:23	07:20	08:12
	21:47	10 05:39 (7) 21:09	8 06:16 (9) 20:02	18:50	16:42	16:03
5	04:58	05:30 (7) 05:40	06:10 (9) 06:33	07:25	07:22	08:14
	21:46	9 05:39 (7) 21:07	4 06:14 (9) 20:00	18:48	16:41	16:03
6	04:59	05:31 (7) 05:42	06:35	07:32 (1) 07:27	07:24	08:15
	21:46	7 05:38 (7) 21:05	19:58	4 07:36 (1) 18:45	16:39	16:02
7	05:00	05:32 (7) 05:43	06:36	07:28 (1) 07:28	07:26	08:16
	21:45	6 05:38 (7) 21:03	19:55	12 07:40 (1) 18:43	16:37	16:02
8	05:01	05:33 (7) 05:45	06:38	07:26 (1) 07:30	07:28	08:18
	21:45	4 05:37 (7) 21:01	19:53	16 07:42 (1) 18:41	16:35	16:01
9	05:02	05:47	06:40	07:24 (1) 07:32	07:30	08:19
	21:44	20:59	19:50	18 07:42 (1) 18:38	16:33	16:01
10	05:03	05:48	06:42	07:23 (1) 07:34	07:31	08:20
	21:43	20:57	19:48	20 07:43 (1) 18:36	16:32	16:01
11	05:04	06:10 (8) 05:50	06:43	07:22 (1) 07:36	07:33	08:21
	21:42	5 06:15 (8) 20:55	19:46	21 07:43 (1) 18:34	16:30	16:01
12	05:05	06:08 (8) 05:52	06:45	07:21 (1) 07:37	07:35	08:22
	21:41	9 06:17 (8) 20:53	19:43	22 07:43 (1) 18:31	16:28	16:00
13	05:06	06:07 (8) 05:54	06:46 (4) 06:47	07:21 (1) 07:39	07:37	08:23
	21:40	11 06:18 (8) 20:51	8 07:04 (4) 19:41	22 07:43 (1) 18:29	16:27	16:00
14	05:07	06:07 (8) 05:55	06:48	07:21 (1) 07:41	07:39	08:24
	21:39	12 06:19 (8) 20:49	13 07:07 (4) 19:38	22 07:43 (1) 18:27	16:25	16:00
15	05:09	06:06 (8) 05:57	06:51 (4) 06:50	07:20 (1) 07:43	07:41	08:25
	21:38	14 06:20 (8) 20:47	17 07:08 (4) 19:36	21 07:41 (1) 18:24	16:24	16:00
16	05:10	06:05 (8) 05:59	06:50 (4) 06:52	07:21 (1) 07:45	07:43	08:26
	21:37	15 06:20 (8) 20:45	19 07:09 (4) 19:33	20 07:41 (1) 18:22	16:22	16:00
17	05:11	06:05 (8) 06:00	06:50 (4) 06:54	07:21 (1) 07:46	07:44	08:27
	21:36	17 06:22 (8) 20:43	20 07:10 (4) 19:31	19 07:40 (1) 18:20	16:21	16:01
18	05:13	06:05 (8) 06:02	06:48 (4) 06:55	07:21 (1) 07:48	07:46	08:28
	21:35	17 06:22 (8) 20:41	22 07:10 (4) 19:29	17 07:38 (1) 18:18	16:19	16:01
19	05:14	06:04 (8) 06:04	06:48 (4) 06:57	07:23 (1) 07:50	07:48	08:28
	21:34	19 06:23 (8) 20:39	23 07:11 (4) 19:26	13 07:36 (1) 18:15	16:18	16:01
20	05:15	06:04 (8) 06:05	06:47 (4) 06:59	07:27 (1) 07:52	07:50	08:29
	21:32	19 06:23 (8) 20:37	23 07:10 (4) 19:24	5 07:32 (1) 18:13	16:17	16:01
21	05:17	06:04 (8) 06:07	06:47 (4) 07:00	07:54	07:51	08:30
	21:31	20 06:24 (8) 20:34	24 07:11 (4) 19:21	18:11	16:15	16:02
22	05:18	06:04 (8) 06:09	06:47 (4) 07:02	07:56	07:53	08:30
	21:30	20 06:24 (8) 20:32	24 07:11 (4) 19:19	18:09	16:14	16:02
23	05:20	06:03 (8) 06:11	06:46 (4) 07:04	07:58	07:55	08:31
	21:28	21 06:24 (8) 20:30	24 07:10 (4) 19:16	18:07	16:13	16:03
24	05:21	06:04 (8) 06:12	06:46 (4) 07:06	07:59	07:57	08:31
	21:27	20 06:24 (8) 20:28	24 07:10 (4) 19:14	18:05	16:12	16:03
25	05:23	06:04 (9) 06:14	06:47 (4) 07:07	07:01	07:58	08:32
	21:26	20 06:24 (8) 20:25	22 07:09 (4) 19:12	17:02	16:11	16:04
26	05:24	06:04 (9) 06:16	06:47 (4) 07:09	07:03	08:00	08:32
	21:24	20 06:24 (8) 20:23	21 07:08 (4) 19:09	17:00	16:10	16:05
27	05:26	06:03 (9) 06:18	06:48 (4) 07:11	07:05	08:02	08:32
	21:22	21 06:24 (8) 20:21	19 07:07 (4) 19:07	16:58	16:09	16:06
28	05:27	06:04 (9) 06:19	06:48 (4) 07:13	07:07	08:03	08:32
	21:21	20 06:24 (8) 20:19	17 07:05 (4) 19:04	16:56	16:08	16:06
29	05:29	06:03 (9) 06:21	06:50 (4) 07:14	07:09	08:05	08:32
	21:19	20 06:23 (8) 20:16	13 07:03 (4) 19:02	16:54	16:07	16:07
30	05:30	06:03 (9) 06:23	06:53 (4) 07:16	07:11	08:06	08:32
	21:18	19 06:22 (8) 20:14	7 07:00 (4) 19:00	16:52	16:06	16:08
31	05:32	06:04 (9) 06:24		07:13		08:32
	21:16	18 06:22 (8) 20:12		16:50		16:09
Sonnenscheinstunden	508	458	382	330	262	237
astr.max.mögl.Beschattung	428	393	252			
Red.Sonnenscheinwahrsch.	0.38	0.42	0.35			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.73	0.72	0.71			
Gesamte Reduktion	0.26	0.29	0.24			
Met.wahrsch.Beschattung	113	115	60			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CM - IO91

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32 16:10	08:03 17:00	07:08 17:55	06:54 19:51	07:31 (1) 05:46 21 07:52 (1) 20:45	04:59 21:34	7	06:02 (8) 06:09 (8)
2	08:32 16:12	08:02 17:02	07:05 17:57	06:52 19:53	07:32 (1) 05:44 19 07:51 (1) 20:47	04:58 21:35	3	06:05 (8) 06:08 (8)
3	08:32 16:13	08:00 17:04	07:03 17:58	06:49 19:55	07:33 (1) 05:42 17 07:50 (1) 20:49	04:57 21:36		
4	08:32 16:14	07:58 17:06	07:01 18:00	06:47 19:57	07:34 (1) 05:41 14 07:48 (1) 20:50	04:56 21:37	1	05:27 (7) 05:28 (7)
5	08:32 16:15	07:57 17:08	06:58 18:02	06:45 19:59	07:37 (1) 05:39 8 07:45 (1) 20:52	04:55 21:38	5	05:26 (7) 05:31 (7)
6	08:31 16:16	07:55 17:10	06:56 18:04	06:42 20:00	05:37 20:54	04:55 21:39	7	05:25 (7) 05:32 (7)
7	08:31 16:18	07:53 17:12	06:54 18:06	06:40 20:02	05:35 20:56	04:54 21:40	8	05:25 (7) 05:33 (7)
8	08:30 16:19	07:51 17:14	06:51 18:08	06:37 20:04	05:33 20:57	04:53 21:41	10	05:24 (7) 05:34 (7)
9	08:30 16:20	07:49 17:16	06:49 18:10	06:35 20:06	05:31 20:59	04:53 21:42	11	05:24 (7) 05:35 (7)
10	08:29 16:22	07:48 17:18	06:47 18:12	06:33 20:08	05:29 21:01	04:52 21:43	12	05:23 (7) 05:36 (7)
11	08:29 16:23	07:46 17:20	06:44 18:13	06:30 20:09	05:27 21:03	04:52 21:44	12	05:23 (7) 05:35 (7)
12	08:28 16:25	07:44 17:22	06:42 18:15	06:28 20:11	05:26 21:04	04:52 21:44	13	05:23 (7) 05:36 (7)
13	08:27 16:26	07:42 17:24	06:40 18:17	06:26 20:13	05:24 21:06	04:51 21:45	14	05:23 (7) 05:37 (7)
14	08:26 16:28	07:40 17:26	06:37 18:19	06:24 20:15	05:22 21:08	04:51 21:46	14	05:22 (7) 05:36 (7)
15	08:25 16:30	07:38 17:28	06:35 18:21	06:21 20:17	05:21 21:09	04:51 21:46	14	05:23 (7) 05:37 (7)
16	08:24 16:31	07:36 17:30	06:32 18:23	06:19 20:18	05:19 21:11	04:51 21:47	14	05:23 (7) 05:37 (7)
17	08:23 16:33	07:34 17:32	06:30 18:24	06:17 20:20	05:17 21:12	04:51 21:47	14	05:23 (7) 05:37 (7)
18	08:22 16:35	07:32 17:34	06:28 18:26	06:14 20:22	05:16 21:14	04:50 21:48	15	05:23 (7) 05:38 (7)
19	08:21 16:36	07:29 17:35	06:25 18:28	06:12 20:24	05:14 21:16	04:50 21:48	15	05:23 (7) 05:38 (7)
20	08:20 16:38	07:27 17:37	06:23 18:30	06:10 20:26	05:13 21:17	04:51 21:48	15	05:24 (7) 05:39 (7)
21	08:19 16:40	07:25 17:39	06:21 18:32	06:08 20:27	05:12 21:19	04:51 21:49	15	05:24 (7) 05:39 (7)
22	08:18 16:42	07:23 17:41	06:18 18:33	06:06 20:29	05:10 21:20	04:51 21:49	15	05:24 (7) 05:39 (7)
23	08:17 16:44	07:21 17:43	06:16 18:35	06:03 20:31	05:09 21:22	04:51 21:49	15	05:24 (7) 05:39 (7)
24	08:15 16:45	07:19 17:45	06:13 18:37	06:01 20:33	05:07 21:23	04:51 21:49	15	05:25 (7) 05:40 (7)
25	08:14 16:47	07:16 17:47	06:11 18:39	06:00 20:35	05:06 21:24	04:51 21:49	15	05:25 (7) 05:40 (7)
26	08:13 16:49	07:14 17:49	06:08 18:41	05:57 20:36	05:05 21:26	04:51 21:49	14	05:25 (7) 05:39 (7)
27	08:11 16:51	07:12 17:51	06:06 18:42	05:55 20:38	05:04 21:27	04:51 21:49	14	05:26 (7) 05:40 (7)
28	08:10 16:53	07:10 17:53	06:04 18:44	05:53 20:40	05:03 21:29	04:51 21:49	14	05:26 (7) 05:39 (7)
29	08:08 16:55	07:07 17:55	06:02 18:46	05:51 20:42	05:02 21:30	04:51 21:49	14	05:26 (7) 05:40 (7)
30	08:07 16:57	07:05 17:57	06:00 18:48	05:49 20:43	05:01 21:31	04:51 21:48	13	05:27 (7) 05:40 (7)
31	08:05 16:58	07:03 17:59	05:58 18:50	05:47 20:44	05:00 21:32	04:51 21:48	10	05:27 (7) 06:10 (8)
Sonnenscheinstunden	253	275	367	418	491	506		
astr.max.mögl.Beschattung			173	417	407	348		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.71	0.72	0.73	0.72		
Gesamte Reduktion			0.19	0.26	0.30	0.27		
Met.wahrsch.Beschattung			32	107	122	92		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CN - IO92

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	06:54	07:34 (1)	05:46		04:59	
	16:10	17:00	17:55	19:51	19	07:53 (1)	20:45	21:34	
2	08:32	08:02	07:05	06:52	07:35 (1)	05:44		04:58	
	16:12	17:02	17:57	19:53	17	07:52 (1)	20:47	21:35	
3	08:32	08:00	07:03	06:49	07:36 (1)	05:42		04:57	
	16:13	17:04	17:58	19:55	14	07:50 (1)	20:49	21:36	
4	08:32	07:58	07:01	06:47	07:38 (1)	05:41		04:56	
	16:14	17:06	18:00	19:57	9	07:47 (1)	20:50	21:37	
5	08:32	07:57	06:58	06:45		05:39		04:55	
	16:15	17:08	18:02	19:59		20:52		21:38	
6	08:31	07:55	06:56	06:42		05:37		04:55	
	16:16	17:10	18:04	20:00		20:54		21:39	
7	08:31	07:53	06:54	06:40		05:35		04:54	
	16:18	17:12	18:06	20:02		20:56	7	06:01 (9)	
8	08:30	07:51	06:51	06:37		05:33		04:53	
	16:19	17:14	18:08	20:04		20:57	11	06:10 (8)	
9	08:30	07:49	06:49	06:35		05:31		04:53	
	16:20	17:16	18:10	20:06		20:59	15	06:12 (8)	
10	08:29	07:48	06:47	06:33		05:29		04:52	
	16:22	17:18	18:12	20:08		21:01	17	06:14 (8)	
11	08:29	07:46	06:44	06:30		05:27		04:52	
	16:23	17:20	18:13	20:09	1	07:01 (4)	21:03	19	06:15 (8)
12	08:28	07:44	06:42	06:28		05:26		04:52	
	16:25	17:22	18:15	20:11	11	07:06 (4)	21:04	20	06:15 (8)
13	08:27	07:42	06:40	06:26		05:24		04:51	
	16:26	17:24	18:17	20:13	16	07:07 (4)	21:06	21	06:16 (8)
14	08:26	07:40	06:37	06:24		05:22		04:51	
	16:28	17:26	18:19	20:15	19	07:09 (4)	21:08	21	06:16 (8)
15	08:25	07:38	06:35	06:21		05:21		04:51	
	16:30	17:28	18:21	20:17	21	07:10 (4)	21:09	21	06:17 (8)
16	08:24	07:36	06:32	06:19		05:19		04:51	
	16:31	17:30	18:23	20:18	23	07:11 (4)	21:11	22	06:17 (8)
17	08:23	07:34	06:30	06:17		05:17		04:51	
	16:33	17:32	18:24	20:20	24	07:10 (4)	21:12	21	06:17 (8)
18	08:22	07:32	06:28	06:14		05:16		04:50	
	16:35	17:34	18:26	20:22	24	07:10 (4)	21:14	20	06:17 (8)
19	08:21	07:29	06:25	06:12		05:14		04:50	
	16:36	17:35	18:28	20:24	24	07:10 (4)	21:16	21	06:17 (8)
20	08:20	07:27	06:23	06:10		05:13		04:51	
	16:38	17:37	18:30	20:26	24	07:10 (4)	21:17	20	06:17 (8)
21	08:19	07:25	06:21	06:08		05:12		04:51	
	16:40	17:39	18:32	20:27	24	07:10 (4)	21:19	20	06:17 (8)
22	08:18	07:23	06:18	06:06		05:10		04:51	
	16:42	17:41	18:33	9	06:51 (1)	20:29	23	07:09 (4)	21:20
23	08:17	07:21	06:16	06:03		05:09		04:51	
	16:44	17:43	18:35	15	06:54 (1)	20:31	23	07:09 (4)	21:22
24	08:15	07:19	06:13	06:01		05:07		04:51	
	16:45	17:45	18:37	17	06:54 (1)	20:33	21	07:08 (4)	21:23
25	08:14	07:16	06:11	05:59		05:06		04:52	
	16:47	17:47	18:39	19	06:55 (1)	20:35	19	07:07 (4)	21:24
26	08:13	07:14	06:08	06:35 (1)		05:05		04:52	
	16:49	17:49	18:41	21	06:56 (1)	20:36	16	07:04 (4)	21:26
27	08:11	07:12	06:06	06:34 (1)		05:04		04:53	
	16:50	17:51	18:42	22	06:56 (1)	20:38	13	07:02 (4)	21:27
28	08:10	07:10	06:04	06:34 (1)		05:03		04:53	
	16:53	17:53	18:44	22	06:56 (1)	20:40	8	07:00 (4)	21:29
29	08:08		07:01	07:33 (1)		05:02		04:54	
	16:55		19:46	22	07:55 (1)	20:42		04:54	
30	08:07		06:59	07:33 (1)		05:01		04:54	
	16:57		19:48	22	07:55 (1)	20:43		04:54	
31	08:05		06:56	07:34 (1)		05:00		04:54	
	16:58		19:50	20	07:54 (1)	21:32		04:54	
Sonnenscheinstunden	253	275	367	418	491	506		400	
astr.max.mögl.Beschattung			189	393	400	400		0.39	
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		0.96	
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		0.72	
Reduktion Windrichtung			0.71	0.72	0.73	0.72		0.27	
Gesamte Reduktion			0.19	0.26	0.30	0.27		106	
Met.wahrsch.Beschattung			35	101	120	106			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CO - IO93

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:35 (1)	05:46		04:59
	16:10	17:00	17:55	19:51	19	07:54 (1)	20:45	21:34
2	08:32	08:02	07:05	06:52	07:37 (1)	05:44		04:58
	16:12	17:02	17:57	19:53	15	07:52 (1)	20:47	21:35
3	08:32	08:00	07:03	06:49	07:39 (1)	05:42		04:57
	16:13	17:04	17:58	19:55	12	07:51 (1)	20:49	21:36
4	08:32	07:58	07:01	06:47	07:42 (1)	05:41		04:56
	16:14	17:06	18:00	19:57	4	07:46 (1)	20:50	21:37
5	08:32	07:57	06:58	06:45		05:39		04:55
	16:15	17:08	18:02	19:59		20:52		21:38
6	08:31	07:55	06:56	06:42		05:37		04:55
	16:16	17:10	18:04	20:00		20:54	4	06:02 (9)
7	08:31	07:53	06:54	06:40		05:35		04:55
	16:18	17:12	18:06	20:02		20:56	8	06:01 (9)
8	08:30	07:51	06:51	06:37		05:33		04:53
	16:19	17:14	18:08	20:04		20:57	13	06:09 (9)
9	08:30	07:49	06:49	06:35		05:31		04:53
	16:20	17:16	18:10	20:06		20:59	16	06:12 (8)
10	08:29	07:48	06:47	06:33		05:29		04:52
	16:22	17:18	18:12	20:08		21:01	18	06:15 (8)
11	08:29	07:46	06:44	06:30		05:27		04:52
	16:23	17:20	18:13	20:09	9	07:06 (4)	21:03	20
12	08:28	07:44	06:42	06:28		05:26		04:52
	16:25	17:22	18:15	20:11	15	07:09 (4)	21:04	21
13	08:27	07:42	06:40	06:26		05:24		04:51
	16:26	17:24	18:17	20:13	17	07:09 (4)	21:06	21
14	08:26	07:40	06:37	06:24		05:22		04:51
	16:28	17:26	18:19	20:15	21	07:11 (4)	21:08	22
15	08:25	07:38	06:35	06:21		05:21		04:51
	16:30	17:28	18:21	20:17	21	07:11 (4)	21:09	22
16	08:24	07:36	06:32	06:19		05:19		04:51
	16:31	17:30	18:23	20:18	23	07:12 (4)	21:11	21
17	08:23	07:34	06:30	06:17		05:17		04:51
	16:33	17:32	18:24	20:20	24	07:11 (4)	21:12	21
18	08:22	07:32	06:28	06:14		05:16		04:50
	16:35	17:34	18:26	20:22	25	07:12 (4)	21:14	21
19	08:21	07:29	06:25	06:12		05:14		04:50
	16:36	17:35	18:28	20:24	25	07:12 (4)	21:16	21
20	08:20	07:27	06:23	06:10		05:13		04:51
	16:38	17:37	18:30	20:26	24	07:11 (4)	21:17	20
21	08:19	07:25	06:21	06:08		05:12		04:51
	16:40	17:39	18:32	5	06:51 (1)	20:27	24	07:11 (4)
22	08:18	07:23	06:18	06:42 (1)	06:06	06:47 (4)	05:10	05:58 (8)
	16:42	17:41	18:33	12	06:54 (1)	20:29	23	07:10 (4)
23	08:17	07:21	06:16	06:40 (1)	06:03	06:48 (4)	05:09	05:58 (8)
	16:43	17:43	18:35	16	06:56 (1)	20:31	22	07:10 (4)
24	08:15	07:19	06:13	06:38 (1)	06:01	06:48 (4)	05:07	05:59 (8)
	16:45	17:45	18:37	18	06:56 (1)	20:33	21	07:09 (4)
25	08:14	07:16	06:11	06:37 (1)	05:59	06:49 (4)	05:06	06:00 (8)
	16:47	17:47	18:39	20	06:57 (1)	20:35	19	07:08 (4)
26	08:13	07:14	06:08	06:36 (1)	05:57	06:50 (4)	05:05	06:01 (8)
	16:49	17:49	18:41	22	06:58 (1)	20:36	15	07:05 (4)
27	08:11	07:12	06:06	06:35 (1)	05:55	06:51 (4)	05:04	06:02 (8)
	16:51	17:51	18:42	22	06:57 (1)	20:38	12	07:03 (4)
28	08:10	07:10	06:04	06:35 (1)	05:53	06:55 (4)	05:03	06:03 (8)
	16:53	17:53	18:44	22	06:57 (1)	20:40	3	06:58 (4)
29	08:08		07:01	07:34 (1)	05:51		05:02	06:04 (8)
	16:55		19:46	22	07:56 (1)	20:42		21:30
30	08:07		06:59	07:35 (1)	05:49			05:01
	16:57		19:48	21	07:56 (1)	20:43		21:31
31	08:05		06:56	07:35 (1)				05:00
	16:58		19:50	21	07:56 (1)			21:32
Sonnenscheinstunden	253	275	367	418	491			506
astr.max.mögl.Beschattung			201		393		407	404
Red.Sonnenscheinwahrsch.			0.28		0.37		0.43	0.39
Reduktion Betriebsdauer			0.96		0.96		0.96	0.96
Reduktion Windrichtung			0.71		0.72		0.73	0.72
Gesamte Reduktion			0.19		0.26		0.30	0.27
Met.wahrsch.Beschattung			38		101		122	107

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
Dennis Kramer / dennis.kramer@i17-wind.de

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CO - IO93
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Table with columns for months (Juli, August, September, Oktober, November, Dezember) and rows for time slots (e.g., 04:55, 21:48) and various metrics (Sonnenscheinstunden, astr. max.mögl. Beschattung, etc.).

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat Sonnenaufgang (SS:MM) Sonnenuntergang (SS:MM) Minuten mit Schatten Zeitpunkt (SS:MM) Zeitpunkt (SS:MM) Schattenanfang Schattenende (WEA mit erstem Schatten) (WEA mit letztem Schatten)



Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt

Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CP - IO94
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:32	08:03	07:08	06:54	07:39 (1)	05:46	04:59
	16:10	17:00	17:55	19:51	07:54 (1)	20:45	21:34
2	08:32	08:02	07:05	06:52	07:42 (1)	05:44	04:58
	16:12	17:02	17:57	19:53	07:51 (1)	20:47	21:35
3	08:32	08:00	07:03	06:49		05:42	04:57
	16:13	17:04	17:58	19:55		20:49	21:36
4	08:32	07:58	07:01	06:47		05:41	04:56
	16:14	17:06	18:00	19:57		20:50	21:37
5	08:32	07:57	06:58	06:45		05:39	04:55
	16:15	17:08	18:02	19:59		20:52	21:38
6	08:31	07:55	06:56	06:42		05:37	04:55
	16:16	17:10	18:04	20:00		20:54	21:39
7	08:31	07:53	06:54	06:40		05:35	04:54
	16:18	17:12	18:06	20:02		20:56	21:40
8	08:30	07:51	06:51	06:37		05:33	04:53
	16:19	17:14	18:08	20:04		20:57	21:41
9	08:30	07:49	06:49	06:35		05:31	04:53
	16:20	17:16	18:10	20:06		20:58	21:42
10	08:29	07:48	06:47	06:33		05:29	04:52
	16:22	17:18	18:12	20:08		21:01	21:43
11	08:29	07:46	06:44	06:30		05:27	04:52
	16:23	17:20	18:13	20:09		21:03	21:44
12	08:28	07:44	06:42	06:28		05:26	04:52
	16:25	17:22	18:15	20:11		21:04	21:44
13	08:27	07:42	06:40	06:26		05:24	04:51
	16:26	17:24	18:17	20:13		21:06	21:45
14	08:26	07:40	06:37	06:24		05:22	04:51
	16:28	17:26	18:19	20:15		21:08	21:46
15	08:25	07:38	06:35	06:21		05:21	04:51
	16:30	17:28	18:21	20:17		21:09	21:46
16	08:24	07:36	06:32	06:19		05:19	04:51
	16:31	17:30	18:23	20:18		21:11	21:47
17	08:23	07:34	06:30	06:17		05:17	04:51
	16:33	17:32	18:24	20:20		21:12	21:47
18	08:22	07:32	06:28	06:14		05:16	04:50
	16:35	17:34	18:26	20:22		21:14	21:48
19	08:21	07:29	06:25	06:12		05:14	04:50
	16:36	17:35	18:28	20:24		21:16	21:48
20	08:20	07:27	06:23	06:10		05:13	04:51
	16:38	17:37	18:30	20:26		21:17	21:48
21	08:19	07:25	06:21	06:08		05:12	04:51
	16:40	17:39	18:32	20:27		21:18	21:49
22	08:18	07:23	06:18	06:06		05:11	04:51
	16:42	17:41	18:33	20:29		21:20	21:49
23	08:17	07:21	06:16	06:04		05:09	04:51
	16:44	17:43	18:35	20:31		21:22	21:49
24	08:15	07:19	06:13	06:01		05:07	04:51
	16:45	17:45	18:37	20:33		21:23	21:49
25	08:14	07:16	06:11	06:00		05:06	04:51
	16:47	17:47	18:39	20:35		21:24	21:49
26	08:13	07:14	06:08	06:38 (1)		05:05	04:52
	16:49	17:49	18:41	20:36		21:26	21:49
27	08:11	07:12	06:06	06:37 (1)		05:04	04:53
	16:51	17:51	18:42	20:38		21:27	21:49
28	08:10	07:10	06:04	06:37 (1)		05:03	04:53
	16:53	17:53	18:44	20:40		21:29	21:49
29	08:08		07:01	07:37 (1)		05:02	04:54
	16:55		19:46	21 07:58 (1)		21:30	21:49
30	08:07		06:59	07:38 (1)		05:01	04:54
	16:57		19:48	19 07:57 (1)		21:31	21:48
31	08:05		06:56	07:39 (1)		05:00	04:54
	16:58		19:50	17 07:56 (1)		21:32	21:48
Sonnenscheinstunden	253	275	367	418	491		506
astr.max.mögl.Beschattung			0.219	0.347	0.385		0.471
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43		0.39
Reduktion Betriebsdauer			0.96	0.95	0.96		0.96
Reduktion Windrichtung			0.70	0.72	0.73		0.72
Gesamte Reduktion			0.19	0.26	0.30		0.27
Met.wahrsch.Beschattung			0.41	0.89	1.15		1.25

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)		

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CQ - IO95

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:37 (1)	05:46	04:59	05:28 (7)
	16:10	17:00	17:55	19:51	15 07:52 (1)	20:45	21:34	12 05:40 (7)
2	08:32	08:02	07:05	06:52	07:39 (1)	05:44	04:58	05:28 (7)
	16:12	17:02	17:57	19:53	11 07:50 (1)	20:47	21:35	13 05:41 (7)
3	08:32	08:00	07:03	06:49	07:43 (1)	05:42	04:57	05:27 (7)
	16:13	17:04	17:58	19:55	3 07:46 (1)	20:49	21:36	14 05:41 (7)
4	08:32	07:58	07:01	06:47	06:47	05:41	04:56	05:27 (7)
	16:14	17:06	18:00	19:57	20:50	05:29	06:06 (9)	15 05:42 (7)
5	08:32	07:57	06:58	06:45	05:39	05:39	06:04 (9)	04:55
	16:15	17:08	18:02	19:59	20:52	11 06:15 (8)	21:38	16 05:43 (7)
6	08:31	07:55	06:56	06:42	05:37	06:02 (9)	04:55	05:27 (7)
	16:16	17:10	18:04	20:00	20:54	15 06:17 (8)	21:39	15 05:42 (7)
7	08:31	07:53	06:54	06:40	05:35	06:01 (9)	04:54	05:27 (7)
	16:18	17:12	18:06	20:02	20:56	18 06:19 (8)	21:40	16 05:43 (7)
8	08:30	07:51	06:51	06:37	05:33	06:00 (9)	04:53	05:27 (7)
	16:19	17:14	18:08	20:04	20:57	20 06:20 (8)	21:41	16 05:43 (7)
9	08:30	07:49	06:49	06:35	05:31	05:59 (9)	04:53	05:28 (7)
	16:20	17:16	18:10	20:06	20:59	21 06:20 (8)	21:42	16 05:44 (7)
10	08:29	07:48	06:47	06:33	06:33	05:29	06:00 (9)	04:52
	16:22	17:18	18:12	20:08	11 07:09 (4)	21:01	06:21 (8)	21:43
11	08:29	07:46	06:44	06:30	06:56 (4)	05:27	05:59 (9)	04:52
	16:23	17:20	18:13	20:09	15 07:11 (4)	21:03	06:21 (8)	21:44
12	08:28	07:44	06:42	06:28	06:54 (4)	05:26	05:59 (9)	04:52
	16:25	17:22	18:15	20:11	19 07:13 (4)	21:04	06:21 (8)	21:44
13	08:27	07:42	06:40	06:26	06:52 (4)	05:24	06:00 (9)	04:51
	16:26	17:24	18:17	20:13	21 07:13 (4)	21:06	06:21 (8)	21:45
14	08:26	07:40	06:37	06:24	06:51 (4)	05:22	06:00 (9)	04:51
	16:28	17:26	18:19	20:15	22 07:13 (4)	21:08	06:21 (8)	21:46
15	08:25	07:38	06:35	06:21	06:51 (4)	05:21	06:01 (9)	04:51
	16:30	17:28	18:21	20:17	23 07:14 (4)	21:09	06:21 (8)	21:46
16	08:24	07:36	06:32	06:19	06:51 (4)	05:19	06:01 (9)	04:51
	16:31	17:30	18:23	20:18	23 07:14 (4)	21:11	06:21 (8)	21:47
17	08:23	07:34	06:30	06:17	06:49 (4)	05:17	06:02 (8)	04:51
	16:33	17:32	18:24	20:20	24 07:13 (4)	21:12	06:21 (8)	21:47
18	08:22	07:32	06:28	06:14	06:49 (4)	05:16	06:03 (8)	04:50
	16:35	17:34	18:26	20:22	24 07:13 (4)	21:14	06:21 (8)	21:48
19	08:21	07:29	06:25	06:12	06:50 (4)	05:14	06:03 (8)	04:50
	16:36	17:35	18:28	20:24	23 07:13 (4)	21:16	06:19 (8)	21:48
20	08:20	07:27	06:23	06:10	06:50 (4)	05:13	06:04 (8)	04:51
	16:38	17:37	18:30	20:26	22 07:12 (4)	21:17	06:19 (8)	21:48
21	08:19	07:25	06:21	06:08	06:50 (4)	05:12	06:05 (8)	04:51
	16:40	17:39	18:32	9 06:53 (1)	20:27	07:11 (4)	21:19	06:19 (8)
22	08:18	07:23	06:18	06:41 (1)	06:06	06:51 (4)	05:10	06:05 (8)
	16:42	17:41	18:33	14 06:55 (1)	20:29	19 07:10 (4)	21:20	12 06:17 (8)
23	08:17	07:21	06:16	06:39 (1)	06:03	06:52 (4)	05:09	06:07 (8)
	16:44	17:43	18:35	17 06:56 (1)	20:31	17 07:09 (4)	21:22	9 06:16 (8)
24	08:15	07:19	06:13	06:38 (1)	06:01	06:54 (4)	05:07	06:10 (8)
	16:45	17:45	18:37	18 06:56 (1)	20:33	13 07:07 (4)	21:23	3 06:13 (8)
25	08:14	07:16	06:11	06:37 (1)	05:59	06:56 (4)	05:06	04:52
	16:47	17:47	18:39	20 06:57 (1)	20:35	9 07:05 (4)	21:24	21:49
26	08:13	07:14	06:08	06:37 (1)	05:57	05:05	04:52	05:28 (6)
	16:49	17:49	18:41	21 06:58 (1)	20:36	21:26	21:49	19 05:47 (7)
27	08:11	07:12	06:06	06:36 (1)	05:55	05:04	04:53	05:29 (6)
	16:51	17:51	18:42	21 06:57 (1)	20:38	21:27	21:49	19 05:48 (7)
28	08:10	07:10	06:04	06:36 (1)	05:53	05:03	04:53	05:30 (6)
	16:53	17:53	18:44	21 06:57 (1)	20:40	21:29	4 05:36 (7)	21:49
29	08:08	07:01	06:01	07:35 (1)	05:51	05:02	05:31 (7)	04:54
	16:55	19:46	21 07:56 (1)	20:42	21:30	7 05:38 (7)	21:49	17 05:48 (7)
30	08:07	06:59	07:36 (1)	05:49	05:01	05:30 (7)	04:54	05:32 (7)
	16:57	19:48	19 07:55 (1)	20:43	21:31	9 05:39 (7)	21:48	17 05:49 (7)
31	08:05	06:56	07:37 (1)	05:47	05:00	05:29 (7)	04:53	05:29 (6)
	16:58	19:50	17 07:54 (1)	20:43	21:32	10 05:39 (7)	21:48	17 05:49 (7)
Sonnenscheinstunden	253	275	367	418	491	506	511	136
astr.max.mögl.Beschattung			198	335	373	433	496	511
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.43	0.39	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.70	0.72	0.73	0.73	0.72	0.72
Gesamte Reduktion			0.19	0.26	0.30	0.27	0.27	0.27
Met.wahrsch.Beschattung			37	86	112	136	136	136

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CQ - IO95

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:32 (7)	05:34	06:09 (9)	06:26	06:55 (4)	07:18	07:14	08:08			
	21:48	05:48 (7)	21:14	22	06:31 (8)	20:09	15	07:10 (4)	18:57	16:48	16:05	
2	04:56	05:32 (7)	05:35	06:10 (9)	06:28	06:57 (4)	07:20	07:16	08:09			
	21:48	05:49 (7)	21:12	21	06:31 (8)	20:07	11	07:08 (4)	18:55	16:46	16:05	
3	04:56	05:33 (7)	05:37	06:09 (9)	06:30			07:21	07:18	08:11		
	21:47	05:49 (7)	21:11	21	06:30 (8)	20:05		18:52	16:44	16:04		
4	04:57	05:32 (7)	05:38	06:10 (9)	06:31			07:23	07:20	08:12		
	21:47	05:48 (7)	21:09	20	06:30 (8)	20:02		18:50	16:42	16:03		
5	04:58	05:33 (7)	05:40	06:11 (9)	06:33			07:25	07:22	08:14		
	21:46	05:49 (7)	21:07	19	06:30 (8)	20:00		18:48	16:41	16:03		
6	04:59	05:33 (7)	05:42	06:11 (9)	06:35			07:27	07:24	08:15		
	21:46	05:49 (7)	21:05	17	06:28 (8)	19:58		18:45	16:39	16:02		
7	05:00	05:34 (7)	05:43	06:13 (9)	06:36			07:28	07:26	08:16		
	21:45	05:49 (7)	21:03	14	06:27 (8)	19:55		18:43	16:37	16:02		
8	05:01	05:34 (7)	05:45	06:14 (9)	06:38			07:30	07:28	08:18		
	21:45	05:49 (7)	21:01	10	06:24 (8)	19:53		18:41	16:35	16:01		
9	05:02	05:35 (7)	05:47	06:16 (9)	06:40			07:32	07:30	08:19		
	21:44	05:49 (7)	20:59	3	06:19 (9)	19:50		18:38	16:33	16:01		
10	05:03	05:35 (7)	05:48		06:42			07:32 (1)	07:34	07:31	08:20	
	21:43	05:49 (7)	20:57		19:48			07:43 (1)	18:36	16:32	16:01	
11	05:04	05:36 (7)	05:50		06:43			07:30 (1)	07:36	07:33	08:21	
	21:42	05:48 (7)	20:55		19:46			07:45 (1)	18:34	16:30	16:01	
12	05:05	05:37 (7)	05:52		06:45			07:28 (1)	07:37	07:35	08:22	
	21:41	05:48 (7)	20:53		19:43			07:46 (1)	18:31	16:28	16:00	
13	05:06	05:38 (7)	05:54		06:47			07:27 (1)	07:39	07:37	08:23	
	21:40	05:47 (7)	20:51		19:41			07:46 (1)	18:29	16:27	16:00	
14	05:07	05:39 (7)	05:55		06:48			07:27 (1)	07:41	07:39	08:24	
	21:39	05:47 (7)	20:49		19:38			07:47 (1)	18:27	16:25	16:00	
15	05:09	05:40 (7)	05:57		06:50			07:25 (1)	07:43	07:41	08:25	
	21:38	05:45 (7)	20:47		19:36			07:46 (1)	18:24	16:24	16:00	
16	05:10		05:59		06:52			07:25 (1)	07:45	07:43	08:26	
	21:37		20:45		19:33			07:46 (1)	18:22	16:22	16:00	
17	05:11		06:00		06:54			07:25 (1)	07:46	07:44	08:27	
	21:36		20:43		19:31			07:46 (1)	18:20	16:21	16:01	
18	05:13		06:02	07:01 (4)	06:55			07:24 (1)	07:48	07:46	08:28	
	21:35		20:41	10	07:11 (4)	19:29		07:45 (1)	18:18	16:19	16:01	
19	05:14		06:04	06:59 (4)	06:57			07:25 (1)	07:50	07:48	08:28	
	21:34		20:39	14	07:13 (4)	19:26		07:44 (1)	18:15	16:18	16:01	
20	05:15	06:18 (8)	06:05	06:57 (4)	06:59			07:26 (1)	07:52	07:50	08:29	
	21:32	06:24 (8)	20:37	17	07:14 (4)	19:24		07:43 (1)	18:13	16:17	16:01	
21	05:17	06:17 (8)	06:07	06:56 (4)	07:00			07:26 (1)	07:54	07:51	08:30	
	21:31	06:27 (8)	20:34	19	07:15 (4)	19:21		07:41 (1)	18:11	16:15	16:02	
22	05:18	06:15 (8)	06:09	06:55 (4)	07:02			07:28 (1)	07:56	07:53	08:30	
	21:30	06:28 (8)	20:32	21	07:16 (4)	19:19		07:39 (1)	18:09	16:14	16:02	
23	05:20	06:14 (8)	06:11	06:54 (4)	07:04				07:58	07:55	08:31	
	21:28	06:28 (8)	20:30	22	07:16 (4)	19:16			18:07	16:13	16:03	
24	05:21	06:14 (8)	06:12	06:53 (4)	07:06				07:59	07:57	08:31	
	21:27	06:30 (8)	20:28	23	07:16 (4)	19:14			18:05	16:12	16:03	
25	05:23	06:13 (8)	06:14	06:53 (4)	07:07				07:01	07:58	08:32	
	21:26	06:30 (8)	20:25	24	07:17 (4)	19:12			17:02	16:11	16:04	
26	05:24	06:13 (8)	06:16	06:52 (4)	07:09				07:03	08:00	08:32	
	21:24	06:31 (8)	20:23	24	07:16 (4)	19:09			17:00	16:10	16:05	
27	05:26	06:12 (8)	06:18	06:52 (4)	07:11				07:05	08:02	08:32	
	21:22	06:31 (8)	20:21	24	07:16 (4)	19:07			16:58	16:09	16:06	
28	05:27	06:12 (9)	06:19	06:52 (4)	07:13				07:07	08:03	08:32	
	21:21	06:32 (8)	20:19	23	07:15 (4)	19:04			16:56	16:08	16:06	
29	05:29	06:11 (9)	06:21	06:52 (4)	07:14				07:09	08:05	08:32	
	21:19	06:32 (8)	20:16	22	07:14 (4)	19:02			16:54	16:07	16:07	
30	05:30	06:10 (9)	06:23	06:53 (4)	07:16				07:11	08:06	08:32	
	21:18	06:31 (8)	20:14	20	07:13 (4)	19:00			16:52	16:06	16:08	
31	05:32	06:10 (9)	06:24	06:53 (4)					07:13		08:32	
	21:16	06:32 (8)	20:12	19	07:12 (4)				16:50		16:09	
Sonnenscheinstunden	508		458		382			330	262	237		
astr. max.mögl. Beschattung	397		429		255							
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met. wahrsch. Beschattung	104		126		60							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat Sonnenaufgang (SS:MM) Minuten mit Schatten Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten) Schattenende (WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CR - IO96

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:08	06:54	07:43 (1)	05:46
	16:10	17:00	17:55	19:51	07:52 (1)	20:45
2	08:32	08:02	07:05	06:52		05:44
	16:12	17:02	17:57	19:53		20:47
3	08:32	08:00	07:03	06:49		05:42
	16:13	17:04	17:58	19:55		20:49
4	08:32	07:58	07:01	06:47		05:41
	16:14	17:06	18:00	19:57		20:50
5	08:32	07:57	06:58	06:45		05:39
	16:15	17:08	18:02	19:59		20:52
6	08:31	07:55	06:56	06:42		05:37
	16:16	17:10	18:04	20:00		20:54
7	08:31	07:53	06:54	06:40		05:35
	16:18	17:12	18:06	20:02		20:56
8	08:30	07:51	06:51	06:37	07:03 (4)	05:33
	16:19	17:14	18:08	20:04	07:12 (4)	20:57
9	08:30	07:49	06:49	06:35	07:01 (4)	05:31
	16:20	17:16	18:10	20:06	07:15 (4)	20:59
10	08:29	07:48	06:47	06:33	06:58 (4)	05:29
	16:22	17:18	18:12	20:08	07:15 (4)	21:01
11	08:29	07:46	06:44	06:30	06:57 (4)	05:27
	16:23	17:20	18:13	20:09	07:16 (4)	21:03
12	08:28	07:44	06:42	06:28	06:56 (4)	05:26
	16:25	17:22	18:15	20:11	07:17 (4)	21:04
13	08:27	07:42	06:40	06:26	06:54 (4)	05:24
	16:26	17:24	18:17	20:13	07:17 (4)	21:06
14	08:26	07:40	06:37	06:24	06:54 (4)	05:22
	16:28	17:26	18:19	20:15	07:17 (4)	21:08
15	08:25	07:38	06:35	06:21	06:54 (4)	05:21
	16:30	17:28	18:21	20:17	07:17 (4)	21:09
16	08:24	07:36	06:32	06:19	06:54 (4)	05:19
	16:31	17:30	18:23	20:18	07:17 (4)	21:11
17	08:23	07:34	06:30	06:17	06:53 (4)	05:17
	16:33	17:32	18:24	20:20	07:16 (4)	21:12
18	08:22	07:32	06:28	06:14	06:53 (4)	05:16
	16:35	17:34	18:26	20:22	07:15 (4)	21:14
19	08:21	07:29	06:25	06:12	06:54 (4)	05:14
	16:36	17:35	18:28	20:24	07:15 (4)	21:16
20	08:20	07:27	06:23	06:10	06:54 (4)	05:13
	16:38	17:37	18:30	11 06:57 (1)	07:14 (4)	21:17
21	08:19	07:25	06:21	06:08	06:55 (4)	05:12
	16:40	17:39	18:32	15 06:59 (1)	07:13 (4)	21:19
22	08:18	07:23	06:18	06:06	06:57 (4)	05:10
	16:42	17:41	18:33	17 06:59 (1)	07:11 (4)	21:20
23	08:17	07:21	06:16	06:04	06:59 (4)	05:09
	16:44	17:43	18:35	19 07:00 (1)	07:08 (4)	21:22
24	08:15	07:19	06:13	06:01		05:07
	16:45	17:45	18:37	21 07:00 (1)		21:23
25	08:14	07:16	06:11	06:39 (1)		05:06
	16:47	17:47	18:39	21 07:00 (1)		21:24
26	08:13	07:14	06:08	06:39 (1)		05:05
	16:49	17:49	18:41	21 07:00 (1)		21:26
27	08:11	07:12	06:06	06:38 (1)		05:04
	16:51	17:51	18:42	21 06:59 (1)		21:27
28	08:10	07:10	06:04	06:39 (1)		05:03
	16:53	17:53	18:44	20 06:59 (1)		21:29
29	08:08		07:01	07:39 (1)		05:02
	16:55		19:46	18 07:57 (1)		21:30
30	08:07		06:59	07:40 (1)		05:01
	16:57		19:48	16 07:56 (1)		21:31
31	08:05		06:56	07:41 (1)		05:00
	16:58		19:50	14 07:55 (1)		21:32
Sonnenscheinstunden	253	275	367	418	491	506
astr.max.mögl.Beschattung			214	308	390	575
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.70	0.72	0.73	0.72
Gesamte Reduktion			0.19	0.26	0.30	0.27
Met.wahrsch.Beschattung			40	79	117	153

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CR - IO96

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:31 (6)	05:34	06:13 (9)	06:26	06:56 (4)	07:18	07:14	08:08			
	21:48	20 05:51 (7)	21:14	22 06:35 (8)	20:09	19 07:15 (4)	18:57	16:48	16:05			
2	04:56	05:32 (6)	05:35	06:13 (9)	06:28	06:57 (4)	07:20	07:16	08:09			
	21:48	19 05:51 (7)	21:12	22 06:35 (8)	20:07	17 07:14 (4)	18:55	16:46	16:05			
3	04:56	05:33 (6)	05:37	06:12 (9)	06:30	06:58 (4)	07:21	07:18	08:11			
	21:47	19 05:52 (7)	21:11	22 06:34 (8)	20:05	14 07:12 (4)	18:52	16:44	16:04			
4	04:57	05:33 (6)	05:38	06:12 (9)	06:31	07:00 (4)	07:23	07:20	08:12			
	21:47	18 05:51 (7)	21:09	23 06:35 (8)	20:02	9 07:09 (4)	18:50	16:42	16:03			
5	04:58	05:35 (6)	05:40	06:13 (9)	06:33		07:25	07:22	08:14			
	21:46	17 05:52 (7)	21:07	22 06:35 (8)	20:00		18:48	16:41	16:03			
6	04:59	05:36 (7)	05:42	06:13 (9)	06:35		07:27	07:24	08:15			
	21:46	16 05:52 (7)	21:05	20 06:33 (8)	19:58		18:45	16:39	16:02			
7	05:00	05:36 (7)	05:43	06:13 (9)	06:36		07:28	07:26	08:16			
	21:45	16 05:52 (7)	21:03	20 06:33 (8)	19:55		18:43	16:37	16:02			
8	05:01	05:36 (7)	05:45	06:14 (9)	06:38		07:30	07:28	08:18			
	21:45	16 05:52 (7)	21:01	17 06:31 (8)	19:53		18:41	16:35	16:01			
9	05:02	05:37 (7)	05:47	06:16 (9)	06:40		07:32	07:30	08:19			
	21:44	16 05:53 (7)	20:59	14 06:30 (8)	19:50		18:38	16:33	16:01			
10	05:03	05:37 (7)	05:48	06:17 (9)	06:42		07:34	07:31	08:20			
	21:43	16 05:53 (7)	20:57	10 06:27 (8)	19:48		18:36	16:32	16:01			
11	05:04	05:37 (7)	05:50	06:43		07:36 (1)	07:36	07:33	08:21			
	21:42	15 05:52 (7)	20:55	19:46	8 07:44 (1)	18:34	16:30	16:01				
12	05:05	05:38 (7)	05:52	06:45		07:33 (1)	07:37	07:35	08:22			
	21:41	14 05:52 (7)	20:53	19:43	13 07:46 (1)	18:31	16:28	16:00				
13	05:06	05:38 (7)	05:54	06:47		07:31 (1)	07:39	07:37	08:23			
	21:40	14 05:52 (7)	20:51	19:41	17 07:48 (1)	18:29	16:27	16:00				
14	05:07	05:39 (7)	05:55	06:48		07:30 (1)	07:41	07:39	08:24			
	21:39	12 05:51 (7)	20:49	19:38	19 07:49 (1)	18:27	16:25	16:00				
15	05:09	05:40 (7)	05:57	06:50		07:28 (1)	07:43	07:41	08:25			
	21:38	11 05:51 (7)	20:47	19:36	20 07:48 (1)	18:24	16:24	16:00				
16	05:10	05:41 (7)	05:59	06:52		07:28 (1)	07:45	07:43	08:26			
	21:37	9 05:50 (7)	20:45	19:33	21 07:49 (1)	18:22	16:22	16:00				
17	05:11	05:43 (7)	06:00	06:54		07:28 (1)	07:46	07:44	08:27			
	21:36	7 05:50 (7)	20:43	19:31	21 07:49 (1)	18:20	16:21	16:01				
18	05:13	05:44 (7)	06:02	06:55		07:27 (1)	07:48	07:46	08:28			
	21:35	4 05:48 (7)	20:41	19:29	21 07:48 (1)	18:18	16:19	16:01				
19	05:14		06:04	06:57		07:27 (1)	07:50	07:48	08:28			
	21:34		20:39	19:26	20 07:47 (1)	18:15	16:18	16:01				
20	05:15		06:05	06:59		07:27 (1)	07:52	07:50	08:29			
	21:32		20:37	10 07:13 (4)	19:24	20 07:47 (1)	18:13	16:17	16:01			
21	05:17		06:07	07:01 (4)	07:00		07:27 (1)	07:54	07:51	08:30		
	21:31		20:34	15 07:16 (4)	19:21	18 07:45 (1)	18:11	16:15	16:02			
22	05:18		06:09	07:00 (4)	07:02		07:28 (1)	07:56	07:53	08:30		
	21:30		20:32	17 07:17 (4)	19:19	16 07:44 (1)	18:09	16:14	16:02			
23	05:20	06:21 (8)	06:11	06:58 (4)	07:04		07:30 (1)	07:58	07:55	08:31		
	21:28	7 06:28 (8)	20:30	20 07:18 (4)	19:16	12 07:42 (1)	18:07	16:13	16:03			
24	05:21	06:20 (8)	06:12	06:57 (4)	07:06		07:33 (1)	07:59	07:57	08:31		
	21:27	10 06:30 (8)	20:28	22 07:19 (4)	19:14	5 07:38 (1)	18:05	16:12	16:03			
25	05:23	06:19 (8)	06:14	06:57 (4)	07:07		07:01	07:58	08:32			
	21:26	12 06:31 (8)	20:25	22 07:19 (4)	19:12		17:02	16:11	16:04			
26	05:24	06:18 (8)	06:16	06:56 (4)	07:09		07:03	08:00	08:32			
	21:24	15 06:33 (8)	20:23	23 07:19 (4)	19:09		17:00	16:10	16:05			
27	05:26	06:17 (8)	06:18	06:56 (4)	07:11		07:05	08:02	08:32			
	21:22	16 06:33 (8)	20:21	23 07:19 (4)	19:07		16:58	16:09	16:06			
28	05:27	06:17 (9)	06:19	06:55 (4)	07:13		07:07	08:03	08:32			
	21:21	17 06:34 (8)	20:19	23 07:18 (4)	19:04		16:56	16:08	16:06			
29	05:29	06:16 (9)	06:21	06:55 (4)	07:14		07:09	08:05	08:32			
	21:19	18 06:34 (8)	20:16	23 07:18 (4)	19:02		16:54	16:07	16:07			
30	05:30	06:14 (9)	06:23	06:55 (4)	07:16		07:11	08:06	08:32			
	21:18	20 06:34 (8)	20:14	23 07:18 (4)	19:00		16:52	16:06	16:08			
31	05:32	06:14 (9)	06:24	06:55 (4)			07:13		08:33			
	21:16	21 06:35 (8)	20:12	21 07:16 (4)			16:50		16:09			
Sonnenscheinstunden	508		458		382		330		262			237
astr. max.mögl. Beschattung		395		434		290						
Red. Sonnenscheinwahrsch.		0.38		0.42		0.35						
Reduktion Betriebsdauer		0.96		0.96		0.96						
Reduktion Windrichtung		0.72		0.72		0.71						
Gesamte Reduktion		0.26		0.29		0.24						
Met. wahrsch. Beschattung		103		127		68						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Minuten mit Schatten	Zeitpunkt (SS:MM)		Schattenanfang		Schattende	
	Sonnennuntergang (SS:MM)			Zeitpunkt (SS:MM)		(WEA mit erstem Schatten)		(WEA mit letztem Schatten)	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CS - IO97

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:32	08:03	07:08	06:54	05:46	04:59	05:30 (7)
	16:10	17:00	17:55	19:51	20:45	21:34	15 05:45 (7)
2	08:32	08:02	07:05	06:52	05:44	04:58	05:30 (7)
	16:12	17:02	17:57	19:53	20:47	21:35	16 05:46 (7)
3	08:32	08:00	07:03	06:49	05:42	04:57	05:30 (7)
	16:13	17:04	17:58	19:55	20:49	21:36	16 05:46 (7)
4	08:32	07:58	07:01	06:47	05:41	04:56	05:30 (7)
	16:14	17:06	18:00	19:57	20:50	21:37	16 05:46 (7)
5	08:32	07:57	06:58	06:45	05:39	04:55	05:30 (7)
	16:15	17:08	18:02	19:59	20:52	21:38	17 05:47 (7)
6	08:31	07:55	06:56	06:42	05:37	04:55	05:30 (7)
	16:16	17:10	18:04	20:00	20:54	21:39	17 05:47 (7)
7	08:31	07:53	06:54	06:40	07:05 (4)	05:35	05:30 (6)
	16:18	17:12	18:06	20:02	07:15 (4)	20:56	23 06:27 (8) 21:40 17 05:47 (7)
8	08:30	07:51	06:51	06:37	07:03 (4)	05:33	06:04 (9) 04:53 05:29 (6)
	16:19	17:14	18:08	20:04	07:18 (4)	20:57	23 06:27 (8) 21:41 18 05:47 (7)
9	08:30	07:49	06:49	06:35	07:01 (4)	05:31	06:03 (9) 04:53 05:29 (6)
	16:20	17:16	18:10	20:06	07:19 (4)	20:59	23 06:26 (8) 21:42 19 05:48 (7)
10	08:29	07:48	06:47	06:33	06:59 (4)	05:29	06:04 (9) 04:52 05:28 (6)
	16:22	17:18	18:12	20:08	07:19 (4)	21:01	23 06:27 (8) 21:43 19 05:47 (7)
11	08:29	07:46	06:44	06:30	06:58 (4)	05:27	06:04 (9) 04:52 05:28 (6)
	16:23	17:20	18:13	20:09	07:20 (4)	21:03	23 06:27 (8) 21:44 20 05:48 (7)
12	08:28	07:44	06:42	06:28	06:58 (4)	05:26	06:04 (9) 04:52 05:28 (6)
	16:25	17:22	18:15	20:11	07:21 (4)	21:04	22 06:26 (8) 21:44 20 05:48 (7)
13	08:27	07:42	06:40	06:26	06:56 (4)	05:24	06:05 (9) 04:51 05:28 (6)
	16:26	17:24	18:17	20:13	07:20 (4)	21:06	21 06:26 (8) 21:45 20 05:48 (7)
14	08:26	07:40	06:37	06:24	06:56 (4)	05:22	06:06 (9) 04:51 05:27 (6)
	16:28	17:26	18:19	20:15	07:20 (4)	21:08	19 06:25 (8) 21:46 21 05:48 (7)
15	08:25	07:38	06:35	06:21	06:56 (4)	05:21	06:08 (9) 04:51 05:27 (6)
	16:30	17:28	18:21	20:17	07:20 (4)	21:09	17 06:25 (8) 21:46 21 05:48 (7)
16	08:24	07:36	06:32	06:19	06:56 (4)	05:19	06:08 (8) 04:51 05:27 (6)
	16:31	17:30	18:23	20:18	07:20 (4)	21:11	16 06:24 (8) 21:47 21 05:48 (7)
17	08:23	07:34	06:30	06:17	06:56 (4)	05:17	06:09 (8) 04:51 05:27 (6)
	16:33	17:32	18:24	20:20	07:18 (4)	21:12	15 06:24 (8) 21:47 21 05:48 (7)
18	08:22	07:32	06:28	06:14	06:56 (4)	05:16	06:11 (8) 04:50 05:27 (6)
	16:35	17:34	18:26	6 06:58 (1) 20:22	21 07:17 (4) 21:14	12 06:23 (8) 21:48	22 05:49 (7)
19	08:21	07:29	06:25	06:49 (1) 06:12	06:57 (4) 05:14	06:11 (8) 04:50	05:28 (6)
	16:36	17:35	18:28	12 07:01 (1) 20:24	20 07:17 (4) 21:16	10 06:21 (8) 21:48	21 05:49 (7)
20	08:20	07:27	06:23	06:46 (1) 06:10	06:58 (4) 05:13	06:14 (8) 04:51	05:29 (6)
	16:38	17:37	18:30	16 07:02 (1) 20:26	17 07:15 (4) 21:17	5 06:19 (8) 21:48	21 05:50 (7)
21	08:19	07:25	06:21	06:45 (1) 06:08	07:00 (4) 05:12	04:51	05:29 (6)
	16:40	17:39	18:32	18 07:03 (1) 20:27	14 07:14 (4) 21:19	21:49	21 05:50 (7)
22	08:18	07:23	06:18	06:43 (1) 06:06	07:02 (4) 05:10	04:51	05:29 (6)
	16:42	17:41	18:33	20 07:03 (1) 20:29	9 07:11 (4) 21:20	21:49	21 05:50 (7)
23	08:17	07:21	06:16	06:43 (1) 06:03	05:09	04:51	05:29 (6)
	16:44	17:43	18:35	21 07:04 (1) 20:31	21:22	21:49	21 05:50 (7)
24	08:15	07:19	06:13	06:42 (1) 06:01	05:07	04:51	05:29 (6)
	16:45	17:45	18:37	21 07:03 (1) 20:33	21:23	21:49	22 05:51 (7)
25	08:14	07:16	06:11	06:42 (1) 05:59	05:06	04:52	05:29 (6)
	16:47	17:47	18:39	21 07:03 (1) 20:35	21:24	4 05:39 (7) 21:49	21 05:50 (7)
26	08:13	07:14	06:08	06:42 (1) 05:57	05:05	05:34 (7) 04:52	05:29 (6)
	16:49	17:49	18:41	21 07:03 (1) 20:36	21:26	7 05:41 (7) 21:49	21 05:50 (7)
27	08:11	07:12	06:06	06:42 (1) 05:55	05:04	05:33 (7) 04:53	05:30 (6)
	16:51	17:51	18:42	20 07:02 (1) 20:38	21:27	9 05:42 (7) 21:49	21 05:51 (7)
28	08:10	07:10	06:04	06:43 (1) 05:53	05:03	05:32 (7) 04:53	05:30 (6)
	16:53	17:53	18:44	18 07:01 (1) 20:40	21:29	11 05:43 (7) 21:49	21 05:51 (7)
29	08:08	07:01	06:43 (1) 05:51	05:02	05:31 (7) 04:54	05:31 (6)	
	16:55	19:46	16 07:59 (1) 20:42	21:30	13 05:44 (7) 21:49	21 05:52 (7)	
30	08:07	06:59	07:44 (1) 05:49	05:01	05:30 (7) 04:54	05:32 (6)	
	16:57	19:48	14 07:58 (1) 20:43	21:31	14 05:44 (7) 21:48	20 05:52 (7)	
31	08:05	06:56	07:47 (1)	05:00	05:30 (7)		
	16:58	19:50	8 07:55 (1)	21:32	15 05:45 (7)		
Sonnenscheinstunden	253	275	367	419	491	506	
astr.max.mögl.Beschattung			232	307	411	588	
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39	
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96	
Reduktion Windrichtung			0.70	0.72	0.73	0.72	
Gesamte Reduktion			0.19	0.26	0.30	0.27	
Met.wahrsch.Beschattung			43	79	123	157	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CS - IO97

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:32 (6)	05:34		06:14 (9)	06:26	06:57 (4)	07:18	07:14	08:08		
	21:48	20 05:52 (7)	21:14	23	06:37 (8)	20:09	22 07:19 (4)	18:57	16:48	16:05		
2	04:56	05:33 (6)	05:35		06:14 (9)	06:28	06:58 (4)	07:20	07:16	08:09		
	21:48	19 05:52 (7)	21:12	23	06:37 (8)	20:07	20 07:18 (4)	18:55	16:46	16:05		
3	04:56	05:34 (6)	05:37		06:13 (9)	06:30	06:58 (4)	07:21	07:18	08:11		
	21:47	19 05:53 (7)	21:11	24	06:37 (8)	20:05	18 07:16 (4)	18:52	16:44	16:04		
4	04:57	05:34 (6)	05:38		06:14 (9)	06:31	07:00 (4)	07:23	07:20	08:12		
	21:47	18 05:52 (7)	21:09	23	06:37 (8)	20:02	15 07:15 (4)	18:50	16:42	16:03		
5	04:58	05:35 (6)	05:40		06:14 (9)	06:33	07:02 (4)	07:25	07:22	08:14		
	21:46	18 05:53 (7)	21:07	23	06:37 (8)	20:00	10 07:12 (4)	18:48	16:41	16:03		
6	04:59	05:36 (6)	05:42		06:14 (9)	06:35		07:27	07:24	08:15		
	21:46	17 05:53 (7)	21:05	22	06:36 (8)	19:58		18:45	16:39	16:02		
7	05:00	05:37 (7)	05:43		06:14 (9)	06:36		07:28	07:26	08:16		
	21:45	16 05:53 (7)	21:03	22	06:36 (8)	19:55		18:43	16:37	16:02		
8	05:01	05:37 (7)	05:45		06:14 (9)	06:38		07:30	07:28	08:18		
	21:45	16 05:53 (7)	21:01	20	06:34 (8)	19:53		18:41	16:35	16:01		
9	05:02	05:37 (7)	05:47		06:16 (9)	06:40		07:32	07:30	08:19		
	21:44	17 05:54 (7)	20:59	17	06:33 (8)	19:50		18:38	16:33	16:01		
10	05:03	05:38 (7)	05:48		06:17 (9)	06:42		07:34	07:31	08:20		
	21:43	16 05:54 (7)	20:57	14	06:31 (8)	19:48		18:36	16:32	16:01		
11	05:04	05:38 (7)	05:50		06:19 (9)	06:43		07:36	07:33	08:21		
	21:42	16 05:54 (7)	20:55	9	06:28 (8)	19:46		18:34	16:30	16:01		
12	05:05	05:38 (7)	05:52		06:45		07:39 (1)	07:37	07:35	08:22		
	21:41	15 05:53 (7)	20:53		19:43	6	07:45 (1)	18:31	16:28	16:00		
13	05:06	05:39 (7)	05:54		06:47		07:36 (1)	07:39	07:37	08:23		
	21:40	14 05:53 (7)	20:51		19:41	13	07:49 (1)	18:29	16:27	16:00		
14	05:07	05:39 (7)	05:55		06:48		07:34 (1)	07:41	07:39	08:24		
	21:39	14 05:53 (7)	20:49		19:38	16	07:50 (1)	18:27	16:25	16:00		
15	05:09	05:40 (7)	05:57		06:50		07:32 (1)	07:43	07:41	08:25		
	21:38	12 05:52 (7)	20:47		19:36	18	07:50 (1)	18:24	16:24	16:00		
16	05:10	05:41 (7)	05:59		06:52		07:31 (1)	07:45	07:43	08:26		
	21:37	10 05:51 (7)	20:45		19:33	20	07:51 (1)	18:22	16:22	16:00		
17	05:11	05:43 (7)	06:00		06:54		07:31 (1)	07:46	07:44	08:27		
	21:36	8 05:51 (7)	20:43		19:31	21	07:52 (1)	18:20	16:21	16:01		
18	05:13	05:44 (7)	06:02		06:55		07:29 (1)	07:48	07:46	08:28		
	21:35	6 05:50 (7)	20:41		19:29	22	07:51 (1)	18:18	16:19	16:01		
19	05:14		06:04		06:57		07:29 (1)	07:50	07:48	08:28		
	21:34		20:39		19:26	22	07:51 (1)	18:15	16:18	16:01		
20	05:15		06:05		06:59		07:29 (1)	07:52	07:50	08:29		
	21:32		20:37		19:24	21	07:50 (1)	18:13	16:17	16:01		
21	05:17		06:07		07:06 (4)	07:00		07:29 (1)	07:54	07:51	08:30	
	21:31		20:34	10	07:16 (4)	19:21	20	07:49 (1)	18:11	16:15	16:02	
22	05:18		06:09		07:04 (4)	07:02		07:29 (1)	07:56	07:53	08:30	
	21:30		20:32	15	07:19 (4)	19:19	19	07:48 (1)	18:09	16:14	16:02	
23	05:20		06:11		07:02 (4)	07:04		07:30 (1)	07:58	07:55	08:31	
	21:28		20:30	17	07:19 (4)	19:16	17	07:47 (1)	18:07	16:13	16:03	
24	05:21	06:23 (8)	06:12		07:01 (4)	07:06		07:32 (1)	07:59	07:57	08:31	
	21:27	8 06:31 (8)	20:28	19	07:20 (4)	19:14	13	07:45 (1)	18:05	16:12	16:03	
25	05:23	06:21 (8)	06:14		07:00 (4)	07:07		07:33 (1)	07:01	07:58	08:32	
	21:26	11 06:32 (8)	20:25	21	07:21 (4)	19:12	9	07:42 (1)	17:02	16:11	16:04	
26	05:24	06:21 (8)	06:16		06:59 (4)	07:09		07:03	08:00	08:32		
	21:24	13 06:34 (8)	20:23	22	07:21 (4)	19:09		17:00	16:10	16:05		
27	05:26	06:19 (8)	06:18		06:58 (4)	07:11		07:05	08:02	08:32		
	21:22	16 06:35 (8)	20:21	24	07:22 (4)	19:07		16:58	16:09	16:06		
28	05:27	06:19 (8)	06:19		06:57 (4)	07:13		07:07	08:03	08:32		
	21:21	17 06:36 (8)	20:19	24	07:21 (4)	19:04		16:56	16:08	16:06		
29	05:29	06:18 (8)	06:21		06:57 (4)	07:14		07:09	08:05	08:32		
	21:19	18 06:36 (8)	20:16	24	07:21 (4)	19:02		16:54	16:07	16:07		
30	05:30	06:16 (8)	06:23		06:57 (4)	07:16		07:11	08:06	08:32		
	21:18	20 06:36 (8)	20:14	24	07:21 (4)	19:00		16:52	16:06	16:08		
31	05:32	06:16 (8)	06:24		06:57 (4)			07:13		08:32		
	21:16	21 06:37 (8)	20:12	23	07:20 (4)			16:50		16:09		
Sonnenscheinstunden	508		458		382			330	262	237		
astr. max.mögl. Beschattung		395		443		322						
Red. Sonnenscheinwahrsch.		0.38		0.42		0.35						
Reduktion Betriebsdauer		0.96		0.96		0.96						
Reduktion Windrichtung		0.72		0.72		0.71						
Gesamte Reduktion		0.26		0.29		0.24						
Met. wahrsch. Beschattung		103		130		76						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CT - IO98

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	05:46	06:13 (9)	04:59	05:30 (7)		
	16:10	17:00	17:55	19:51	20:45	1 06:14 (9)	21:34	15 05:45 (7)		
2	08:32	08:02	07:05	06:52	05:44	06:10 (9)	04:58	05:31 (7)		
	16:12	17:02	17:57	19:53	20:47	13 06:23 (8)	21:35	16 05:47 (7)		
3	08:32	08:00	07:03	06:49	05:42	06:08 (9)	04:57	05:30 (7)		
	16:13	17:04	17:58	19:55	20:49	16 06:24 (8)	21:36	17 05:47 (7)		
4	08:32	07:58	07:01	06:47	05:41	06:06 (9)	04:56	05:30 (7)		
	16:14	17:06	18:00	19:57	20:50	19 06:25 (8)	21:37	17 05:47 (7)		
5	08:32	07:57	06:58	06:45	05:39	06:05 (9)	04:55	05:31 (7)		
	16:15	17:08	18:02	19:59	20:52	21 06:26 (8)	21:38	16 05:47 (7)		
6	08:31	07:55	06:56	06:42	07:09 (4)	05:37	06:04 (9)	04:55	05:30 (6)	
	16:16	17:10	18:04	20:00	4 07:13 (4)	20:54	22 06:26 (8)	21:39	17 05:47 (7)	
7	08:31	07:53	06:54	06:40	07:05 (4)	05:35	06:05 (9)	04:54	05:30 (6)	
	16:18	17:12	18:06	20:02	12 07:17 (4)	20:56	22 06:27 (8)	21:40	18 05:48 (7)	
8	08:30	07:51	06:51	06:37	07:03 (4)	05:33	06:04 (9)	04:53	05:29 (6)	
	16:19	17:14	18:08	20:04	16 07:19 (4)	20:57	23 06:27 (8)	21:41	18 05:47 (7)	
9	08:30	07:49	06:49	06:35	07:01 (4)	05:31	06:04 (9)	04:53	05:29 (6)	
	16:20	17:16	18:10	20:06	20 07:21 (4)	20:59	23 06:27 (8)	21:42	19 05:48 (7)	
10	08:29	07:48	06:47	06:33	07:00 (4)	05:29	06:05 (9)	04:52	05:28 (6)	
	16:22	17:18	18:12	20:08	21 07:21 (4)	21:01	23 06:28 (8)	21:43	20 05:48 (7)	
11	08:29	07:46	06:44	06:30	06:59 (4)	05:27	06:05 (9)	04:52	05:28 (6)	
	16:23	17:20	18:13	20:09	22 07:21 (4)	21:03	22 06:27 (8)	21:44	20 05:48 (7)	
12	08:28	07:44	06:42	06:28	06:58 (4)	05:26	06:05 (9)	04:52	05:28 (6)	
	16:25	17:22	18:15	20:11	24 07:22 (4)	21:04	22 06:27 (8)	21:44	20 05:48 (7)	
13	08:27	07:42	06:40	06:26	06:57 (4)	05:24	06:06 (9)	04:51	05:28 (6)	
	16:26	17:24	18:17	20:13	24 07:21 (4)	21:06	21 06:27 (8)	21:45	21 05:49 (7)	
14	08:26	07:40	06:37	06:24	06:57 (4)	05:22	06:07 (9)	04:51	05:27 (6)	
	16:28	17:26	18:19	20:15	24 07:21 (4)	21:08	19 06:26 (8)	21:46	21 05:48 (7)	
15	08:25	07:38	06:35	06:21	06:57 (4)	05:21	06:09 (9)	04:51	05:27 (6)	
	16:30	17:28	18:21	20:17	24 07:21 (4)	21:09	17 06:26 (8)	21:46	21 05:48 (7)	
16	08:24	07:36	06:32	06:19	06:57 (4)	05:19	06:09 (9)	04:51	05:27 (6)	
	16:31	17:30	18:23	20:18	23 07:20 (4)	21:11	16 06:25 (8)	21:47	22 05:49 (7)	
17	08:23	07:34	06:30	06:17	06:57 (4)	05:17	06:10 (8)	04:51	05:28 (6)	
	16:33	17:32	18:24	20:20	22 07:19 (4)	21:12	14 06:24 (8)	21:47	21 05:49 (7)	
18	08:22	07:32	06:28	06:14	06:57 (4)	05:16	06:12 (8)	04:50	05:28 (6)	
	16:35	17:34	18:26	9 07:00 (1)	20:22	21 07:18 (4)	21:14	11 06:23 (8)	21:48	21 05:49 (7)
19	08:21	07:29	06:25	06:49 (1)	06:12	06:58 (4)	05:14	06:13 (8)	04:50	05:28 (6)
	16:36	17:35	18:28	14 07:03 (1)	20:24	19 07:17 (4)	21:16	8 06:21 (8)	21:48	21 05:49 (7)
20	08:20	07:27	06:23	06:46 (1)	06:10	07:00 (4)	05:13	06:17 (8)	04:51	05:29 (6)
	16:38	17:37	18:30	18 07:04 (1)	20:26	16 07:16 (4)	21:17	1 06:18 (8)	21:48	21 05:50 (7)
21	08:19	07:25	06:21	06:46 (1)	06:08	07:01 (4)	05:12	04:51	05:29 (6)	
	16:40	17:39	18:32	19 07:05 (1)	20:27	13 07:14 (4)	21:19	21:49	21 05:50 (7)	
22	08:18	07:23	06:18	06:44 (1)	06:06	07:04 (4)	05:10	04:51	05:29 (6)	
	16:42	17:41	18:33	20 07:04 (1)	20:29	6 07:10 (4)	21:20	21:49	21 05:50 (7)	
23	08:17	07:21	06:16	06:44 (1)	06:03	05:09	05:09	04:51	05:29 (6)	
	16:43	17:43	18:35	21 07:05 (1)	20:31	21:22	21:49	21 05:50 (7)		
24	08:15	07:19	06:13	06:43 (1)	06:01	05:07	05:07	04:51	05:30 (6)	
	16:45	17:45	18:37	21 07:04 (1)	20:33	21:23	21:49	21 05:51 (7)		
25	08:14	07:16	06:11	06:43 (1)	05:59	05:06	05:06	05:35 (7)	04:52	05:30 (6)
	16:47	17:47	18:39	21 07:04 (1)	20:35	21:24	5 05:40 (7)	21:49	21 05:51 (7)	
26	08:13	07:14	06:08	06:43 (1)	05:57	05:05	05:34 (7)	04:52	05:30 (6)	
	16:49	17:49	18:41	21 07:04 (1)	20:36	21:26	8 05:42 (7)	21:49	21 05:51 (7)	
27	08:11	07:12	06:06	06:43 (1)	05:55	05:04	05:33 (7)	04:53	05:30 (6)	
	16:51	17:51	18:42	19 07:02 (1)	20:38	21:27	10 05:43 (7)	21:49	21 05:51 (7)	
28	08:10	07:10	06:04	06:44 (1)	05:53	05:03	05:32 (7)	04:53	05:30 (6)	
	16:53	17:53	18:44	18 07:02 (1)	20:40	21:29	12 05:44 (7)	21:49	21 05:51 (7)	
29	08:08	07:01	06:44 (1)	05:51	05:02	05:31 (7)	04:54	05:31 (6)	05:31 (6)	
	16:55	19:46	15 07:59 (1)	20:42	21:30	14 05:45 (7)	21:49	21 05:52 (7)		
30	08:07	06:59	07:46 (1)	05:49	05:01	05:31 (7)	04:54	05:32 (6)	05:32 (6)	
	16:57	19:48	12 07:58 (1)	20:43	21:31	14 05:45 (7)	21:48	21 05:53 (7)		
31	08:05	06:56	07:50 (1)	05:48	05:00	05:30 (7)	05:30 (7)	05:30 (7)	05:30 (7)	
	16:58	19:50	3 07:53 (1)	20:44	21:32	15 05:45 (7)	05:45 (7)	05:45 (7)	05:45 (7)	
Sonnenscheinstunden	253	275	367	419	491	412	506	592	592	
astr.max.mögl.Beschattung			0.28	0.37	0.43	0.43	0.39	0.39	0.39	
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Reduktion Betriebsdauer			0.70	0.72	0.73	0.72	0.72	0.72	0.72	
Gesamte Reduktion			0.19	0.26	0.30	0.27	0.27	0.27	0.27	
Met.wahrsch.Beschattung			43	80	123	158	158	158	158	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CT - IO98

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:32 (6)	05:34	06:15 (9)	06:26	06:58 (4)	07:18	07:14	08:08			
	21:48	20 05:52 (7)	21:14	22 06:37 (8)	20:09	22 07:20 (4)	18:57	16:48	16:05			
2	04:56	05:33 (6)	05:35	06:15 (9)	06:28	06:59 (4)	07:20	07:16	08:09			
	21:48	20 05:53 (7)	21:12	23 06:38 (8)	20:07	21 07:20 (4)	18:55	16:46	16:05			
3	04:56	05:34 (6)	05:37	06:14 (9)	06:30	06:59 (4)	07:21	07:18	08:11			
	21:47	19 05:53 (7)	21:11	23 06:37 (8)	20:05	19 07:18 (4)	18:52	16:44	16:04			
4	04:57	05:34 (6)	05:38	06:14 (9)	06:31	07:00 (4)	07:23	07:20	08:12			
	21:47	19 05:53 (7)	21:09	24 06:38 (8)	20:02	16 07:16 (4)	18:50	16:42	16:03			
5	04:58	05:35 (6)	05:40	06:15 (9)	06:33	07:02 (4)	07:25	07:22	08:14			
	21:46	18 05:53 (7)	21:07	23 06:38 (8)	20:00	12 07:14 (4)	18:48	16:41	16:03			
6	04:59	05:36 (6)	05:42	06:14 (9)	06:35	07:04 (4)	07:27	07:24	08:15			
	21:46	17 05:53 (7)	21:05	23 06:37 (8)	19:58	6 07:10 (4)	18:45	16:39	16:02			
7	05:00	05:37 (7)	05:43	06:15 (9)	06:36		07:28	07:26	08:16			
	21:45	17 05:54 (7)	21:03	22 06:37 (8)	19:55		18:43	16:37	16:02			
8	05:01	05:37 (7)	05:45	06:14 (9)	06:38		07:30	07:28	08:18			
	21:45	17 05:54 (7)	21:01	21 06:35 (8)	19:53		18:41	16:35	16:01			
9	05:02	05:38 (7)	05:47	06:16 (9)	06:40		07:32	07:30	08:19			
	21:44	16 05:54 (7)	20:59	18 06:34 (8)	19:50		18:38	16:33	16:01			
10	05:03	05:38 (7)	05:48	06:17 (9)	06:42		07:34	07:31	08:20			
	21:43	16 05:54 (7)	20:57	15 06:32 (8)	19:48		18:36	16:32	16:01			
11	05:04	05:38 (7)	05:50	06:19 (9)	06:43		07:36	07:33	08:21			
	21:42	16 05:54 (7)	20:55	11 06:30 (8)	19:46		18:34	16:30	16:01			
12	05:05	05:39 (7)	05:52		06:45		07:37	07:35	08:22			
	21:41	15 05:54 (7)	20:53		19:43		18:31	16:28	16:00			
13	05:06	05:39 (7)	05:54		06:47		07:38 (1)	07:39	07:37	08:23		
	21:40	15 05:54 (7)	20:51		19:41	10	07:48 (1)	18:29	16:27	16:00		
14	05:07	05:39 (7)	05:55		06:48		07:36 (1)	07:41	07:39	08:24		
	21:39	14 05:53 (7)	20:49		19:38	15	07:51 (1)	18:27	16:25	16:00		
15	05:09	05:40 (7)	05:57		06:50		07:33 (1)	07:43	07:41	08:25		
	21:38	13 05:53 (7)	20:47		19:36	18	07:51 (1)	18:24	16:24	16:00		
16	05:10	05:41 (7)	05:59		06:52		07:32 (1)	07:45	07:43	08:26		
	21:37	11 05:52 (7)	20:45		19:33	20	07:52 (1)	18:22	16:22	16:00		
17	05:11	05:43 (7)	06:00		06:54		07:32 (1)	07:46	07:44	08:27		
	21:36	9 05:52 (7)	20:43		19:31	20	07:52 (1)	18:20	16:21	16:01		
18	05:13	05:44 (7)	06:02		06:55		07:30 (1)	07:48	07:46	08:28		
	21:35	7 05:51 (7)	20:41		19:29	22	07:52 (1)	18:18	16:19	16:01		
19	05:14	05:45 (7)	06:04		06:57		07:30 (1)	07:50	07:48	08:28		
	21:34	4 05:49 (7)	20:39		19:26	22	07:52 (1)	18:15	16:18	16:01		
20	05:15		06:05		06:59		07:30 (1)	07:52	07:50	08:29		
	21:32		20:37		19:24	22	07:52 (1)	18:13	16:17	16:01		
21	05:17		06:07		07:00		07:29 (1)	07:54	07:51	08:30		
	21:31		20:34	8	07:08 (4)	21	07:50 (1)	18:11	16:15	16:02		
22	05:18		06:09		07:02		07:30 (1)	07:56	07:53	08:30		
	21:30		20:32	13	07:19 (4)	19	07:49 (1)	18:09	16:14	16:02		
23	05:20		06:11		07:04		07:31 (1)	07:58	07:55	08:31		
	21:28		20:30	17	07:20 (4)	17	07:48 (1)	18:07	16:13	16:03		
24	05:21	6	06:25 (8)	06:12	07:02 (4)	07:06	07:32 (1)	07:59	07:57	08:31		
	21:27		06:31 (8)	20:28	19	07:21 (4)	19:14	15	07:47 (1)	18:05	16:12	16:03
25	05:23		06:22 (8)	06:14	07:01 (4)	07:07	07:33 (1)	07:01	07:58	08:32		
	21:26	10	06:32 (8)	20:25	21	07:22 (4)	19:12	11	07:44 (1)	17:02	16:11	16:04
26	05:24		06:22 (8)	06:16	07:00 (4)	07:09		07:03	08:00	08:32		
	21:24	12	06:34 (8)	20:23	22	07:22 (4)	19:09		17:00	16:10	16:05	
27	05:26		06:20 (8)	06:18	06:59 (4)	07:11		07:05	08:02	08:32		
	21:22	15	06:35 (8)	20:21	23	07:22 (4)	19:07		16:58	16:09	16:06	
28	05:27		06:20 (8)	06:19	06:58 (4)	07:13		07:07	08:03	08:32		
	21:21	16	06:36 (8)	20:19	24	07:22 (4)	19:04		16:56	16:08	16:06	
29	05:29		06:19 (9)	06:21	06:58 (4)	07:14		07:09	08:05	08:32		
	21:19	18	06:37 (8)	20:16	24	07:22 (4)	19:02		16:54	16:07	16:07	
30	05:30		06:17 (9)	06:23	06:58 (4)	07:16		07:11	08:06	08:32		
	21:18	20	06:37 (8)	20:14	24	07:22 (4)	19:00		16:52	16:06	16:08	
31	05:32		06:16 (9)	06:24	06:57 (4)			07:13		08:33		
	21:16	21	06:37 (8)	20:12	24	07:21 (4)		16:50		16:09		
Sonnenscheinstunden	508		458		382		330		262		237	
astr. max.mögl. Beschattung		401		444		328						
Red. Sonnenscheinwahrsch.		0.38		0.42		0.35						
Reduktion Betriebsdauer		0.96		0.96		0.96						
Reduktion Windrichtung		0.72		0.72		0.71						
Gesamte Reduktion		0.26		0.29		0.24						
Met. wahrsch. Beschattung		105		130		77						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat Sonnenaufgang (SS:MM) Minuten mit Schatten Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten) Zeitpunkt (SS:MM) Schattendecke (WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CU - IO99

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	06:54	07:47 (1)	05:46	04:59	05:28 (7)	
	16:10	17:00	17:55	19:51	07:52 (1)	20:45	21:34	13 05:41 (7)	
2	08:32	08:02	07:05	06:52		05:44	04:58	05:28 (7)	
	16:12	17:02	17:57	19:53		20:47	21:35	14 05:42 (7)	
3	08:32	08:00	07:03	06:49		05:42	04:57	05:28 (7)	
	16:13	17:04	17:58	19:55		20:49	5 06:13 (9)	15 05:43 (7)	
4	08:32	07:58	07:01	06:47		05:41	06:06 (9)	04:56 05:27 (7)	
	16:14	17:06	18:00	19:57		20:50	12 06:18 (8)	21:37 05:43 (7)	
5	08:32	07:57	06:58	06:45		05:39	06:04 (9)	04:55 05:28 (7)	
	16:15	17:08	18:02	19:59		20:52	16 06:20 (8)	21:38 05:44 (7)	
6	08:31	07:55	06:56	06:42		05:37	06:02 (9)	04:55 05:28 (7)	
	16:16	17:10	18:04	20:00		20:54	19 06:21 (8)	21:39 05:44 (7)	
7	08:31	07:53	06:54	06:40		05:35	06:02 (9)	04:54 05:28 (7)	
	16:18	17:12	18:06	20:02		20:56	21 06:23 (8)	21:40 05:44 (7)	
8	08:30	07:51	06:51	06:37	07:03 (4)	05:33	06:02 (9)	04:53 05:28 (7)	
	16:19	17:14	18:08	20:04	11 07:14 (4)	20:57	21 06:23 (8)	21:41 05:44 (7)	
9	08:30	07:49	06:49	06:35	07:01 (4)	05:31	06:01 (9)	04:53 05:28 (7)	
	16:20	17:16	18:10	20:06	16 07:17 (4)	20:59	23 06:24 (8)	21:42 05:45 (7)	
10	08:29	07:48	06:47	06:33	06:59 (4)	05:29	06:01 (9)	04:52 05:28 (7)	
	16:22	17:18	18:12	20:08	18 07:17 (4)	21:01	23 06:24 (8)	21:43 05:44 (7)	
11	08:29	07:46	06:44	06:30	06:57 (4)	05:27	06:01 (9)	04:52 05:28 (7)	
	16:23	17:20	18:13	20:09	21 07:18 (4)	21:03	23 06:24 (8)	21:44 05:45 (7)	
12	08:28	07:44	06:42	06:28	06:57 (4)	05:26	06:01 (9)	04:52 05:29 (7)	
	16:25	17:22	18:15	20:11	22 07:19 (4)	21:04	23 06:24 (8)	21:44 05:45 (7)	
13	08:27	07:42	06:40	06:26	06:55 (4)	05:24	06:02 (9)	04:51 05:29 (7)	
	16:26	17:24	18:17	20:13	24 07:19 (4)	21:06	22 06:24 (8)	21:45 05:46 (7)	
14	08:26	07:40	06:37	06:24	06:55 (4)	05:22	06:02 (9)	04:51 05:28 (6)	
	16:28	17:26	18:19	20:15	24 07:19 (4)	21:08	22 06:24 (8)	21:46 05:47 (7)	
15	08:25	07:38	06:35	06:21	06:55 (4)	05:21	06:03 (9)	04:51 05:28 (6)	
	16:30	17:28	18:21	20:17	24 07:19 (4)	21:09	21 06:24 (8)	21:46 05:46 (7)	
16	08:24	07:36	06:32	06:19	06:54 (4)	05:19	06:04 (9)	04:51 05:27 (6)	
	16:31	17:30	18:23	20:18	25 07:19 (4)	21:11	19 06:23 (8)	21:47 05:46 (7)	
17	08:23	07:34	06:30	06:17	06:54 (4)	05:17	06:05 (8)	04:50 05:27 (6)	
	16:33	17:32	18:24	20:20	24 07:18 (4)	21:12	18 06:23 (8)	21:47 05:46 (7)	
18	08:22	07:32	06:28	06:14	06:54 (4)	05:16	06:06 (8)	04:50 05:27 (6)	
	16:35	17:34	18:26	20:22	23 07:17 (4)	21:14	17 06:23 (8)	21:48 05:46 (7)	
19	08:21	07:29	06:25	06:12	06:54 (4)	05:14	06:06 (8)	04:50 05:27 (6)	
	16:36	17:35	18:28	11 07:00 (1)	20:24	23 07:17 (4)	16 06:22 (8)	21:48 05:46 (7)	
20	08:20	07:27	06:23	06:46 (1)	06:10	06:55 (4)	05:13	06:07 (8)	04:51 05:28 (6)
	16:38	17:37	18:30	15 07:01 (1)	20:26	21 07:16 (4)	21:17	14 06:21 (8)	21:48 05:47 (7)
21	08:19	07:25	06:21	06:45 (1)	06:08	06:56 (4)	05:12	06:08 (8)	04:51 05:28 (6)
	16:40	17:39	18:32	18 07:03 (1)	20:27	19 07:15 (4)	21:19	13 06:21 (8)	21:49 05:47 (7)
22	08:18	07:23	06:18	06:43 (1)	06:06	06:57 (4)	05:10	06:09 (8)	04:51 05:28 (6)
	16:42	17:41	18:33	20 07:03 (1)	20:29	16 07:13 (4)	21:20	10 06:19 (8)	21:49 05:47 (7)
23	08:17	07:21	06:16	06:43 (1)	06:03	06:59 (4)	05:09	06:11 (8)	04:51 05:28 (6)
	16:43	17:43	18:35	21 07:04 (1)	20:31	12 07:11 (4)	21:22	6 06:17 (8)	21:49 05:47 (7)
24	08:15	07:19	06:13	06:41 (1)	06:01	07:03 (4)	05:07		04:51 05:29 (6)
	16:45	17:45	18:37	22 07:03 (1)	20:33	4 07:07 (4)	21:23		21:49 05:48 (7)
25	08:14	07:16	06:11	06:41 (1)	05:59		05:06		04:52 05:29 (6)
	16:47	17:47	18:39	22 07:03 (1)	20:35		21:24		21:49 05:48 (7)
26	08:13	07:14	06:08	06:41 (1)	05:57		05:05		04:52 05:29 (6)
	16:49	17:49	18:41	22 07:03 (1)	20:36		21:26		21:49 05:48 (7)
27	08:11	07:12	06:06	06:41 (1)	05:55		05:04		04:53 05:30 (6)
	16:50	17:51	18:42	21 07:02 (1)	20:38		21:27		21:49 05:49 (7)
28	08:10	07:10	06:04	06:41 (1)	05:53		05:03	05:32 (7)	04:53 05:31 (6)
	16:53	17:53	18:44	21 07:02 (1)	20:40		21:29	5 05:37 (7)	21:49 05:48 (7)
29	08:08		07:01	07:41 (1)	05:51		05:02	05:31 (7)	04:54 05:32 (6)
	16:55		19:46	19 08:00 (1)	20:42		21:30	8 05:39 (7)	21:49 05:49 (7)
30	08:07		06:59	07:43 (1)	05:49		05:01	05:30 (7)	04:54 05:32 (7)
	16:57		19:48	16 07:59 (1)	20:43		21:31	10 05:40 (7)	21:48 05:49 (7)
31	08:05		06:56	07:45 (1)			05:00	05:29 (7)	
	16:58		19:50	12 07:57 (1)			21:32	11 05:40 (7)	
Sonnenscheinstunden	253	275	367	418	491		506		
astr.max.mögl.Beschattung			240		332		398		519
Red.Sonnenscheinwahrsch.			0.28		0.37		0.43		0.39
Reduktion Betriebsdauer			0.96		0.96		0.96		0.96
Reduktion Windrichtung			0.70		0.72		0.73		0.72
Gesamte Reduktion			0.19		0.26		0.30		0.27
Met.wahrsch.Beschattung			45		85		119		138

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CU - IO99

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:32 (7)	05:34	06:11 (9)	06:26	06:56 (4)	07:18	07:14	08:08			
	21:48	05:49 (7)	21:14	23	06:34 (8)	20:09	21	07:17 (4)	18:57	16:48	16:05	
2	04:56	05:33 (7)	05:35	06:12 (9)	06:28	06:58 (4)	07:20	07:16	08:09			
	21:48	05:50 (7)	21:12	23	06:35 (8)	20:07	18	07:16 (4)	18:55	16:46	16:05	
3	04:56	05:33 (7)	05:37	06:11 (9)	06:30	06:58 (4)	07:21	07:18	08:11			
	21:47	05:50 (7)	21:11	23	06:34 (8)	20:05	16	07:14 (4)	18:52	16:44	16:04	
4	04:57	05:33 (7)	05:38	06:11 (9)	06:31	07:00 (4)	07:23	07:20	08:12			
	21:47	05:49 (7)	21:09	23	06:34 (8)	20:02	11	07:11 (4)	18:50	16:42	16:03	
5	04:58	05:33 (7)	05:40	06:12 (9)	06:33	07:00 (4)	07:25	07:22	08:14			
	21:46	05:50 (7)	21:07	22	06:34 (8)	20:00		18:48	16:41	16:03		
6	04:59	05:34 (7)	05:42	06:12 (9)	06:35	07:00 (4)	07:27	07:24	08:15			
	21:46	05:50 (7)	21:05	20	06:32 (8)	19:58		18:45	16:39	16:02		
7	05:00	05:34 (7)	05:43	06:13 (9)	06:36	07:00 (4)	07:28	07:26	08:16			
	21:45	05:50 (7)	21:03	18	06:31 (8)	19:55		18:43	16:37	16:02		
8	05:01	05:35 (7)	05:45	06:14 (9)	06:38	07:00 (4)	07:30	07:28	08:18			
	21:45	05:50 (7)	21:01	15	06:29 (8)	19:53		18:41	16:35	16:01		
9	05:02	05:35 (7)	05:47	06:16 (9)	06:40	07:00 (4)	07:32	07:30	08:19			
	21:44	05:50 (7)	20:59	11	06:27 (8)	19:50		18:38	16:33	16:01		
10	05:03	05:36 (7)	05:48	06:18 (9)	06:42	07:00 (4)	07:34	07:31	08:20			
	21:43	05:50 (7)	20:57	2	06:20 (9)	19:48		18:36	16:32	16:01		
11	05:04	05:36 (7)	05:50	06:43	07:42 (1)	07:36	07:33	08:21				
	21:42	05:50 (7)	20:55	19:46	2	07:44 (1)	18:34	16:30	16:01			
12	05:05	05:37 (7)	05:52	06:45	07:36 (1)	07:37	07:35	08:22				
	21:41	05:49 (7)	20:53	19:43	12	07:48 (1)	18:31	16:28	16:00			
13	05:06	05:38 (7)	05:54	06:47	07:34 (1)	07:39	07:37	08:23				
	21:40	05:49 (7)	20:51	19:41	16	07:50 (1)	18:29	16:27	16:00			
14	05:07	05:39 (7)	05:55	06:48	07:33 (1)	07:41	07:39	08:24				
	21:39	05:48 (7)	20:49	19:38	18	07:51 (1)	18:27	16:25	16:00			
15	05:09	05:40 (7)	05:57	06:50	07:31 (1)	07:43	07:41	08:25				
	21:38	05:47 (7)	20:47	19:36	20	07:51 (1)	18:24	16:24	16:00			
16	05:10	05:41 (7)	05:59	06:52	07:30 (1)	07:45	07:43	08:26				
	21:37	05:45 (7)	20:45	19:33	21	07:51 (1)	18:22	16:22	16:00			
17	05:11	06:00	06:54	07:30 (1)	07:46	07:44	08:27					
	21:36	06:02	19:31	22	07:52 (1)	18:20	16:21	16:01				
18	05:13	06:02	06:55	07:29 (1)	07:48	07:46	08:28					
	21:35	20:41	19:29	22	07:51 (1)	18:18	16:19	16:01				
19	05:14	06:04	06:57	07:29 (1)	07:50	07:48	08:28					
	21:34	20:39	7	07:14 (4)	19:26	22	07:51 (1)	18:15	16:18	16:01		
20	05:15	06:05	07:03 (4)	06:59	07:29 (1)	07:52	07:50	08:29				
	21:32	2	06:25 (8)	20:37	13	07:16 (4)	19:24	21	07:50 (1)	18:13	16:17	16:01
21	05:17	06:20 (8)	06:07	07:02 (4)	07:00	07:28 (1)	07:54	07:51	08:30			
	21:31	8	06:28 (8)	20:34	16	07:18 (4)	19:21	21	07:49 (1)	18:11	16:15	16:02
22	05:18	06:18 (8)	06:09	07:00 (4)	07:02	07:29 (1)	07:56	07:53	08:30			
	21:30	12	06:30 (8)	20:32	19	07:19 (4)	19:19	19	07:48 (1)	18:09	16:14	16:02
23	05:20	06:17 (8)	06:11	06:59 (4)	07:04	07:30 (1)	07:58	07:55	08:31			
	21:28	14	06:31 (8)	20:30	21	07:20 (4)	19:16	16	07:46 (1)	18:07	16:13	16:03
24	05:21	06:17 (8)	06:12	06:58 (4)	07:06	07:32 (1)	07:59	07:57	08:31			
	21:27	15	06:32 (8)	20:28	22	07:20 (4)	19:14	12	07:44 (1)	18:05	16:12	16:03
25	05:23	06:16 (8)	06:14	06:58 (4)	07:07	07:35 (1)	07:01	07:58	08:32			
	21:26	17	06:33 (8)	20:25	23	07:21 (4)	19:12	5	07:40 (1)	17:02	16:11	16:04
26	05:24	06:16 (8)	06:16	06:56 (4)	07:09	07:03	08:00	08:32				
	21:24	18	06:34 (8)	20:23	24	07:20 (4)	19:09	17:00	16:10	16:05		
27	05:26	06:15 (9)	06:18	06:56 (4)	07:11	07:05	08:02	08:32				
	21:22	19	06:34 (8)	20:21	25	07:21 (4)	19:07	16:58	16:09	16:06		
28	05:27	06:15 (9)	06:19	06:55 (4)	07:13	07:07	08:03	08:32				
	21:21	20	06:35 (8)	20:19	25	07:20 (4)	19:04	16:56	16:08	16:06		
29	05:29	06:13 (9)	06:21	06:56 (4)	07:14	07:09	08:05	08:32				
	21:19	22	06:35 (8)	20:16	24	07:20 (4)	19:02	16:54	16:07	16:07		
30	05:30	06:12 (9)	06:23	06:56 (4)	07:16	07:11	08:06	08:32				
	21:18	22	06:34 (8)	20:14	23	07:19 (4)	19:00	16:52	16:06	16:08		
31	05:32	06:12 (9)	06:24	06:56 (4)	07:18	07:13	08:06	08:32				
	21:16	23	06:35 (8)	20:12	22	07:18 (4)	19:00	16:50	16:06	16:09		
Sonnenscheinstunden	508		458		382		330	262	237			
astr.max.mögl.Beschattung	409		444		315							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.70							
Gesamte Reduktion	0.26		0.29		0.23							
Met.wahrsch.Beschattung	107		130		74							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CV - IO100

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	05:46	06:12 (9)	04:59	05:31 (7)
	16:10	17:00	17:55	19:51	20:45	12	06:24 (8)	11:34
2	08:32	08:02	07:05	06:52	05:44	06:10 (9)	04:58	05:31 (7)
	16:12	17:02	17:57	19:53	20:47	16	06:26 (8)	11:35
3	08:32	08:00	07:03	06:49	05:42	06:08 (9)	04:57	05:31 (7)
	16:13	17:04	17:58	19:55	20:49	19	06:27 (8)	11:36
4	08:32	07:58	07:01	06:47	05:41	06:07 (9)	04:56	05:31 (7)
	16:14	17:06	18:00	19:57	20:50	21	06:28 (8)	11:37
5	08:32	07:57	06:58	06:45	07:11 (4)	05:39	06:06 (9)	04:55
	16:15	17:08	18:02	19:59	7	07:18 (4)	20:52	23
6	08:31	07:55	06:56	06:42	07:07 (4)	05:37	06:05 (9)	04:55
	16:16	17:10	18:04	20:00	13	07:20 (4)	20:54	24
7	08:31	07:53	06:54	06:40	07:05 (4)	05:35	06:06 (9)	04:54
	16:18	17:12	18:06	20:02	17	07:22 (4)	20:56	24
8	08:30	07:51	06:51	06:37	07:04 (4)	05:33	06:05 (9)	04:53
	16:19	17:14	18:08	20:04	19	07:23 (4)	20:57	25
9	08:30	07:49	06:49	06:35	07:03 (4)	05:31	06:05 (9)	04:53
	16:20	17:16	18:10	20:06	21	07:24 (4)	20:59	24
10	08:29	07:48	06:47	06:33	07:01 (4)	05:29	06:06 (9)	04:52
	16:22	17:18	18:12	20:08	23	07:24 (4)	21:01	24
11	08:29	07:46	06:44	06:30	07:01 (4)	05:27	06:06 (9)	04:52
	16:23	17:20	18:13	20:09	23	07:24 (4)	21:03	23
12	08:28	07:44	06:42	06:28	07:00 (4)	05:26	06:07 (9)	04:52
	16:25	17:22	18:15	20:11	25	07:25 (4)	21:04	21
13	08:27	07:42	06:40	06:26	06:59 (4)	05:24	06:08 (9)	04:51
	16:26	17:24	18:17	20:13	25	07:24 (4)	21:06	21
14	08:26	07:40	06:37	06:24	07:00 (4)	05:22	06:09 (9)	04:51
	16:28	17:26	18:19	20:15	23	07:23 (4)	21:08	18
15	08:25	07:38	06:35	06:21	07:00 (4)	05:21	06:11 (8)	04:51
	16:30	17:28	18:21	20:17	23	07:23 (4)	21:09	16
16	08:24	07:36	06:32	06:19	07:00 (4)	05:19	06:11 (8)	04:51
	16:31	17:30	18:23	20:18	23	07:23 (4)	21:11	15
17	08:23	07:34	06:30	06:17	07:00 (4)	05:17	06:13 (8)	04:50
	16:33	17:32	18:24	11	07:04 (1)	20:20	21	07:21 (4)
18	08:22	07:32	06:28	06:14	07:01 (4)	05:16	06:15 (8)	04:50
	16:35	17:34	18:26	15	07:06 (1)	20:22	19	07:20 (4)
19	08:21	07:29	06:25	06:10	07:02 (4)	05:14	06:17 (8)	04:50
	16:36	17:35	18:28	17	07:07 (1)	20:24	16	07:18 (4)
20	08:20	07:27	06:23	06:08	07:04 (4)	05:13	06:20 (8)	04:51
	16:38	17:37	18:30	20	07:08 (1)	20:26	12	07:16 (4)
21	08:19	07:25	06:21	06:07	07:07 (4)	05:12	07:07 (4)	04:51
	16:40	17:39	18:32	21	07:08 (1)	20:27	6	07:13 (4)
22	08:18	07:23	06:18	06:06	07:00 (4)	05:10	08:10	04:51
	16:42	17:41	18:33	22	07:08 (1)	20:29	21:20	21:49
23	08:17	07:21	06:16	06:04	07:01 (1)	06:03	05:09	04:51
	16:43	17:43	18:35	22	07:08 (1)	20:31	21:22	21:49
24	08:15	07:19	06:13	06:04	07:01 (1)	06:01	05:07	05:36 (7)
	16:45	17:45	18:37	22	07:07 (1)	20:33	21:23	4
25	08:14	07:16	06:11	06:04	07:01 (1)	05:59	05:06	05:35 (7)
	16:47	17:47	18:39	21	07:07 (1)	20:35	21:24	7
26	08:13	07:14	06:08	06:04	07:01 (1)	05:57	05:05	05:34 (7)
	16:49	17:49	18:41	20	07:06 (1)	20:36	21:26	10
27	08:11	07:12	06:06	06:04	07:01 (1)	05:55	05:04	05:33 (7)
	16:51	17:51	18:42	18	07:04 (1)	20:38	21:27	12
28	08:10	07:10	06:04	06:04	07:01 (1)	05:53	05:03	05:32 (7)
	16:53	17:53	18:44	15	07:03 (1)	20:40	21:29	13
29	08:08	07:01	06:01	07:49 (1)	05:51	05:02	05:32 (7)	04:54
	16:55	19:46	11	08:00 (1)	20:42	21:30	14	05:46 (7)
30	08:07	06:59	05:49	20:43	05:01	05:31 (7)	04:54	05:32 (6)
	16:57	19:48	20:43	21:31	15	05:46 (7)	21:48	21
31	08:05	06:56	05:48	05:00	05:31 (7)	04:54	05:31 (7)	05:32 (6)
	16:58	19:50	21:32	16	05:47 (7)	21:48	21	05:53 (7)
Sonnenscheinstunden	253	275	367	419	491		506	
astr.max.mögl.Beschattung			0.28	0.37	0.43		0.43	0.39
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96		0.96	0.96
Reduktion Betriebsdauer			0.70	0.72	0.73		0.72	0.72
Reduktion Windrichtung			0.18	0.26	0.30		0.27	0.27
Gesamte Reduktion			0.43	0.51	0.56		0.53	0.53
Met.wahrsch.Beschattung								163

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CV - IO100

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:32 (6)	05:34	06:17 (9)	06:26	07:00 (4)	07:18	07:14	08:08			
	21:48	05:53 (7)	21:14	22	06:39 (8)	20:09	23	07:23 (4)	18:57	16:48	16:05	
2	04:56	05:33 (6)	05:35	06:17 (9)	06:28	07:00 (4)	07:20	07:16	08:09			
	21:48	05:54 (7)	21:12	23	06:40 (8)	20:07	23	07:23 (4)	18:55	16:46	16:05	
3	04:56	05:34 (6)	05:37	06:16 (9)	06:30	07:00 (4)	07:21	07:18	08:11			
	21:47	20	05:54 (7)	21:11	23	06:39 (8)	20:05	21	07:21 (4)	18:52	16:44	16:04
4	04:57	05:34 (6)	05:38	06:16 (9)	06:31	07:01 (4)	07:23	07:20	08:12			
	21:47	20	05:54 (7)	21:09	24	06:40 (8)	20:02	19	07:20 (4)	18:50	16:42	16:03
5	04:58	05:35 (6)	05:40	06:16 (9)	06:33	07:02 (4)	07:25	07:22	08:14			
	21:46	19	05:54 (7)	21:07	24	06:40 (8)	20:00	17	07:19 (4)	18:48	16:41	16:03
6	04:59	05:36 (6)	05:42	06:15 (9)	06:35	07:03 (4)	07:27	07:24	08:15			
	21:46	18	05:54 (7)	21:05	24	06:39 (8)	19:58	13	07:16 (4)	18:45	16:39	16:02
7	05:00	05:37 (6)	05:43	06:16 (9)	06:36	07:06 (4)	07:28	07:26	08:16			
	21:45	18	05:55 (7)	21:03	23	06:39 (8)	19:55	7	07:13 (4)	18:43	16:37	16:02
8	05:01	05:38 (7)	05:45	06:15 (9)	06:38		07:30	07:28	08:18			
	21:45	17	05:55 (7)	21:01	23	06:38 (8)	19:53		18:41	16:35	16:01	
9	05:02	05:38 (7)	05:47	06:16 (9)	06:40		07:32	07:30	08:19			
	21:44	17	05:55 (7)	20:59	21	06:37 (8)	19:50		18:38	16:33	16:01	
10	05:03	05:39 (7)	05:48	06:17 (9)	06:42		07:34	07:31	08:20			
	21:43	16	05:55 (7)	20:57	19	06:36 (8)	19:48		18:36	16:32	16:01	
11	05:04	05:39 (7)	05:50	06:19 (9)	06:43		07:36	07:33	08:21			
	21:42	16	05:55 (7)	20:55	15	06:34 (8)	19:46		18:34	16:30	16:01	
12	05:05	05:39 (7)	05:52	06:21 (9)	06:45		07:37	07:35	08:22			
	21:41	16	05:55 (7)	20:53	11	06:32 (8)	19:43		18:31	16:28	16:00	
13	05:06	05:39 (7)	05:54	06:47	06:47		07:39	07:37	08:23			
	21:40	16	05:55 (7)	20:51		19:41		18:29	16:27	16:00		
14	05:07	05:40 (7)	05:55	06:48	06:48		07:41 (1)	07:41	07:39	08:24		
	21:39	15	05:55 (7)	20:49		19:38	10	07:51 (1)	18:27	16:25	16:00	
15	05:09	05:40 (7)	05:57	06:50	06:50		07:38 (1)	07:43	07:41	08:25		
	21:38	14	05:54 (7)	20:47		19:36	14	07:52 (1)	18:24	16:24	16:00	
16	05:10	05:41 (7)	05:59	06:52	06:52		07:36 (1)	07:45	07:43	08:26		
	21:37	12	05:53 (7)	20:45		19:33	17	07:53 (1)	18:22	16:22	16:00	
17	05:11	05:43 (7)	06:00	06:54	06:54		07:35 (1)	07:46	07:44	08:27		
	21:36	11	05:54 (7)	20:43		19:31	19	07:54 (1)	18:20	16:21	16:01	
18	05:13	05:44 (7)	06:02	06:55	06:55		07:33 (1)	07:48	07:46	08:28		
	21:35	9	05:53 (7)	20:41		19:29	21	07:54 (1)	18:18	16:19	16:01	
19	05:14	05:45 (7)	06:04	06:57	06:57		07:33 (1)	07:50	07:48	08:28		
	21:34	6	05:51 (7)	20:39		19:26	21	07:54 (1)	18:15	16:18	16:01	
20	05:15		06:05	06:59	06:59		07:33 (1)	07:52	07:50	08:29		
	21:32		20:37		19:24	21	07:54 (1)	18:13	16:17	16:01		
21	05:17		06:07	07:00	07:00		07:32 (1)	07:54	07:51	08:30		
	21:31		20:34		19:21	21	07:53 (1)	18:11	16:15	16:02		
22	05:18		06:09	07:02	07:02		07:32 (1)	07:56	07:53	08:30		
	21:30		20:32	7	07:18 (4)	19:19	21	07:53 (1)	18:09	16:14	16:02	
23	05:20		06:11	07:07 (4)	07:04		07:32 (1)	07:58	07:55	08:31		
	21:28		20:30	13	07:20 (4)	19:16	20	07:52 (1)	18:07	16:13	16:03	
24	05:21		06:12	07:06 (4)	07:06		07:33 (1)	07:59	07:57	08:31		
	21:27		20:28	16	07:22 (4)	19:14	18	07:51 (1)	18:05	16:12	16:03	
25	05:23	6	06:26 (8)	07:04 (4)	07:07		07:33 (1)	07:01	07:58	08:32		
	21:26		06:32 (8)	20:25	20	07:24 (4)	19:12	16	07:49 (1)	17:02	16:11	16:04
26	05:24		06:25 (8)	07:03 (4)	07:09		07:35 (1)	07:03	08:00	08:32		
	21:24	10	06:35 (8)	20:23	21	07:24 (4)	19:09	12	07:47 (1)	17:00	16:10	16:05
27	05:26		06:23 (8)	06:18	07:02 (4)	07:11		07:38 (1)	07:05	08:02	08:32	
	21:22	13	06:36 (8)	20:21	22	07:24 (4)	19:07	6	07:44 (1)	16:58	16:09	16:06
28	05:27		06:22 (8)	06:19	07:01 (4)	07:13		07:07	08:03	08:32		
	21:21	16	06:38 (8)	20:19	23	07:24 (4)	19:04		16:56	16:08	16:06	
29	05:29		06:21 (8)	06:21	07:00 (4)	07:14		07:09	08:05	08:32		
	21:19	17	06:38 (8)	20:16	24	07:24 (4)	19:02		16:54	16:07	16:07	
30	05:30		06:19 (9)	06:23	07:00 (4)	07:16		07:11	08:06	08:32		
	21:18	19	06:38 (8)	20:14	25	07:25 (4)	19:00		16:52	16:06	16:08	
31	05:32		06:18 (9)	06:24	06:59 (4)			07:13	08:32			
	21:16	21	06:39 (8)	20:12	25	07:24 (4)		16:50	16:09			
Sonnenscheinstunden	509		458		382		330		262		237	
astr. max.mögl. Beschattung	404		448		360							
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.70							
Gesamte Reduktion	0.26		0.29		0.23							
Met. wahrsch. Beschattung	106		132		85							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CW - IO101

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32 08:03 07:08 16:10 17:00 17:55			06:54 07:17 (3) 05:46 19:51 07:26 (3) 20:45		04:59 05:28 (7) 21:34 13 05:41 (7)		
2	08:32 08:02 07:05 16:12 17:02 17:57			06:52 07:15 (3) 05:44 19:53 07:28 (3) 20:47		04:58 05:28 (7) 21:35 14 05:42 (7)		
3	08:32 08:00 07:03 16:13 17:04 17:58			06:49 07:13 (3) 05:42 19:55 07:29 (3) 20:49	6	06:08 (9) 04:57 (7) 06:14 (9) 21:36 15 05:43 (7)		
4	08:32 07:58 07:01 16:14 17:06 18:00			06:47 07:10 (3) 05:41 19:57 07:28 (3) 20:50	14	06:06 (9) 04:56 (7) 06:20 (8) 21:37 15 05:43 (7)		
5	08:32 07:57 06:58 16:15 17:08 18:02			06:45 07:10 (3) 05:39 19:59 07:29 (3) 20:52	17	06:04 (9) 04:55 (7) 06:21 (8) 21:38 16 05:44 (7)		
6	08:31 07:55 06:56 16:16 17:10 18:04			06:42 07:09 (3) 05:37 20:00 07:28 (3) 20:54	20	06:02 (9) 04:55 (7) 06:22 (8) 21:39 16 05:44 (7)		
7	08:31 07:53 06:54 16:18 17:12 18:06			06:40 07:07 (4) 05:35 20:02 07:27 (3) 20:56	21	06:03 (9) 04:54 (7) 06:24 (8) 21:40 17 05:45 (7)		
8	08:30 07:51 06:51 16:19 17:14 18:08			06:37 07:03 (4) 05:33 20:04 07:27 (3) 20:57	22	06:02 (9) 04:53 (7) 06:24 (8) 21:41 16 05:44 (7)		
9	08:30 07:49 06:49 16:20 17:16 18:10			06:35 07:02 (4) 05:31 20:06 07:26 (3) 20:59	23	06:01 (9) 04:53 (7) 06:24 (8) 21:42 17 05:45 (7)		
10	08:29 07:48 06:47 16:22 17:18 18:12			06:33 06:59 (4) 05:29 20:08 07:24 (3) 21:01	23	06:02 (9) 04:52 (7) 06:25 (8) 21:43 17 05:45 (7)		
11	08:29 07:46 06:44 16:23 17:20 18:13			06:30 06:58 (4) 05:27 20:09 07:22 (3) 21:03	23	06:02 (9) 04:52 (7) 06:25 (8) 21:44 17 05:45 (7)		
12	08:28 07:44 06:42 16:25 17:22 18:15			06:28 06:58 (4) 05:26 20:11 07:21 (4) 21:04	24	06:01 (9) 04:52 (7) 06:25 (8) 21:44 17 05:46 (7)		
13	08:27 07:42 06:40 16:26 17:24 18:17			06:26 06:56 (4) 05:24 20:13 07:20 (4) 21:06	24	06:02 (9) 04:51 (7) 06:25 (8) 21:45 17 05:46 (7)		
14	08:26 07:40 06:37 16:28 17:26 18:19			06:24 06:56 (4) 05:22 20:15 07:20 (4) 21:08	23	06:02 (9) 04:51 (7) 06:25 (8) 21:46 17 05:45 (7)		
15	08:25 07:38 06:35 16:30 17:28 18:21			06:21 06:56 (4) 05:21 20:17 07:20 (4) 21:09	21	06:04 (9) 04:51 (7) 06:25 (8) 21:46 18 05:46 (7)		
16	08:24 07:36 06:32 16:31 17:30 18:23			06:19 06:55 (4) 05:19 20:18 07:20 (4) 21:11	20	06:04 (9) 04:51 (7) 06:24 (8) 21:47 18 05:46 (7)		
17	08:23 07:34 06:30 16:33 17:32 18:24			06:17 06:55 (4) 05:17 20:20 07:19 (4) 21:12	19	06:05 (8) 04:50 (7) 06:24 (8) 21:47 18 05:46 (7)		
18	08:22 07:32 06:28 16:35 17:34 18:26		8	06:52 (1) 06:14 07:00 (1) 20:22	23	06:06 (8) 04:50 (7) 06:24 (8) 21:48 18 05:46 (7)		
19	08:21 07:29 06:25 16:36 17:35 18:28		14	06:49 (1) 06:12 07:03 (1) 20:24	22	06:06 (8) 04:50 (7) 07:18 (4) 21:16 17 05:47 (7)		
20	08:20 07:27 06:23 16:38 17:37 18:30		17	06:47 (1) 06:10 07:04 (1) 20:26	20	06:07 (8) 04:51 (7) 07:17 (4) 21:17 15 05:48 (7)		
21	08:19 07:25 06:21 16:40 17:39 18:32		19	06:46 (1) 06:08 07:05 (1) 20:27	17	06:07 (8) 04:51 (7) 06:58 (4) 05:12 12 05:48 (7)		
22	08:18 07:23 06:18 16:42 17:41 18:33		21	06:44 (1) 06:06 07:05 (1) 20:29	15	06:08 (8) 04:51 (7) 06:59 (4) 05:10 10 05:48 (7)		
23	08:17 07:21 06:16 16:43 17:43 18:35		22	06:44 (1) 06:03 07:06 (1) 20:31	10	06:09 (8) 04:51 (7) 07:01 (4) 05:09 6 06:18 (8) 21:49 19 05:48 (7)		
24	08:15 07:19 06:13 16:45 17:45 18:37		22	06:43 (1) 06:01 07:05 (1) 20:33		05:07 21:23 21:49 19 05:49 (7)		
25	08:14 07:16 06:11 16:47 17:47 18:39		22	06:43 (1) 05:59 07:05 (1) 20:35		05:06 21:24 21:49 18 05:48 (7)		
26	08:13 07:14 06:08 16:49 17:49 18:41		22	06:43 (1) 05:57 07:05 (1) 20:36		05:05 21:26 21:49 18 05:48 (7)		
27	08:11 07:12 06:06 16:50 17:51 18:42		20	06:43 (1) 05:55 07:03 (1) 20:38		05:04 21:27 21:49 18 05:49 (7)		
28	08:10 07:10 06:04 16:53 17:53 18:44		20	06:43 (1) 05:53 07:03 (1) 20:40		05:03 21:29 21:49 18 05:49 (7)		
29	08:08 07:01 06:01 16:55 17:55 18:46		18	07:43 (1) 05:51 08:01 (1) 20:42		05:32 (7) 04:53 (7) 21:29 5 05:37 (7) 21:49 18 05:49 (7)		
30	08:07 06:59 05:49 16:57 17:57 18:48		14	07:45 (1) 05:49 07:59 (1) 20:43		05:31 (7) 04:54 (7) 21:30 8 05:39 (7) 21:49 17 05:49 (7)		
31	08:05 06:56 05:40 16:58 17:58 18:49		14	07:20 (3) 05:49 07:57 (1) 20:43		05:30 (7) 04:54 (7) 21:31 10 05:40 (7) 21:48 17 05:49 (7)		
Sonnenscheinstunden	253	275	367	419	491	506		
astr. max. mögl. Beschattung			253	461	412	516		
Red. Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.70	0.72	0.73	0.72		
Gesamte Reduktion			0.19	0.26	0.30	0.27		
Met. wahrsch. Beschattung			47	118	123	137		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CW - IO101

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:32 (7)	05:34		06:12 (9)	06:26	06:57 (4)	07:18	07:14	08:08		
	21:48	17 05:49 (7)	21:14	23	06:35 (8)	20:09	24	07:21 (3)	18:57	16:48	16:05	
2	04:56	05:33 (7)	05:35		06:12 (9)	06:28	06:58 (4)	07:20	07:16	08:09		
	21:48	17 05:50 (7)	21:12	23	06:35 (8)	20:07	25	07:23 (3)	18:55	16:46	16:05	
3	04:56	05:33 (7)	05:37		06:11 (9)	06:30	06:59 (4)	07:21	07:18	08:11		
	21:47	17 05:50 (7)	21:11	24	06:35 (8)	20:05	24	07:23 (3)	18:52	16:44	16:04	
4	04:57	05:33 (7)	05:38		06:12 (9)	06:31	06:12 (9)	07:23	07:20	08:12		
	21:47	17 05:50 (7)	21:09	23	06:35 (8)	20:02	24	07:24 (3)	18:50	16:42	16:03	
5	04:58	05:33 (7)	05:40		06:12 (9)	06:33	07:04 (4)	07:25	07:22	08:14		
	21:46	17 05:50 (7)	21:07	22	06:34 (8)	20:00	20	07:24 (3)	18:48	16:41	16:03	
6	04:59	05:34 (7)	05:42		06:12 (9)	06:35	07:05 (3)	07:27	07:24	08:15		
	21:46	16 05:50 (7)	21:05	21	06:33 (8)	19:58	19	07:24 (3)	18:45	16:39	16:02	
7	05:00	05:34 (7)	05:43		06:13 (9)	06:36	07:05 (3)	07:28	07:26	08:16		
	21:45	16 05:50 (7)	21:03	19	06:32 (8)	19:55	19	07:24 (3)	18:43	16:37	16:02	
8	05:01	05:35 (7)	05:45		06:14 (9)	06:38	07:05 (3)	07:30	07:28	08:18		
	21:45	15 05:50 (7)	21:01	16	06:30 (8)	19:53	18	07:23 (3)	18:41	16:35	16:01	
9	05:02	05:35 (7)	05:47		06:16 (9)	06:40	07:06 (3)	07:32	07:30	08:19		
	21:44	15 05:50 (7)	20:59	12	06:28 (8)	19:50	16	07:22 (3)	18:38	16:33	16:01	
10	05:03	05:36 (7)	05:48		06:17 (9)	06:42	07:08 (3)	07:34	07:31	08:20		
	21:43	14 05:50 (7)	20:57	4	06:21 (9)	19:48	13	07:21 (3)	18:36	16:32	16:01	
11	05:04	05:36 (7)	05:50		06:43		07:10 (3)	07:36	07:33	08:21		
	21:42	14 05:50 (7)	20:55		19:46	10	07:20 (3)	18:34	16:30	16:01		
12	05:05	05:37 (7)	05:52		06:45		07:11 (3)	07:37	07:35	08:22		
	21:41	12 05:49 (7)	20:53		19:43	14	07:48 (1)	18:31	16:28	16:00		
13	05:06	05:38 (7)	05:54		06:47		07:37 (1)	07:39	07:37	08:23		
	21:40	11 05:49 (7)	20:51		19:41	13	07:50 (1)	18:29	16:27	16:00		
14	05:07	05:39 (7)	05:55		06:48		07:35 (1)	07:41	07:39	08:24		
	21:39	9 05:48 (7)	20:49		19:38	17	07:52 (1)	18:27	16:25	16:00		
15	05:09	05:40 (7)	05:57		06:50		07:33 (1)	07:43	07:41	08:25		
	21:38	7 05:47 (7)	20:47		19:36	19	07:52 (1)	18:24	16:24	16:00		
16	05:10	05:42 (7)	05:59		06:52		07:32 (1)	07:45	07:43	08:26		
	21:37	2 05:44 (7)	20:45		19:33	21	07:53 (1)	18:22	16:22	16:00		
17	05:11		06:00		06:54		07:32 (1)	07:46	07:44	08:27		
	21:36		20:43		19:31	21	07:53 (1)	18:20	16:21	16:01		
18	05:13		06:02		06:55		07:30 (1)	07:48	07:46	08:28		
	21:35		20:41		19:29	22	07:52 (1)	18:18	16:19	16:01		
19	05:14		06:04		06:57		07:30 (1)	07:50	07:48	08:28		
	21:34		20:39		19:26	22	07:52 (1)	18:15	16:18	16:01		
20	05:15	06:23 (8)	06:05		07:05 (4)	06:59	07:30 (1)	07:52	07:50	08:29		
	21:32	2 06:25 (8)	20:37	11	07:16 (4)	19:24	22	07:52 (1)	18:13	16:17	16:01	
21	05:17	06:21 (8)	06:07		07:03 (4)	07:00	07:30 (1)	07:54	07:51	08:30		
	21:31	8 06:29 (8)	20:34	16	07:19 (4)	19:21	21	07:51 (1)	18:11	16:15	16:02	
22	05:18	06:19 (8)	06:09		07:02 (4)	07:02	07:30 (1)	07:56	07:53	08:30		
	21:30	12 06:31 (8)	20:32	18	07:20 (4)	19:19	20	07:50 (1)	18:09	16:14	16:02	
23	05:20	06:18 (8)	06:11		07:00 (4)	07:04	07:31 (1)	07:58	07:55	08:31		
	21:28	13 06:31 (8)	20:30	21	07:21 (4)	19:16	18	07:49 (1)	18:07	16:13	16:03	
24	05:21	06:17 (8)	06:12		06:59 (4)	07:06	07:32 (1)	07:59	07:57	08:31		
	21:27	16 06:33 (8)	20:28	23	07:22 (4)	19:14	15	07:47 (1)	18:05	16:12	16:03	
25	05:23	06:16 (8)	06:14		06:59 (4)	07:07	07:34 (1)	07:01	07:58	08:32		
	21:26	17 06:33 (8)	20:25	23	07:22 (4)	19:12	10	07:44 (1)	17:02	16:11	16:04	
26	05:24	06:16 (8)	06:16		06:58 (4)	07:09		07:03	08:00	08:32		
	21:24	19 06:35 (8)	20:23	24	07:22 (4)	19:09		17:00	16:10	16:05		
27	05:26	06:15 (8)	06:18		06:57 (4)	07:11		07:05	08:02	08:32		
	21:22	20 06:35 (8)	20:21	25	07:22 (4)	19:07		16:58	16:09	16:06		
28	05:27	06:15 (9)	06:19		06:56 (4)	07:13		07:07	08:03	08:32		
	21:21	21 06:36 (8)	20:19	25	07:21 (4)	19:04		16:56	16:08	16:06		
29	05:29	06:14 (9)	06:21		06:57 (4)	07:14		07:09	08:05	08:32		
	21:19	21 06:35 (8)	20:16	24	07:21 (4)	19:02		16:54	16:07	16:07		
30	05:30	06:13 (9)	06:23		06:57 (4)	07:16		07:11	08:06	08:32		
	21:18	22 06:35 (8)	20:14	24	07:21 (4)	19:00		16:52	16:06	16:08		
31	05:32	06:13 (9)	06:24		06:56 (4)			07:13		08:32		
	21:16	23 06:36 (8)	20:12	24	07:20 (4)			16:50		16:09		
Sonnenscheinstunden	508		458		382			330		262		237
astr.max.mögl.Beschattung	410		445		467							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met.wahrsch.Beschattung	107		131		110							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CX - IO102

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46	04:59	05:28 (7)	
	16:10	17:00	17:55	19:51	11 07:28 (3)	20:45	21:34	14 05:42 (7)	
2	08:32	08:02	07:05	06:52	07:15 (3)	05:44	04:58	05:29 (7)	
	16:12	17:02	17:57	19:53	14 07:29 (3)	20:47	21:35	14 05:43 (7)	
3	08:32	08:00	07:03	06:49	07:13 (3)	05:42	06:08 (9)	04:57 (7)	
	16:13	17:04	17:58	19:55	17 07:30 (3)	20:49	11 06:19 (8)	15 05:43 (7)	
4	08:32	07:58	07:01	06:47	07:11 (3)	05:41	06:06 (9)	04:56 (7)	
	16:14	17:06	18:00	19:57	18 07:29 (3)	20:50	15 06:21 (8)	15 05:43 (7)	
5	08:32	07:57	06:58	06:45	07:11 (3)	05:39	06:04 (9)	04:55 (7)	
	16:15	17:08	18:02	19:59	19 07:30 (3)	20:52	19 06:23 (8)	16 05:44 (7)	
6	08:31	07:55	06:56	06:42	07:10 (3)	05:37	06:03 (9)	04:55 (7)	
	16:16	17:10	18:04	20:00	18 07:28 (3)	20:54	21 06:24 (8)	16 05:44 (7)	
7	08:31	07:53	06:54	06:40	07:06 (4)	05:35	06:03 (9)	04:54 (7)	
	16:18	17:12	18:06	20:02	22 07:28 (3)	20:56	22 06:25 (8)	17 05:45 (7)	
8	08:30	07:51	06:51	06:37	07:03 (4)	05:33	06:02 (9)	04:53 (7)	
	16:19	17:14	18:08	20:04	25 07:28 (3)	20:57	23 06:25 (8)	17 05:45 (7)	
9	08:30	07:49	06:49	06:35	07:02 (4)	05:31	06:02 (9)	04:53 (7)	
	16:20	17:16	18:10	20:06	25 07:27 (3)	20:59	23 06:25 (8)	16 05:45 (7)	
10	08:29	07:48	06:47	06:33	07:00 (4)	05:29	06:03 (9)	04:52 (7)	
	16:22	17:18	18:12	20:08	24 07:24 (3)	21:01	23 06:26 (8)	17 05:45 (7)	
11	08:29	07:46	06:44	06:30	06:59 (4)	05:27	06:02 (9)	04:52 (7)	
	16:23	17:20	18:13	20:09	23 07:22 (4)	21:03	24 06:26 (8)	18 05:46 (7)	
12	08:28	07:44	06:42	06:28	06:58 (4)	05:26	06:02 (9)	04:52 (7)	
	16:25	17:22	18:15	20:11	24 07:22 (4)	21:04	24 06:26 (8)	17 05:46 (7)	
13	08:27	07:42	06:40	06:26	06:57 (4)	05:24	06:03 (9)	04:51 (7)	
	16:26	17:24	18:17	20:13	24 07:21 (4)	21:06	23 06:26 (8)	18 05:47 (7)	
14	08:26	07:40	06:37	06:24	06:57 (4)	05:22	06:03 (9)	04:51 (7)	
	16:28	17:26	18:19	20:15	25 07:22 (4)	21:08	22 06:25 (8)	17 05:46 (7)	
15	08:25	07:38	06:35	06:21	06:57 (4)	05:21	06:05 (9)	04:51 (7)	
	16:30	17:28	18:21	20:17	25 07:22 (4)	21:09	21 06:26 (8)	18 05:46 (7)	
16	08:24	07:36	06:32	06:19	06:57 (4)	05:19	06:05 (9)	04:51 (7)	
	16:31	17:30	18:23	20:18	24 07:21 (4)	21:11	20 06:25 (8)	17 05:47 (7)	
17	08:23	07:34	06:30	06:17	06:56 (4)	05:17	06:06 (8)	04:50 (7)	
	16:33	17:32	18:24	2 06:58 (1)	20:20	24 07:20 (4)	21:12	19 06:25 (8)	17 05:47 (7)
18	08:22	07:32	06:28	06:51 (1)	06:14	06:57 (4)	05:16	06:07 (8)	04:50 (7)
	16:35	17:34	18:26	12 07:03 (1)	20:22	22 07:19 (4)	21:14	18 06:25 (8)	19 05:47 (7)
19	08:21	07:29	06:25	06:50 (1)	06:12	06:57 (4)	05:14	06:07 (8)	04:50 (7)
	16:36	17:35	18:28	15 07:05 (1)	20:24	22 07:19 (4)	21:16	16 06:23 (8)	19 05:47 (7)
20	08:20	07:27	06:23	06:47 (1)	06:10	06:58 (4)	05:13	06:08 (8)	04:51 (7)
	16:38	17:37	18:30	19 07:06 (1)	20:26	19 07:17 (4)	21:17	15 06:23 (8)	18 05:48 (7)
21	08:19	07:25	06:21	06:47 (1)	06:08	06:59 (4)	05:12	06:10 (8)	04:51 (7)
	16:40	17:39	18:32	20 07:07 (1)	20:27	17 07:16 (4)	21:19	12 06:22 (8)	19 05:48 (7)
22	08:18	07:23	06:18	06:45 (1)	06:06	07:01 (4)	05:10	06:11 (8)	04:51 (7)
	16:42	17:41	18:33	21 07:06 (1)	20:29	13 07:14 (4)	21:20	9 06:20 (8)	19 05:48 (7)
23	08:17	07:21	06:16	06:45 (1)	06:03	07:04 (4)	05:09	06:13 (8)	04:51 (7)
	16:43	17:43	18:35	22 07:07 (1)	20:31	7 07:11 (4)	21:22	5 06:18 (8)	19 05:48 (7)
24	08:15	07:19	06:13	06:44 (1)	06:01		05:07		04:51 (7)
	16:45	17:45	18:37	22 07:06 (1)	20:33		21:23		19 05:49 (7)
25	08:14	07:16	06:11	06:44 (1)	05:59		05:06		04:52 (7)
	16:47	17:47	18:39	22 07:06 (1)	20:35		21:24		19 05:49 (7)
26	08:13	07:14	06:08	06:44 (1)	05:57		05:05		04:52 (7)
	16:49	17:49	18:41	22 07:06 (1)	20:36		21:26		19 05:49 (7)
27	08:11	07:12	06:06	06:44 (1)	05:55		05:04		04:53 (7)
	16:51	17:51	18:42	20 07:04 (1)	20:38		21:27		18 05:49 (7)
28	08:10	07:10	06:04	06:45 (1)	05:53		05:03		04:53 (7)
	16:53	17:53	18:44	19 07:04 (1)	20:40		21:29	6 05:38 (7)	18 05:49 (7)
29	08:08		07:01	07:45 (1)	05:51		05:02		05:31 (7)
	16:55		19:46	16 08:01 (1)	20:42		21:30	9 05:40 (7)	18 05:50 (7)
30	08:07		06:59	07:47 (1)	05:49		05:01		05:30 (7)
	16:57		19:48	12 07:59 (1)	20:43		21:31	11 05:41 (7)	17 05:49 (7)
31	08:05		06:56	07:20 (3)			05:00		05:29 (7)
	16:58		19:50	12 07:56 (1)			21:32	12 05:41 (7)	
Sonnenscheinstunden	253	275	367	418	462	491	506	525	
astr.max.mögl.Beschattung			0.28	0.28	0.37	0.43	0.43	0.39	
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96	0.96	0.96	
Reduktion Betriebsdauer			0.70	0.70	0.72	0.73	0.72	0.72	
Gesamte Reduktion			0.19	0.26	0.30	0.30	0.27	0.27	
Met.wahrsch.Beschattung			47	118	127	140	140	140	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CX - IO102

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:33 (7)	05:34		06:12 (9)	06:26	06:58 (4)	07:18	07:14	08:08		
	21:48	17 05:50 (7)	21:14	24	06:36 (8)	20:09	23 07:21 (3)	18:57	16:48	16:05		
2	04:56	05:33 (7)	05:35		06:13 (9)	06:28	06:59 (4)	07:20	07:16	08:09		
	21:48	17 05:50 (7)	21:12	23	06:36 (8)	20:07	24 07:23 (3)	18:55	16:46	16:05		
3	04:56	05:34 (7)	05:37		06:12 (9)	06:30	06:59 (4)	07:21	07:18	08:11		
	21:47	17 05:51 (7)	21:11	24	06:36 (8)	20:05	25 07:24 (3)	18:52	16:44	16:04		
4	04:57	05:33 (7)	05:38		06:12 (9)	06:31	07:00 (4)	07:23	07:20	08:12		
	21:47	17 05:50 (7)	21:09	24	06:36 (8)	20:02	25 07:25 (3)	18:50	16:42	16:03		
5	04:58	05:34 (7)	05:40		06:13 (9)	06:33	07:03 (4)	07:25	07:22	08:14		
	21:46	16 05:50 (7)	21:07	23	06:36 (8)	20:00	22 07:25 (3)	18:48	16:41	16:03		
6	04:59	05:34 (7)	05:42		06:13 (9)	06:35	07:06 (3)	07:27	07:24	08:15		
	21:46	17 05:51 (7)	21:05	21	06:34 (8)	19:58	19 07:25 (3)	18:45	16:39	16:02		
7	05:00	05:35 (7)	05:43		06:14 (9)	06:36	07:06 (3)	07:28	07:26	08:16		
	21:45	16 05:51 (7)	21:03	20	06:34 (8)	19:55	19 07:25 (3)	18:43	16:37	16:02		
8	05:01	05:35 (7)	05:45		06:14 (9)	06:38	07:06 (3)	07:30	07:28	08:18		
	21:45	16 05:51 (7)	21:01	18	06:32 (8)	19:53	18 07:24 (3)	18:41	16:35	16:01		
9	05:02	05:36 (7)	05:47		06:16 (9)	06:40	07:06 (3)	07:32	07:30	08:19		
	21:44	15 05:51 (7)	20:59	14	06:30 (8)	19:50	17 07:23 (3)	18:38	16:33	16:01		
10	05:03	05:36 (7)	05:48		06:17 (9)	06:42	07:08 (3)	07:34	07:31	08:20		
	21:43	15 05:51 (7)	20:57	6	06:23 (9)	19:48	14 07:22 (3)	18:36	16:32	16:01		
11	05:04	05:36 (7)	05:50		06:43		07:10 (3)	07:36	07:33	08:21		
	21:42	14 05:50 (7)	20:55		19:46	11	07:21 (3)	18:34	16:30	16:01		
12	05:05	05:37 (7)	05:52		06:45		07:11 (3)	07:37	07:35	08:22		
	21:41	13 05:50 (7)	20:53		19:43	9	07:46 (1)	18:31	16:28	16:00		
13	05:06	05:38 (7)	05:54		06:47		07:13 (3)	07:39	07:37	08:23		
	21:40	11 05:49 (7)	20:51		19:41	12	07:50 (1)	18:29	16:27	16:00		
14	05:07	05:39 (7)	05:55		06:48		07:37 (1)	07:41	07:39	08:24		
	21:39	10 05:49 (7)	20:49		19:38	15	07:52 (1)	18:27	16:25	16:00		
15	05:09	05:40 (7)	05:57		06:50		07:35 (1)	07:43	07:41	08:25		
	21:38	7 05:47 (7)	20:47		19:36	18	07:53 (1)	18:24	16:24	16:00		
16	05:10	05:41 (7)	05:59		06:52		07:34 (1)	07:45	07:43	08:26		
	21:37	5 05:46 (7)	20:45		19:33	20	07:54 (1)	18:22	16:22	16:00		
17	05:11		06:00		06:54		07:33 (1)	07:46	07:44	08:27		
	21:36		20:43		19:31	21	07:54 (1)	18:20	16:21	16:01		
18	05:13		06:02		06:55		07:31 (1)	07:48	07:46	08:28		
	21:35		20:41		19:29	23	07:54 (1)	18:18	16:19	16:01		
19	05:14		06:04		06:57		07:31 (1)	07:50	07:48	08:28		
	21:34		20:39		19:26	23	07:54 (1)	18:15	16:18	16:01		
20	05:15		06:05		07:08 (4)	06:59	07:31 (1)	07:52	07:50	08:29		
	21:32		20:37	8	07:16 (4)	19:24	23 07:54 (1)	18:13	16:17	16:01		
21	05:17	06:22 (8)	06:07		07:05 (4)	07:00	07:30 (1)	07:54	07:51	08:30		
	21:31	7 06:29 (8)	20:34	14	07:19 (4)	19:21	22 07:52 (1)	18:11	16:15	16:02		
22	05:18	06:20 (8)	06:09		07:04 (4)	07:02	07:31 (1)	07:56	07:53	08:30		
	21:30	11 06:31 (8)	20:32	17	07:21 (4)	19:19	21 07:52 (1)	18:09	16:14	16:02		
23	05:20	06:19 (8)	06:11		07:02 (4)	07:04	07:32 (1)	07:58	07:55	08:31		
	21:28	13 06:32 (8)	20:30	19	07:21 (4)	19:16	19 07:51 (1)	18:07	16:13	16:03		
24	05:21	06:18 (8)	06:12		07:01 (4)	07:06	07:33 (1)	07:59	07:57	08:31		
	21:27	16 06:34 (8)	20:28	21	07:22 (4)	19:14	16 07:49 (1)	18:05	16:12	16:03		
25	05:23	06:17 (8)	06:14		07:00 (4)	07:07	07:33 (1)	07:01	07:58	08:32		
	21:26	17 06:34 (8)	20:25	23	07:23 (4)	19:12	14 07:47 (1)	17:02	16:11	16:04		
26	05:24	06:17 (8)	06:16		06:59 (4)	07:09	07:36 (1)	07:03	08:00	08:32		
	21:24	18 06:35 (8)	20:23	24	07:23 (4)	19:09	8 07:44 (1)	17:00	16:10	16:05		
27	05:26	06:16 (8)	06:18		06:59 (4)	07:11		07:05	08:02	08:32		
	21:22	19 06:35 (8)	20:21	24	07:23 (4)	19:07		16:58	16:09	16:06		
28	05:27	06:16 (9)	06:19		06:58 (4)	07:13		07:07	08:03	08:32		
	21:21	20 06:36 (8)	20:19	24	07:22 (4)	19:04		16:56	16:08	16:06		
29	05:29	06:15 (9)	06:21		06:58 (4)	07:14		07:09	08:05	08:32		
	21:19	21 06:36 (8)	20:16	24	07:22 (4)	19:02		16:54	16:07	16:07		
30	05:30	06:13 (9)	06:23		06:58 (4)	07:16		07:11	08:06	08:32		
	21:18	23 06:36 (8)	20:14	24	07:22 (4)	19:00		16:52	16:06	16:08		
31	05:32	06:13 (9)	06:24		06:57 (4)			07:13		08:32		
	21:16	24 06:37 (8)	20:12	24	07:21 (4)			16:50		16:09		
Sonnenscheinstunden	508		458		382			330		262		237
astr. max.mögl. Beschattung	412		443		481							
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.71							
Gesamte Reduktion	0.26		0.29		0.24							
Met. wahrsch. Beschattung	108		130		113							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CY - IO103

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	05:46	06:12 (9)	04:59	05:31 (7)		
	16:10	17:00	17:55	19:51	20:45	13 06:25 (8)	21:34	16 05:47 (7)		
2	08:32	08:02	07:05	06:52	05:44	06:10 (9)	04:58	05:31 (7)		
	16:12	17:02	17:57	19:53	20:47	17 06:27 (8)	21:35	17 05:48 (7)		
3	08:32	08:00	07:03	06:49	05:42	06:08 (9)	04:57	05:31 (7)		
	16:13	17:04	17:58	19:55	20:49	20 06:28 (8)	21:36	17 05:48 (7)		
4	08:32	07:58	07:01	06:47	05:41	06:07 (9)	04:56	05:31 (7)		
	16:14	17:06	18:00	19:57	20:50	22 06:29 (8)	21:37	17 05:48 (7)		
5	08:32	07:57	06:58	06:45	05:39	06:06 (9)	04:55	05:32 (6)		
	16:15	17:08	18:02	19:59	8 07:11 (4)	20:52	23 06:29 (8)	17 05:49 (7)		
6	08:31	07:55	06:56	06:42	07:07 (4)	05:37	06:05 (9)	04:55	05:30 (6)	
	16:16	17:10	18:04	20:00	14 07:21 (4)	20:54	24 06:29 (8)	21:39	18 05:48 (7)	
7	08:31	07:53	06:54	06:40	07:05 (4)	05:35	06:06 (9)	04:54	05:30 (6)	
	16:18	17:12	18:06	20:02	18 07:23 (4)	20:56	24 06:30 (8)	21:40	19 05:49 (7)	
8	08:30	07:51	06:51	06:37	07:04 (4)	05:33	06:06 (9)	04:53	05:29 (6)	
	16:19	17:14	18:08	20:04	20 07:24 (4)	20:57	24 06:30 (8)	21:41	20 05:49 (7)	
9	08:30	07:49	06:49	06:35	07:03 (4)	05:31	06:06 (9)	04:53	05:29 (6)	
	16:20	17:16	18:10	20:06	22 07:25 (4)	20:59	24 06:30 (8)	21:42	20 05:49 (7)	
10	08:29	07:48	06:47	06:33	07:02 (4)	05:29	06:07 (9)	04:52	05:28 (6)	
	16:22	17:18	18:12	20:08	23 07:25 (4)	21:01	23 06:30 (8)	21:43	21 05:49 (7)	
11	08:29	07:46	06:44	06:30	07:01 (4)	05:27	06:07 (9)	04:52	05:28 (6)	
	16:23	17:20	18:13	20:09	24 07:25 (4)	21:03	23 06:30 (8)	21:44	21 05:49 (7)	
12	08:28	07:44	06:42	06:28	07:01 (4)	05:26	06:07 (9)	04:52	05:29 (6)	
	16:25	17:22	18:15	20:11	24 07:25 (4)	21:04	22 06:29 (8)	21:44	21 05:50 (7)	
13	08:27	07:42	06:40	06:26	07:00 (4)	05:24	06:09 (9)	04:51	05:29 (6)	
	16:26	17:24	18:17	20:13	24 07:24 (4)	21:06	20 06:29 (8)	21:45	21 05:50 (7)	
14	08:26	07:40	06:37	06:24	07:00 (4)	05:22	06:10 (9)	04:51	05:28 (6)	
	16:28	17:26	18:19	20:15	24 07:24 (4)	21:08	18 06:28 (8)	21:46	21 05:49 (7)	
15	08:25	07:38	06:35	06:21	07:00 (4)	05:21	06:11 (8)	04:51	05:28 (6)	
	16:30	17:28	18:21	20:17	24 07:24 (4)	21:09	17 06:28 (8)	21:46	21 05:49 (7)	
16	08:24	07:36	06:32	06:07 (1)	06:19	07:01 (4)	05:19	06:12 (8)	04:51	05:28 (6)
	16:31	17:30	18:23	5 07:02 (1)	20:18	22 07:23 (4)	21:11	14 06:28 (8)	21:47	22 05:50 (7)
17	08:23	07:34	06:30	06:53 (1)	06:17	07:01 (4)	05:17	06:13 (8)	04:50	05:28 (6)
	16:33	17:32	18:24	12 07:05 (1)	20:20	20 07:21 (4)	21:12	12 06:25 (8)	21:47	22 05:50 (7)
18	08:22	07:32	06:28	06:51 (1)	06:14	07:02 (4)	05:16	06:15 (8)	04:50	05:28 (6)
	16:35	17:34	18:26	16 07:07 (1)	20:22	18 07:20 (4)	21:14	9 06:24 (8)	21:48	22 05:50 (7)
19	08:21	07:29	06:25	06:50 (1)	06:12	07:03 (4)	05:14	06:18 (8)	04:50	05:28 (6)
	16:36	17:35	18:28	18 07:08 (1)	20:24	15 07:18 (4)	21:16	2 06:20 (8)	21:48	22 05:50 (7)
20	08:20	07:27	06:23	06:48 (1)	06:10	07:05 (4)	05:13	04:51	05:30 (6)	05:30 (6)
	16:38	17:37	18:30	20 07:08 (1)	20:26	11 07:16 (4)	21:17	21:48	21 05:51 (7)	21:48
21	08:19	07:25	06:21	06:48 (1)	06:08	07:09 (4)	05:12	04:51	05:30 (6)	05:30 (6)
	16:40	17:39	18:32	21 07:09 (1)	20:27	2 07:11 (4)	21:19	21:49	21 05:51 (7)	21:49
22	08:18	07:23	06:18	06:47 (1)	06:06	08:10	05:10	04:51	05:30 (6)	05:30 (6)
	16:42	17:41	18:33	21 07:08 (1)	20:29	21:20	21:49	21:51 (7)	05:29 (6)	05:29 (6)
23	08:17	07:21	06:16	06:47 (1)	06:03	05:09	04:51	05:29 (6)	05:29 (6)	05:29 (6)
	16:43	17:43	18:35	22 07:09 (1)	20:31	21:22	21:49	22 05:51 (7)	05:30 (6)	05:30 (6)
24	08:15	07:19	06:13	06:46 (1)	06:01	05:07	5 05:36 (7)	04:51	05:30 (6)	05:30 (6)
	16:45	17:45	18:37	21 07:07 (1)	20:33	21:23	5 05:41 (7)	21:49	22 05:52 (7)	05:30 (6)
25	08:14	07:16	06:11	06:46 (1)	05:59	05:06	05:35 (7)	04:52	05:30 (6)	05:30 (6)
	16:47	17:47	18:39	21 07:07 (1)	20:35	21:24	8 05:43 (7)	21:49	22 05:52 (7)	05:30 (6)
26	08:13	07:14	06:08	06:47 (1)	05:57	05:05	05:34 (7)	04:52	05:30 (6)	05:30 (6)
	16:49	17:49	18:41	20 07:07 (1)	20:36	21:26	10 05:44 (7)	21:49	22 05:52 (7)	05:31 (6)
27	08:11	07:12	06:06	06:47 (1)	05:55	05:04	05:33 (7)	04:53	05:31 (6)	05:31 (6)
	16:51	17:51	18:42	18 07:05 (1)	20:38	21:27	12 05:45 (7)	21:49	22 05:53 (7)	05:31 (6)
28	08:10	07:10	06:04	06:49 (1)	05:53	05:03	05:32 (7)	04:53	05:31 (6)	05:31 (6)
	16:53	17:53	18:44	14 07:03 (1)	20:40	21:29	14 05:46 (7)	21:49	21 05:52 (7)	05:32 (6)
29	08:08	07:01	06:00	07:50 (1)	05:51	05:02	05:32 (7)	04:54	05:32 (6)	05:32 (6)
	16:55	19:46	10 08:00 (1)	20:42	21:30	14 05:46 (7)	21:49	21 05:53 (7)	05:32 (6)	05:32 (6)
30	08:07	06:59	05:49	05:49	05:01	05:31 (7)	04:54	05:32 (6)	05:32 (6)	05:32 (6)
	16:57	19:48	20:43	20:43	21:31	15 05:46 (7)	21:48	21 05:53 (7)	05:32 (6)	05:32 (6)
31	08:05	06:56	05:46	05:46	05:00	05:31 (7)	04:54	05:32 (6)	05:32 (6)	05:32 (6)
	16:58	19:50	20:43	20:43	21:32	16 05:47 (7)	21:48	21 05:53 (7)	05:32 (6)	05:32 (6)
Sonnenscheinstunden	253	275	367	419	491		506	611		
astr.max.mögl.Beschattung			0.29	0.28	0.37	0.43	0.39	0.39		
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96	0.96	0.96		
Reduktion Betriebsdauer			0.70	0.72	0.73	0.73	0.72	0.72		
Reduktion Windrichtung			0.18	0.26	0.30	0.30	0.27	0.27		
Gesamte Reduktion			0.18	0.26	0.30	0.30	0.27	0.27		
Met.wahrsch.Beschattung			44	80	133	133	163	163		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CY - IO103

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:32 (6)	05:34	06:17 (9)	06:26	07:00 (4)	07:18	07:14	08:08			
	21:48	05:53 (7)	21:14	22	06:39 (8)	20:09	24	07:24 (4)	18:57	16:48	16:05	
2	04:56	05:33 (6)	05:35	06:17 (9)	06:28	07:01 (4)	07:20	07:01 (4)	07:20	07:16	08:09	
	21:48	05:54 (7)	21:12	23	06:40 (8)	20:07	23	07:24 (4)	18:55	16:46	16:05	
3	04:56	05:34 (6)	05:37	06:16 (9)	06:30	07:00 (4)	07:21	07:00 (4)	07:21	07:18	08:11	
	21:47	20	05:54 (7)	21:11	24	06:40 (8)	20:05	22	07:22 (4)	18:52	16:44	16:04
4	04:57	05:34 (6)	05:38	06:16 (9)	06:31	07:01 (4)	07:23	07:01 (4)	07:23	07:20	08:12	
	21:47	20	05:54 (7)	21:09	24	06:40 (8)	20:02	20	07:21 (4)	18:50	16:42	16:03
5	04:58	05:35 (6)	05:40	06:16 (9)	06:33	07:02 (4)	07:25	07:02 (4)	07:25	07:22	08:14	
	21:46	19	05:54 (7)	21:07	24	06:40 (8)	20:00	18	07:20 (4)	18:48	16:41	16:03
6	04:59	05:36 (6)	05:42	06:15 (9)	06:35	07:03 (4)	07:27	07:03 (4)	07:27	07:24	08:15	
	21:46	19	05:55 (7)	21:05	24	06:39 (8)	19:58	14	07:17 (4)	18:45	16:39	16:02
7	05:00	05:37 (6)	05:43	06:16 (9)	06:36	07:05 (4)	07:28	07:05 (4)	07:28	07:26	08:16	
	21:45	18	05:55 (7)	21:03	23	06:39 (8)	19:55	10	07:15 (4)	18:43	16:37	16:02
8	05:01	05:38 (7)	05:45	06:16 (9)	06:38		07:30		07:28	08:18		
	21:45	17	05:55 (7)	21:01	22	06:38 (8)	19:53		18:41	16:35	16:01	
9	05:02	05:38 (7)	05:47	06:16 (9)	06:40		07:32		07:30	08:19		
	21:44	17	05:55 (7)	20:59	22	06:38 (8)	19:50		18:38	16:33	16:01	
10	05:03	05:39 (7)	05:48	06:17 (9)	06:42		07:34		07:31	08:20		
	21:43	16	05:55 (7)	20:57	19	06:36 (8)	19:48		18:36	16:32	16:01	
11	05:04	05:39 (7)	05:50	06:19 (9)	06:43		07:36		07:33	08:21		
	21:42	16	05:55 (7)	20:55	16	06:35 (8)	19:46		18:34	16:30	16:01	
12	05:05	05:39 (7)	05:52	06:21 (9)	06:45		07:37		07:35	08:22		
	21:41	16	05:55 (7)	20:53	12	06:33 (8)	19:43		18:31	16:28	16:00	
13	05:06	05:40 (7)	05:54		06:47		07:39		07:37	08:23		
	21:40	15	05:55 (7)	20:51		19:41		18:29	16:27	16:00		
14	05:07	05:40 (7)	05:55		06:48		07:42 (1)	07:41	07:39	08:24		
	21:39	15	05:55 (7)	20:49		19:38	9	07:51 (1)	18:27	16:25	16:00	
15	05:09	05:40 (7)	05:57		06:50		07:39 (1)	07:43	07:41	08:25		
	21:38	14	05:54 (7)	20:47		19:36	13	07:52 (1)	18:24	16:24	16:00	
16	05:10	05:41 (7)	05:59		06:52		07:37 (1)	07:45	07:43	08:26		
	21:37	13	05:54 (7)	20:45		19:33	17	07:54 (1)	18:22	16:22	16:00	
17	05:11	05:43 (7)	06:00		06:54		07:36 (1)	07:46	07:44	08:27		
	21:36	11	05:54 (7)	20:43		19:31	19	07:55 (1)	18:20	16:21	16:01	
18	05:13	05:44 (7)	06:02		06:55		07:34 (1)	07:48	07:46	08:28		
	21:35	9	05:53 (7)	20:41		19:29	20	07:54 (1)	18:18	16:19	16:01	
19	05:14	05:45 (7)	06:04		06:57		07:34 (1)	07:50	07:48	08:28		
	21:34	6	05:51 (7)	20:39		19:26	21	07:55 (1)	18:15	16:18	16:01	
20	05:15		06:05		06:59		07:33 (1)	07:52	07:50	08:29		
	21:32		20:37		19:24		22	07:55 (1)	18:13	16:17	16:01	
21	05:17		06:07		07:00		07:32 (1)	07:54	07:51	08:30		
	21:31		20:34		19:21		22	07:54 (1)	18:11	16:15	16:02	
22	05:18		06:09		07:13 (4)	07:02		07:56	07:53	08:30		
	21:30		20:32	5	07:18 (4)	19:19		07:54 (1)	18:09	16:14	16:02	
23	05:20		06:11		07:08 (4)	07:04		07:33 (1)	07:58	07:55	08:31	
	21:28		20:30	12	07:20 (4)	19:16		07:53 (1)	18:07	16:13	16:03	
24	05:21		06:12		07:06 (4)	07:06		07:33 (1)	07:59	07:57	08:31	
	21:27		20:28	16	07:22 (4)	19:14		07:52 (1)	18:05	16:12	16:03	
25	05:23	6	06:27 (8)	06:14	07:05 (4)	07:07		07:33 (1)	07:01	07:58	08:32	
	21:26		06:33 (8)	20:25	19	07:24 (4)	19:12		07:50 (1)	17:02	16:11	16:04
26	05:24		06:25 (8)	06:16	07:03 (4)	07:09		07:35 (1)	07:03	08:00	08:32	
	21:24	10	06:35 (8)	20:23	21	07:24 (4)	19:09		07:48 (1)	17:00	16:10	16:05
27	05:26		06:23 (8)	06:18	07:03 (4)	07:11		07:37 (1)	07:05	08:02	08:32	
	21:22	13	06:36 (8)	20:21	22	07:25 (4)	19:07		07:46 (1)	16:58	16:09	16:06
28	05:27		06:23 (8)	06:19	07:01 (4)	07:13			07:07	08:03	08:32	
	21:21	15	06:38 (8)	20:19	24	07:25 (4)	19:04			16:56	16:08	16:06
29	05:29		06:21 (8)	06:21	07:01 (4)	07:14			07:09	08:05	08:32	
	21:19	17	06:38 (8)	20:16	24	07:25 (4)	19:02			16:54	16:07	16:07
30	05:30		06:19 (9)	06:23	07:01 (4)	07:16			07:11	08:06	08:32	
	21:18	19	06:38 (8)	20:14	24	07:25 (4)	19:00			16:52	16:06	16:08
31	05:32		06:19 (9)	06:24	07:00 (4)					07:13	08:32	
	21:16	20	06:39 (8)	20:12	24	07:24 (4)				16:50	16:09	
Sonnenscheinstunden	509		458		382			330		262		237
astr. max. mögl. Beschattung		403		446		374						
Red. Sonnenscheinwahrsch.		0.38		0.42		0.35						
Reduktion Betriebsdauer		0.96		0.96		0.96						
Reduktion Windrichtung		0.72		0.72		0.70						
Gesamte Reduktion		0.26		0.29		0.23						
Met. wahrsch. Beschattung		105		131		88						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CZ - IO104

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46		04:59
	16:10	17:00	17:55	19:51	14 07:31 (3)	20:45		21:34
2	08:32	08:02	07:05	06:52	07:15 (3)	05:44	06:10 (9)	04:58
	16:12	17:02	17:57	19:53	17 07:32 (3)	20:47	13 06:23 (8)	21:35
3	08:32	08:00	07:03	06:49	07:14 (3)	05:42		04:57
	16:13	17:04	17:58	19:55	18 07:32 (3)	20:49	17 06:25 (8)	21:36
4	08:32	07:58	07:01	06:47	07:13 (3)	05:41		04:56
	16:14	17:06	18:00	19:57	19 07:32 (3)	20:50	20 06:26 (8)	21:37
5	08:32	07:57	06:58	06:45	07:13 (3)	05:39		04:55
	16:15	17:08	18:02	19:59	19 07:32 (3)	20:52	22 06:27 (8)	21:38
6	08:31	07:55	06:56	06:42	07:08 (4)	05:37		04:55
	16:16	17:10	18:04	20:00	22 07:30 (3)	20:54	23 06:27 (8)	21:39
7	08:31	07:53	06:54	06:40	07:06 (4)	05:35		04:54
	16:18	17:12	18:06	20:02	24 07:30 (3)	20:56	24 06:29 (8)	21:40
8	08:30	07:51	06:51	06:37	07:04 (4)	05:33		04:53
	16:19	17:14	18:08	20:04	25 07:29 (3)	20:57	25 06:29 (8)	21:41
9	08:30	07:49	06:49	06:35	07:03 (4)	05:31		04:53
	16:20	17:16	18:10	20:06	24 07:27 (3)	20:59	24 06:28 (8)	21:42
10	08:29	07:48	06:47	06:33	07:01 (4)	05:29		04:52
	16:22	17:18	18:12	20:08	24 07:25 (4)	21:01	24 06:29 (8)	21:43
11	08:29	07:46	06:44	06:30	07:01 (4)	05:27		04:52
	16:23	17:20	18:13	20:09	24 07:25 (4)	21:03	24 06:29 (8)	21:44
12	08:28	07:44	06:42	06:28	07:01 (4)	05:26		04:52
	16:25	17:22	18:15	20:11	24 07:25 (4)	21:04	23 06:28 (8)	21:44
13	08:27	07:42	06:40	06:26	06:59 (4)	05:24		04:51
	16:26	17:24	18:17	20:13	25 07:24 (4)	21:06	22 06:28 (8)	21:45
14	08:26	07:40	06:37	06:24	07:00 (4)	05:22		04:51
	16:28	17:26	18:19	20:15	24 07:24 (4)	21:08	22 06:28 (8)	21:46
15	08:25	07:38	06:35	06:21	07:00 (4)	05:21		04:51
	16:30	17:28	18:21	20:17	24 07:24 (4)	21:09	20 06:28 (8)	21:46
16	08:24	07:36	06:32	06:58 (1)	06:19	07:00 (4)	05:19	04:51
	16:31	17:30	18:23	6 07:04 (1)	20:18	24 07:24 (4)	21:11	18 06:27 (8)
17	08:23	07:34	06:30	06:53 (1)	06:17	07:00 (4)	05:17	04:50
	16:33	17:32	18:24	13 07:06 (1)	20:20	22 07:22 (4)	21:12	16 06:26 (8)
18	08:22	07:32	06:28	06:52 (1)	06:14	07:00 (4)	05:16	04:50
	16:35	17:34	18:26	16 07:08 (1)	20:22	21 07:21 (4)	21:14	15 06:26 (8)
19	08:21	07:29	06:25	06:51 (1)	06:12	07:01 (4)	05:14	04:50
	16:36	17:35	18:28	18 07:09 (1)	20:24	19 07:20 (4)	21:16	13 06:24 (8)
20	08:20	07:27	06:23	06:49 (1)	06:10	07:03 (4)	05:13	04:51
	16:38	17:37	18:30	20 07:09 (1)	20:26	15 07:18 (4)	21:17	10 06:23 (8)
21	08:19	07:25	06:21	06:48 (1)	06:08	07:05 (4)	05:12	04:51
	16:40	17:39	18:32	22 07:10 (1)	20:27	11 07:16 (4)	21:19	5 06:21 (8)
22	08:18	07:23	06:18	06:47 (1)	06:06		05:10	04:51
	16:42	17:41	18:33	22 07:09 (1)	20:29		21:20	21:49
23	08:17	07:21	06:16	06:47 (1)	06:03		05:09	04:51
	16:43	17:43	18:35	23 07:10 (1)	20:31		21:22	21:49
24	08:15	07:19	06:13	06:46 (1)	06:01		05:07	04:51
	16:45	17:45	18:37	23 07:09 (1)	20:33		21:23	21:49
25	08:14	07:16	06:11	06:47 (1)	05:59		05:06	04:52
	16:47	17:47	18:39	21 07:08 (1)	20:35		21:24	21:49
26	08:13	07:14	06:08	06:48 (1)	05:57		05:05	04:52
	16:49	17:49	18:41	20 07:08 (1)	20:36		21:26	5 05:39 (7)
27	08:11	07:12	06:06	06:48 (1)	05:55		05:04	05:33 (7)
	16:51	17:51	18:42	18 07:06 (1)	20:38		21:27	8 05:41 (7)
28	08:10	07:10	06:04	06:49 (1)	05:53		05:03	05:32 (7)
	16:53	17:53	18:44	15 07:04 (1)	20:40		21:29	10 05:42 (7)
29	08:08		07:01	07:50 (1)	05:51		05:02	05:31 (7)
	16:55		19:46	11 08:01 (1)	20:42		21:30	12 05:43 (7)
30	08:07		06:59	07:22 (3)	05:49		05:01	05:30 (7)
	16:57		19:48	7 07:29 (3)	20:43		21:31	13 05:43 (7)
31	08:05		06:56	07:20 (3)			05:00	05:30 (7)
	16:58		19:50	11 07:31 (3)			21:32	14 05:44 (7)
Sonnenscheinstunden	253	275	367	418	439	442	506	571
astr.max.mögl.Beschattung			0.28	0.28	0.37	0.43		0.39
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96		0.96
Reduktion Betriebsdauer			0.70	0.70	0.72	0.73		0.72
Gesamte Reduktion			0.18	0.26	0.30	0.30		0.27
Met.wahrsch.Beschattung			49	112	132	152		152

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: CZ - IO104

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:33 (6)	05:34		06:15 (9)	06:26	07:00 (4)	07:18	07:14	08:08		
	21:48	19 05:52 (7)	21:14	24	06:39 (8)	20:09	24 07:24 (4)	18:57	16:48	16:05		
2	04:56	05:34 (6)	05:35		06:15 (9)	06:28	07:00 (4)	07:20	07:16	08:09		
	21:48	18 05:52 (7)	21:12	24	06:39 (8)	20:07	24 07:24 (4)	18:55	16:46	16:05		
3	04:56	05:35 (7)	05:37		06:14 (9)	06:30	07:00 (4)	07:21	07:18	08:11		
	21:47	18 05:53 (7)	21:11	24	06:38 (8)	20:05	24 07:24 (3)	18:52	16:44	16:04		
4	04:57	05:35 (7)	05:38		06:14 (9)	06:31	07:01 (4)	07:23	07:20	08:12		
	21:47	17 05:52 (7)	21:09	25	06:39 (8)	20:02	25 07:26 (3)	18:50	16:42	16:03		
5	04:58	05:35 (7)	05:40		06:15 (9)	06:33	07:03 (4)	07:25	07:22	08:14		
	21:46	17 05:52 (7)	21:07	24	06:39 (8)	20:00	24 07:27 (3)	18:48	16:41	16:03		
6	04:59	05:36 (7)	05:42		06:14 (9)	06:35	07:04 (4)	07:27	07:24	08:15		
	21:46	17 05:53 (7)	21:05	24	06:38 (8)	19:58	22 07:26 (3)	18:45	16:39	16:02		
7	05:00	05:36 (7)	05:43		06:15 (9)	06:36	07:07 (4)	07:28	07:26	08:16		
	21:45	17 05:53 (7)	21:03	23	06:38 (8)	19:55	20 07:27 (3)	18:43	16:37	16:02		
8	05:01	05:36 (7)	05:45		06:15 (9)	06:38	07:08 (3)	07:30	07:28	08:18		
	21:45	17 05:53 (7)	21:01	21	06:36 (8)	19:53	19 07:27 (3)	18:41	16:35	16:01		
9	05:02	05:37 (7)	05:47		06:16 (9)	06:40	07:07 (3)	07:32	07:30	08:19		
	21:44	16 05:53 (7)	20:59	19	06:35 (8)	19:50	19 07:26 (3)	18:38	16:33	16:01		
10	05:03	05:37 (7)	05:48		06:17 (9)	06:42	07:08 (3)	07:34	07:31	08:20		
	21:43	16 05:53 (7)	20:57	16	06:33 (8)	19:48	17 07:25 (3)	18:36	16:32	16:01		
11	05:04	05:38 (7)	05:50		06:19 (9)	06:43	07:10 (3)	07:36	07:33	08:21		
	21:42	15 05:53 (7)	20:55	11	06:30 (8)	19:46	14 07:24 (3)	18:34	16:30	16:01		
12	05:05	05:38 (7)	05:52			06:45	07:11 (3)	07:37	07:35	08:22		
	21:41	15 05:53 (7)	20:53			19:43	11 07:22 (3)	18:31	16:28	16:00		
13	05:06	05:38 (7)	05:54			06:47	07:13 (3)	07:39	07:37	08:23		
	21:40	14 05:52 (7)	20:51			19:41	8 07:21 (3)	18:29	16:27	16:00		
14	05:07	05:39 (7)	05:55			06:48	07:15 (3)	07:41	07:39	08:24		
	21:39	13 05:52 (7)	20:49			19:38	12 07:52 (1)	18:27	16:25	16:00		
15	05:09	05:40 (7)	05:57			06:50	07:39 (1)	07:43	07:41	08:25		
	21:38	11 05:51 (7)	20:47			19:36	14 07:53 (1)	18:24	16:24	16:00		
16	05:10	05:41 (7)	05:59			06:52	07:37 (1)	07:45	07:43	08:26		
	21:37	9 05:50 (7)	20:45			19:33	18 07:55 (1)	18:22	16:22	16:00		
17	05:11	05:43 (7)	06:00			06:54	07:36 (1)	07:46	07:44	08:27		
	21:36	6 05:49 (7)	20:43			19:31	20 07:56 (1)	18:20	16:21	16:01		
18	05:13		06:02			06:55	07:35 (1)	07:48	07:46	08:28		
	21:35		20:41			19:29	21 07:56 (1)	18:18	16:19	16:01		
19	05:14		06:04			06:57	07:34 (1)	07:50	07:48	08:28		
	21:34		20:39			19:26	22 07:56 (1)	18:15	16:18	16:01		
20	05:15		06:05			06:59	07:34 (1)	07:52	07:50	08:29		
	21:32		20:37			19:24	22 07:56 (1)	18:13	16:17	16:01		
21	05:17		06:07			07:00	07:33 (1)	07:54	07:51	08:30		
	21:31		20:34	4	07:13 (4)	19:21	22 07:55 (1)	18:11	16:15	16:02		
22	05:18		06:09			07:02	07:33 (1)	07:56	07:53	08:30		
	21:30		20:32	12	07:21 (4)	19:19	22 07:55 (1)	18:09	16:14	16:02		
23	05:20	06:24 (8)	06:11			07:06 (4)	07:04	07:33 (1)	07:58	07:55	08:31	
	21:28	8 06:32 (8)	20:30	16	07:22 (4)	19:16	21 07:54 (1)	18:07	16:13	16:03		
24	05:21	06:23 (8)	06:12			07:05 (4)	07:06	07:34 (1)	07:59	07:57	08:31	
	21:27	11 06:34 (8)	20:28	19	07:24 (4)	19:14	19 07:53 (1)	18:05	16:12	16:03		
25	05:23	06:21 (8)	06:14			07:04 (4)	07:07	07:34 (1)	07:01	07:58	08:32	
	21:26	14 06:35 (8)	20:25	21	07:25 (4)	19:12	17 07:51 (1)	17:02	16:11	16:04		
26	05:24	06:21 (8)	06:16			07:02 (4)	07:09	07:35 (1)	07:03	08:00	08:32	
	21:24	16 06:37 (8)	20:23	23	07:25 (4)	19:09	15 07:50 (1)	17:00	16:10	16:05		
27	05:26	06:20 (8)	06:18			07:02 (4)	07:11	07:38 (1)	07:05	08:02	08:32	
	21:22	17 06:37 (8)	20:21	23	07:25 (4)	19:07	9 07:47 (1)	16:58	16:09	16:06		
28	05:27	06:20 (9)	06:19			07:01 (4)	07:13		07:07	08:03	08:32	
	21:21	18 06:38 (8)	20:19	24	07:25 (4)	19:04			16:56	16:08	16:06	
29	05:29	06:18 (9)	06:21			07:00 (4)	07:14		07:09	08:05	08:32	
	21:19	20 06:38 (8)	20:16	25	07:25 (4)	19:02			16:54	16:07	16:07	
30	05:30	06:16 (9)	06:23			07:00 (4)	07:16		07:11	08:06	08:32	
	21:18	22 06:38 (8)	20:14	25	07:25 (4)	19:00			16:52	16:06	16:08	
31	05:32	06:16 (9)	06:24			07:00 (4)			07:13	08:32	08:32	
	21:16	23 06:39 (8)	20:12	24	07:24 (4)				16:50	16:09	16:09	
Sonnenscheinstunden	509		458			382			330	262	237	
astr. max.mögl. Beschattung	404		451			505						
Red. Sonnenscheinwahrsch.	0.38		0.42			0.35						
Reduktion Betriebsdauer	0.96		0.96			0.96						
Reduktion Windrichtung	0.72		0.72			0.71						
Gesamte Reduktion	0.26		0.29			0.24						
Met. wahrsch. Beschattung	106		132			119						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DA - IO105

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46
	16:10	17:00	17:55	19:51	16 07:33 (3)	11 06:23 (8)
2	08:32	08:02	07:05	06:52	07:15 (3)	05:44
	16:12	17:02	17:57	19:53	18 07:33 (3)	16 06:26 (8)
3	08:32	08:00	07:03	06:49	07:15 (3)	05:42
	16:13	17:04	17:58	19:55	19 07:34 (3)	19 06:27 (8)
4	08:32	07:58	07:01	06:47	07:14 (3)	05:41
	16:14	17:06	18:00	19:57	19 07:33 (3)	21 06:28 (8)
5	08:32	07:57	06:58	06:45	07:11 (4)	05:39
	16:15	17:08	18:02	19:59	22 07:33 (3)	23 06:29 (8)
6	08:31	07:55	06:56	06:42	07:08 (4)	05:37
	16:16	17:10	18:04	20:00	23 07:31 (3)	24 06:29 (8)
7	08:31	07:53	06:54	06:40	07:06 (4)	05:35
	16:18	17:12	18:06	20:02	24 07:30 (3)	24 06:30 (8)
8	08:30	07:51	06:51	06:37	07:05 (4)	05:33
	16:19	17:14	18:08	20:04	24 07:29 (3)	25 06:30 (8)
9	08:30	07:49	06:49	06:35	07:04 (4)	05:31
	16:20	17:16	18:10	20:06	23 07:27 (3)	25 06:30 (8)
10	08:29	07:48	06:47	06:33	07:03 (4)	05:29
	16:22	17:18	18:12	20:08	24 07:27 (4)	24 06:30 (8)
11	08:29	07:46	06:44	06:30	07:02 (4)	05:27
	16:23	17:20	18:13	20:09	25 07:27 (4)	24 06:30 (8)
12	08:28	07:44	06:42	06:28	07:02 (4)	05:26
	16:25	17:22	18:15	20:11	25 07:27 (4)	23 06:29 (8)
13	08:27	07:42	06:40	06:26	07:01 (4)	05:24
	16:26	17:24	18:17	20:13	25 07:26 (4)	23 06:30 (8)
14	08:26	07:40	06:37	06:24	07:01 (4)	05:22
	16:28	17:26	18:19	20:15	25 07:26 (4)	21 06:29 (8)
15	08:25	07:38	06:35	06:21	07:01 (4)	05:21
	16:30	17:28	18:21	20:17	24 07:25 (4)	19 06:29 (8)
16	08:24	07:36	06:32	06:56 (1)	06:19	07:02 (4)
	16:31	17:30	18:23	12 07:08 (1)	20:18	23 07:25 (4)
17	08:23	07:34	06:30	06:53 (1)	06:17	07:02 (4)
	16:33	17:32	18:24	16 07:09 (1)	20:20	21 07:23 (4)
18	08:22	07:32	06:28	06:52 (1)	06:14	07:03 (4)
	16:35	17:34	18:26	19 07:11 (1)	20:22	19 07:22 (4)
19	08:21	07:29	06:25	06:51 (1)	06:12	07:04 (4)
	16:36	17:35	18:28	21 07:12 (1)	20:24	16 07:20 (4)
20	08:20	07:27	06:23	06:50 (1)	06:10	07:06 (4)
	16:38	17:37	18:30	21 07:11 (1)	20:26	12 07:18 (4)
21	08:19	07:25	06:21	06:50 (1)	06:08	07:09 (4)
	16:40	17:39	18:32	22 07:12 (1)	20:27	6 07:15 (4)
22	08:18	07:23	06:18	06:49 (1)	06:06	07:08 (4)
	16:42	17:41	18:33	22 07:11 (1)	20:29	21:20
23	08:17	07:21	06:16	06:49 (1)	06:03	05:09
	16:43	17:43	18:35	22 07:11 (1)	20:31	21:22
24	08:15	07:19	06:13	06:48 (1)	06:01	05:07
	16:45	17:45	18:37	22 07:10 (1)	20:33	21:23
25	08:14	07:16	06:11	06:49 (1)	05:59	05:06
	16:47	17:47	18:39	20 07:09 (1)	20:35	21:24
26	08:13	07:14	06:08	06:50 (1)	05:57	05:05
	16:49	17:49	18:41	19 07:09 (1)	20:36	7 05:34 (7)
27	08:11	07:12	06:06	06:50 (1)	05:55	05:04
	16:51	17:51	18:42	16 07:06 (1)	20:38	21:27
28	08:10	07:10	06:04	06:52 (1)	05:53	05:03
	16:53	17:53	18:44	13 07:05 (1)	20:40	21:29
29	08:08	07:01	05:51	07:24 (3)	05:51	05:02
	16:55	19:46	11 08:00 (1)	20:42	21:30	13 05:44 (7)
30	08:07	06:59	07:22 (3)	05:49	05:01	05:31 (7)
	16:57	19:48	9 07:31 (3)	20:43	21:31	14 05:45 (7)
31	08:05	06:56	07:20 (3)	05:47	05:00	05:30 (7)
	16:58	19:50	13 07:33 (3)	05:45	21:32	15 05:45 (7)
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung			278	433	453	592
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.70	0.72	0.73	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.27
Met.wahrsch.Beschattung			51	111	135	158

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DA - IO105

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:33 (6)	05:34		06:16 (9)	06:26	07:01 (4)	07:18	07:14	08:08		
	21:48	20 05:53 (7)	21:14	24	06:40 (8)	20:09	25 07:26 (4)	18:57	16:48	16:05		
2	04:56	05:34 (6)	05:35		06:16 (9)	06:28	07:02 (4)	07:20	07:16	08:09		
	21:48	19 05:53 (7)	21:12	24	06:40 (8)	20:07	24 07:26 (4)	18:55	16:46	16:05		
3	04:56	05:35 (6)	05:37		06:15 (9)	06:30	07:01 (4)	07:21	07:18	08:11		
	21:47	19 05:54 (7)	21:11	25	06:40 (8)	20:05	23 07:24 (3)	18:52	16:44	16:04		
4	04:57	05:36 (6)	05:38		06:15 (9)	06:31	07:02 (4)	07:23	07:20	08:12		
	21:47	17 05:53 (7)	21:09	25	06:40 (8)	20:02	24 07:26 (3)	18:50	16:42	16:03		
5	04:58	05:36 (7)	05:40		06:16 (9)	06:33	07:03 (4)	07:25	07:22	08:14		
	21:46	17 05:53 (7)	21:07	24	06:40 (8)	20:00	24 07:27 (3)	18:48	16:41	16:03		
6	04:59	05:36 (7)	05:42		06:15 (9)	06:35	07:04 (4)	07:27	07:24	08:15		
	21:46	18 05:54 (7)	21:05	24	06:39 (8)	19:58	23 07:27 (3)	18:45	16:39	16:02		
7	05:00	05:37 (7)	05:43		06:16 (9)	06:36	07:06 (4)	07:28	07:26	08:16		
	21:45	17 05:54 (7)	21:03	23	06:39 (8)	19:55	22 07:28 (3)	18:43	16:37	16:02		
8	05:01	05:37 (7)	05:45		06:15 (9)	06:38	07:09 (3)	07:30	07:28	08:18		
	21:45	17 05:54 (7)	21:01	23	06:38 (8)	19:53	19 07:28 (3)	18:41	16:35	16:01		
9	05:02	05:37 (7)	05:47		06:16 (9)	06:40	07:08 (3)	07:32	07:30	08:19		
	21:44	17 05:54 (7)	20:59	21	06:37 (8)	19:50	19 07:27 (3)	18:38	16:33	16:01		
10	05:03	05:38 (7)	05:48		06:17 (9)	06:42	07:08 (3)	07:34	07:31	08:20		
	21:43	16 05:54 (7)	20:57	18	06:38 (8)	19:48	19 07:27 (3)	18:36	16:32	16:01		
11	05:04	05:38 (7)	05:50		06:19 (9)	06:43	07:10 (3)	07:36	07:33	08:21		
	21:42	16 05:54 (7)	20:55	15	06:34 (8)	19:46	16 07:26 (3)	18:34	16:30	16:01		
12	05:05	05:39 (7)	05:52		06:22 (9)	06:45	07:11 (3)	07:37	07:35	08:22		
	21:41	15 05:54 (7)	20:53	3	06:25 (9)	19:43	13 07:24 (3)	18:31	16:28	16:00		
13	05:06	05:39 (7)	05:54		06:47		07:13 (3)	07:39	07:37	08:23		
	21:40	14 05:53 (7)	20:51		19:41	10	07:23 (3)	18:29	16:27	16:00		
14	05:07	05:39 (7)	05:55		06:48		07:15 (3)	07:41	07:39	08:24		
	21:39	14 05:53 (7)	20:49		19:38	10	07:51 (1)	18:27	16:25	16:00		
15	05:09	05:40 (7)	05:57		06:50		07:42 (1)	07:43	07:41	08:25		
	21:38	12 05:52 (7)	20:47		19:36	12	07:54 (1)	18:24	16:24	16:00		
16	05:10	05:41 (7)	05:59		06:52		07:40 (1)	07:45	07:43	08:26		
	21:37	10 05:51 (7)	20:45		19:33	16	07:56 (1)	18:22	16:22	16:00		
17	05:11	05:43 (7)	06:00		06:54		07:38 (1)	07:46	07:44	08:27		
	21:36	8 05:51 (7)	20:43		19:31	19	07:57 (1)	18:20	16:21	16:01		
18	05:13	05:44 (7)	06:02		06:55		07:37 (1)	07:48	07:46	08:28		
	21:35	5 05:49 (7)	20:41		19:29	20	07:57 (1)	18:18	16:19	16:01		
19	05:14		06:04		06:57		07:36 (1)	07:50	07:48	08:28		
	21:34		20:39		19:26	21	07:57 (1)	18:15	16:18	16:01		
20	05:15		06:05		06:59		07:35 (1)	07:52	07:50	08:29		
	21:32		20:37		19:24	23	07:58 (1)	18:13	16:17	16:01		
21	05:17		06:07		07:00		07:34 (1)	07:54	07:51	08:30		
	21:31		20:34		19:21	23	07:57 (1)	18:11	16:15	16:02		
22	05:18		06:09		07:02		07:34 (1)	07:56	07:53	08:30		
	21:30		20:32	7	07:20 (4)	19:19	23 07:57 (1)	18:09	16:14	16:02		
23	05:20	06:28 (8)	06:11		07:09 (4)	07:04	07:34 (1)	07:58	07:55	08:31		
	21:28	2 06:30 (8)	20:30	13	07:22 (4)	19:16	22 07:56 (1)	18:07	16:13	16:03		
24	05:21	06:25 (8)	06:12		07:07 (4)	07:06	07:35 (1)	07:59	07:57	08:31		
	21:27	9 06:34 (8)	20:28	17	07:24 (4)	19:14	21 07:56 (1)	18:05	16:12	16:03		
25	05:23	06:23 (8)	06:14		07:06 (4)	07:07	07:35 (1)	07:01	07:58	08:32		
	21:26	12 06:35 (8)	20:25	20	07:26 (4)	19:12	19 07:54 (1)	17:02	16:11	16:04		
26	05:24	06:23 (8)	06:16		07:04 (4)	07:09	07:36 (1)	07:03	08:00	08:32		
	21:24	14 06:37 (8)	20:23	22	07:26 (4)	19:09	16 07:52 (1)	17:00	16:10	16:05		
27	05:26	06:22 (8)	06:18		07:04 (4)	07:11	07:37 (1)	07:05	08:02	08:32		
	21:22	16 06:38 (8)	20:21	23	07:27 (4)	19:07	13 07:50 (1)	16:58	16:09	16:06		
28	05:27	06:21 (8)	06:19		07:02 (4)	07:13	07:39 (1)	07:07	08:03	08:32		
	21:21	18 06:39 (8)	20:19	24	07:26 (4)	19:04	7 07:46 (1)	16:56	16:08	16:06		
29	05:29	06:20 (9)	06:21		07:02 (4)	07:14		07:09	08:05	08:32		
	21:19	19 06:39 (8)	20:16	25	07:27 (4)	19:02		16:54	16:07	16:07		
30	05:30	06:18 (9)	06:23		07:02 (4)	07:16		07:11	08:06	08:32		
	21:18	21 06:39 (8)	20:14	25	07:27 (4)	19:00		16:52	16:06	16:08		
31	05:32	06:17 (9)	06:24		07:01 (4)			07:13		08:32		
	21:16	23 06:40 (8)	20:12	25	07:26 (4)			16:50		16:09		
Sonnenscheinstunden	509		458		382			330	262	237		
astr. max.mögl. Beschattung		405		450		526						
Red. Sonnenscheinwahrsch.		0.38		0.42		0.35						
Reduktion Betriebsdauer		0.96		0.96		0.96						
Reduktion Windrichtung		0.72		0.72		0.71						
Gesamte Reduktion		0.26		0.29		0.24						
Met. wahrsch. Beschattung		106		132		124						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DB - IO106

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46	06:12 (9)	04:59
	16:10	17:00	17:55	19:51	18 07:35 (3)	20:45	18 06:30 (8)	21:34
2	08:32	08:02	07:05	06:52	07:16 (3)	05:44	06:10 (9)	04:58
	16:12	17:02	17:57	19:53	19 07:35 (3)	20:47	21 06:31 (8)	21:35
3	08:32	08:00	07:03	06:49	07:16 (3)	05:42	06:09 (9)	04:57
	16:13	17:04	17:58	19:55	19 07:35 (3)	20:49	23 06:32 (8)	21:36
4	08:32	07:58	07:01	06:47	07:12 (4)	05:41	06:08 (9)	04:56
	16:14	17:06	18:00	19:57	22 07:34 (3)	20:50	24 06:32 (8)	21:37
5	08:32	07:57	06:58	06:45	07:10 (4)	05:39	06:08 (9)	04:55
	16:15	17:08	18:02	19:59	23 07:33 (3)	20:52	24 06:32 (8)	21:38
6	08:31	07:55	06:56	06:42	07:08 (4)	05:37	06:07 (9)	04:55
	16:16	17:10	18:04	20:00	24 07:32 (3)	20:54	25 06:32 (8)	21:39
7	08:31	07:53	06:54	06:40	07:07 (4)	05:35	06:08 (9)	04:54
	16:18	17:12	18:06	20:02	23 07:30 (3)	20:56	25 06:33 (8)	21:40
8	08:30	07:51	06:51	06:37	07:06 (4)	05:33	06:08 (9)	04:53
	16:19	17:14	18:08	20:04	23 07:29 (3)	20:57	25 06:33 (8)	21:41
9	08:30	07:49	06:49	06:35	07:06 (4)	05:31	06:08 (9)	04:53
	16:20	17:16	18:10	20:06	23 07:29 (4)	20:59	24 06:32 (8)	21:42
10	08:29	07:48	06:47	06:33	07:04 (4)	05:29	06:09 (9)	04:52
	16:22	17:18	18:12	20:08	25 07:29 (4)	21:01	24 06:33 (8)	21:43
11	08:29	07:46	06:44	06:30	07:04 (4)	05:27	06:09 (9)	04:52
	16:23	17:20	18:13	20:09	25 07:29 (4)	21:03	23 06:32 (8)	21:44
12	08:28	07:44	06:42	06:28	07:04 (4)	05:26	06:10 (9)	04:52
	16:25	17:22	18:15	20:11	25 07:29 (4)	21:04	21 06:31 (8)	21:44
13	08:27	07:42	06:40	06:26	07:03 (4)	05:24	06:12 (9)	04:51
	16:26	17:24	18:17	20:13	24 07:27 (4)	21:06	19 06:31 (8)	21:45
14	08:26	07:40	06:37	06:24	07:04 (4)	05:22	06:13 (8)	04:51
	16:28	17:26	18:19	20:15	23 07:27 (4)	21:08	17 06:30 (8)	21:46
15	08:25	07:38	06:35	06:21	07:04 (4)	05:21	06:15 (8)	04:51
	16:30	17:28	18:21	10 06:58 (1)	06:21	07:26 (4)	21:09	14 06:29 (8)
16	08:24	07:36	06:32	06:19	07:05 (4)	05:19	06:16 (8)	04:51
	16:31	17:30	18:23	15 07:11 (1)	20:18	20 07:25 (4)	21:11	11 06:27 (8)
17	08:23	07:34	06:30	06:17	07:05 (4)	05:17	06:18 (8)	04:50
	16:33	17:32	18:24	17 07:11 (1)	20:20	18 07:23 (4)	21:12	8 06:26 (8)
18	08:22	07:32	06:28	06:14	07:07 (4)	05:16	04:50	05:29 (6)
	16:35	17:34	18:26	19 07:12 (1)	20:22	14 07:21 (4)	21:14	22 05:51 (7)
19	08:21	07:29	06:25	06:12	07:09 (4)	05:14	04:50	05:30 (6)
	16:36	17:35	18:28	21 07:13 (1)	20:24	10 07:19 (4)	21:16	21 05:51 (7)
20	08:20	07:27	06:23	06:10	07:13 (1)	20:26	05:13	04:51
	16:38	17:37	18:30	22 07:13 (1)	20:26	21:17	21:48	21 05:52 (7)
21	08:19	07:25	06:21	06:08	07:13 (1)	20:27	05:12	04:51
	16:40	17:39	18:32	22 07:13 (1)	20:27	21:19	21:49	21 05:52 (7)
22	08:18	07:23	06:18	06:06	07:11 (1)	20:29	05:10	04:51
	16:42	17:41	18:33	22 07:12 (1)	20:29	21:20	21:49	21 05:52 (7)
23	08:17	07:21	06:16	06:03	07:10 (1)	20:31	05:09	05:37 (7)
	16:43	17:43	18:35	22 07:12 (1)	20:31	21:22	4 05:41 (7)	21:49
24	08:15	07:19	06:13	06:01	07:10 (1)	20:33	05:07	05:36 (7)
	16:45	17:45	18:37	20 07:10 (1)	20:33	21:23	8 05:44 (7)	21:49
25	08:14	07:16	06:11	06:00	07:09 (1)	20:35	05:06	05:35 (7)
	16:47	17:47	18:39	19 07:10 (1)	20:35	21:24	10 05:45 (7)	21:49
26	08:13	07:14	06:08	06:00	07:08 (1)	20:36	05:05	05:34 (7)
	16:49	17:49	18:41	17 07:09 (1)	20:36	21:26	12 05:46 (7)	21:49
27	08:11	07:12	06:06	06:00	07:07 (1)	20:38	05:04	05:33 (7)
	16:51	17:51	18:42	13 07:06 (1)	20:38	21:27	14 05:47 (7)	21:49
28	08:10	07:10	06:04	06:00	07:06 (1)	20:40	05:03	05:33 (7)
	16:53	17:53	18:44	10 07:03 (1)	20:40	21:29	14 05:47 (7)	21:49
29	08:08	07:01	06:00	06:00	07:02 (3)	20:42	05:02	05:33 (7)
	16:55	19:46	8 07:32 (3)	20:42	06:14 (9)	05:01	21:30	15 05:48 (7)
30	08:07	06:59	07:22 (3)	05:49	06:28 (8)	05:00	05:32 (7)	04:54
	16:57	19:48	12 07:34 (3)	20:43	14 06:28 (8)	21:31	16 05:48 (7)	21:48
31	08:05	06:56	07:20 (3)	05:48	05:00	05:32 (7)	05:00	05:32 (7)
	16:58	19:50	15 07:35 (3)	20:44	21:32	16 05:48 (7)	05:00	05:32 (7)
Sonnenscheinstunden	253	275	367	419	491	506	618	
astr.max.mögl.Beschattung			284	414	455	618		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.70	0.72	0.73	0.72		
Gesamte Reduktion			0.18	0.26	0.30	0.27		
Met.wahrsch.Beschattung			52	106	136	165		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DB - IO106

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:33 (6)	05:34		06:20 (9)	06:26	07:03 (4)	07:18	07:14	08:08			
	21:48	05:55 (7)	21:14	22	06:42 (8)	20:09	25	07:28 (4)	18:57	16:48	16:05		
2	04:56	05:34 (6)	05:35		06:19 (9)	06:28		07:03 (4)	07:20	07:16	08:09		
	21:48	05:55 (7)	21:12	23	06:42 (8)	20:07	25	07:28 (4)	18:55	16:46	16:05		
3	04:56	05:35 (6)	05:37		06:18 (9)	06:30		07:03 (4)	07:21	07:18	08:11		
	21:47	05:56 (7)	21:11	24	06:42 (8)	20:05	23	07:26 (4)	18:52	16:44	16:04		
4	04:57	05:35 (6)	05:38		06:18 (9)	06:31		07:03 (4)	07:23	07:20	08:12		
	21:47	05:55 (7)	21:09	25	06:43 (8)	20:02	23	07:26 (3)	18:50	16:42	16:03		
5	04:58	05:36 (6)	05:40		06:18 (9)	06:33		07:04 (4)	07:25	07:22	08:14		
	21:46	05:56 (7)	21:07	25	06:43 (8)	20:00	23	07:27 (3)	18:48	16:41	16:03		
6	04:59	05:37 (6)	05:42		06:17 (9)	06:35		07:04 (4)	07:27	07:24	08:15		
	21:46	05:56 (7)	21:05	25	06:42 (8)	19:58	24	07:28 (3)	18:45	16:39	16:02		
7	05:00	05:38 (6)	05:43		06:18 (9)	06:36		07:05 (4)	07:28	07:26	08:16		
	21:45	05:56 (7)	21:03	25	06:43 (8)	19:55	24	07:29 (3)	18:43	16:37	16:02		
8	05:01	05:39 (6)	05:45		06:17 (9)	06:38		07:07 (4)	07:30	07:28	08:18		
	21:45	05:57 (7)	21:01	25	06:42 (8)	19:53	22	07:29 (3)	18:41	16:35	16:01		
9	05:02	05:40 (6)	05:47		06:18 (9)	06:40		07:10 (3)	07:32	07:30	08:19		
	21:44	05:57 (7)	20:59	23	06:41 (8)	19:50	18	07:28 (3)	18:38	16:33	16:01		
10	05:03	05:40 (7)	05:48		06:18 (9)	06:42		07:10 (3)	07:34	07:31	08:20		
	21:43	05:57 (7)	20:57	22	06:40 (8)	19:48	18	07:28 (3)	18:36	16:32	16:01		
11	05:04	05:40 (7)	05:50		06:19 (9)	06:43		07:10 (3)	07:36	07:33	08:21		
	21:42	05:57 (7)	20:55	20	06:39 (8)	19:46	18	07:28 (3)	18:34	16:30	16:01		
12	05:05	05:40 (7)	05:52		06:21 (9)	06:45		07:11 (3)	07:37	07:35	08:22		
	21:41	05:57 (7)	20:53	17	06:38 (8)	19:43	15	07:26 (3)	18:31	16:28	16:00		
13	05:06	05:41 (7)	05:54		06:22 (9)	06:47		07:13 (3)	07:39	07:37	08:23		
	21:40	05:57 (7)	20:51	13	06:35 (8)	19:41	12	07:25 (3)	18:29	16:27	16:00		
14	05:07	05:41 (7)	05:55			06:48		07:15 (3)	07:41	07:39	08:24		
	21:39	05:57 (7)	20:49			19:38	9	07:24 (3)	18:27	16:25	16:00		
15	05:09	05:41 (7)	05:57			06:50		07:16 (3)	07:43	07:41	08:25		
	21:38	05:56 (7)	20:47			19:36	8	07:51 (1)	18:24	16:24	16:00		
16	05:10	05:42 (7)	05:59			06:52		07:43 (1)	07:45	07:43	08:26		
	21:37	05:56 (7)	20:45			19:33	12	07:55 (1)	18:22	16:22	16:00		
17	05:11	05:43 (7)	06:00			06:54		07:41 (1)	07:46	07:44	08:27		
	21:36	05:56 (7)	20:43			19:31	16	07:57 (1)	18:20	16:21	16:01		
18	05:13	05:44 (7)	06:02			06:55		07:39 (1)	07:48	07:46	08:28		
	21:35	05:55 (7)	20:41			19:29	18	07:57 (1)	18:18	16:19	16:01		
19	05:14	05:45 (7)	06:04			06:57		07:38 (1)	07:50	07:48	08:28		
	21:34	05:54 (7)	20:39			19:26	20	07:58 (1)	18:15	16:18	16:01		
20	05:15	05:46 (7)	06:05			06:59		07:37 (1)	07:52	07:50	08:29		
	21:32	05:52 (7)	20:37			19:24	21	07:58 (1)	18:13	16:17	16:01		
21	05:17		06:07			07:00		07:36 (1)	07:54	07:51	08:30		
	21:31		20:34			19:21	22	07:58 (1)	18:11	16:15	16:02		
22	05:18		06:09			07:02		07:35 (1)	07:56	07:53	08:30		
	21:30		20:32			19:19	23	07:58 (1)	18:09	16:14	16:02		
23	05:20		06:11			07:04		07:35 (1)	07:58	07:55	08:31		
	21:28		20:30			19:16	22	07:57 (1)	18:07	16:13	16:03		
24	05:21		06:12		07:13 (4)	07:06		07:36 (1)	07:59	07:57	08:31		
	21:27		20:28	10	07:23 (4)	19:14	21	07:57 (1)	18:05	16:12	16:03		
25	05:23		06:14		07:10 (4)	07:07		07:35 (1)	07:01	07:58	08:32		
	21:26		20:25	15	07:25 (4)	19:12	20	07:55 (1)	17:02	16:11	16:04		
26	05:24	06:30 (8)	06:16		07:08 (4)	07:09		07:36 (1)	07:03	08:00	08:32		
	21:24	5	06:35 (8)	20:23	18	07:26 (4)	19:09	18	07:54 (1)	17:00	16:10	16:05	
27	05:26	06:27 (8)	06:18		07:07 (4)	07:11		07:37 (1)	07:05	08:02	08:32		
	21:22	10	06:37 (8)	20:21	20	07:27 (4)	19:07	16	07:53 (1)	16:58	16:09	16:06	
28	05:27	06:26 (8)	06:19		07:05 (4)	07:13		07:38 (1)	07:07	08:03	08:32		
	21:21	13	06:39 (8)	20:19	22	07:27 (4)	19:04	12	07:50 (1)	16:56	16:08	16:06	
29	05:29	06:25 (8)	06:21		07:05 (4)	07:14		07:42 (1)	07:09	08:05	08:32		
	21:19	15	06:40 (8)	20:16	23	07:28 (4)	19:02	4	07:46 (1)	16:54	16:07	16:07	
30	05:30	06:23 (9)	06:23		07:04 (4)	07:16			07:11	08:06	08:32		
	21:18	17	06:40 (8)	20:14	24	07:28 (4)	19:00		16:52	16:06	16:08		
31	05:32	06:22 (9)	06:24		07:03 (4)				07:13		08:32		
	21:16	20	06:42 (8)	20:12	25	07:28 (4)			16:50		16:09		
Sonnenscheinstunden	509		458		382			330	262	237			
astr. max.mögl. Beschattung	407		446		532								
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35								
Reduktion Betriebsdauer	0.96		0.96		0.96								
Reduktion Windrichtung	0.72		0.72		0.71								
Gesamte Reduktion	0.26		0.29		0.24								
Met. wahrsch. Beschattung	106		131		125								

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DC - IO107

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46	06:12 (9)	04:59	05:30 (7)	
	16:10	17:00	17:55	19:51	18 07:35 (3)	20:45	15 06:27 (8)	21:34	16 05:46 (7)	
2	08:32	08:02	07:05	06:52	07:16 (3)	05:44	06:10 (9)	04:58	05:31 (7)	
	16:12	17:02	17:57	19:53	19 07:35 (3)	20:47	18 06:28 (8)	21:35	16 05:47 (7)	
3	08:32	08:00	07:03	06:49	07:16 (3)	05:42	06:08 (9)	04:57	05:31 (7)	
	16:13	17:04	17:58	6 07:33 (2)	19:55	19 07:35 (3)	20:49	22 06:30 (8)	21:36	17 05:48 (7)
4	08:32	07:58	07:01	07:25 (2)	06:47	07:13 (4)	05:41	06:07 (9)	04:56	05:30 (7)
	16:14	17:06	18:00	10 07:35 (2)	19:57	21 07:34 (3)	20:50	23 06:30 (8)	21:37	17 05:47 (7)
5	08:32	07:57	06:58	07:22 (2)	06:45	07:11 (4)	05:39	06:07 (9)	04:55	05:31 (7)
	16:15	17:08	18:02	13 07:35 (2)	19:59	23 07:34 (3)	20:52	24 06:31 (8)	21:38	17 05:48 (7)
6	08:31	07:55	06:56	07:20 (2)	06:42	07:08 (4)	05:37	06:06 (9)	04:55	05:31 (7)
	16:16	17:10	18:04	16 07:36 (2)	20:00	24 07:32 (3)	20:54	25 06:31 (8)	21:39	17 05:48 (7)
7	08:31	07:53	06:54	07:19 (2)	06:40	07:07 (4)	05:35	06:07 (9)	04:54	05:31 (7)
	16:18	17:12	18:06	18 07:37 (2)	20:02	24 07:31 (3)	20:56	25 06:32 (8)	21:40	18 05:49 (7)
8	08:30	07:51	06:51	07:18 (2)	06:37	07:06 (4)	05:33	06:06 (9)	04:53	05:31 (6)
	16:19	17:14	18:08	18 07:36 (2)	20:04	24 07:30 (3)	20:57	26 06:32 (8)	21:41	18 05:49 (7)
9	08:30	07:49	06:49	07:18 (2)	06:35	07:05 (4)	05:31	06:06 (9)	04:53	05:30 (6)
	16:20	17:16	18:10	18 07:36 (2)	20:06	25 07:30 (4)	20:59	25 06:31 (8)	21:42	19 05:49 (7)
10	08:29	07:48	06:47	07:17 (2)	06:33	07:04 (4)	05:29	06:07 (9)	04:52	05:29 (6)
	16:22	17:18	18:12	18 07:35 (2)	20:08	25 07:29 (4)	21:01	25 06:32 (8)	21:43	20 05:49 (7)
11	08:29	07:46	06:44	07:18 (2)	06:30	07:04 (4)	05:27	06:07 (9)	04:52	05:29 (6)
	16:23	17:20	18:13	16 07:34 (2)	20:09	25 07:29 (4)	21:03	24 06:31 (8)	21:44	20 05:49 (7)
12	08:28	07:44	06:42	07:20 (2)	06:28	07:04 (4)	05:26	06:07 (9)	04:52	05:29 (6)
	16:25	17:22	18:15	14 07:34 (2)	20:11	25 07:29 (4)	21:04	24 06:31 (8)	21:44	21 05:50 (7)
13	08:27	07:42	06:40	07:20 (2)	06:26	07:03 (4)	05:24	06:09 (9)	04:51	05:29 (6)
	16:26	17:24	18:17	11 07:31 (2)	20:13	25 07:28 (4)	21:06	22 06:31 (8)	21:45	21 05:50 (7)
14	08:26	07:40	06:37	07:25 (2)	06:24	07:03 (4)	05:22	06:10 (9)	04:51	05:28 (6)
	16:28	17:26	18:19	1 07:26 (2)	20:15	25 07:28 (4)	21:08	20 06:30 (8)	21:46	21 05:49 (7)
15	08:25	07:38	06:35	06:59 (1)	06:21	07:04 (4)	05:21	06:12 (9)	04:51	05:28 (6)
	16:30	17:28	18:21	10 07:09 (1)	20:17	23 07:27 (4)	21:09	18 06:30 (8)	21:46	22 05:50 (7)
16	08:24	07:36	06:32	06:57 (1)	06:19	07:04 (4)	05:19	06:12 (8)	04:51	05:29 (6)
	16:31	17:30	18:23	15 07:12 (1)	20:18	22 07:26 (4)	21:11	16 06:28 (8)	21:47	21 05:50 (7)
17	08:23	07:34	06:30	06:54 (1)	06:17	07:04 (4)	05:17	06:14 (8)	04:50	05:29 (6)
	16:33	17:32	18:24	18 07:12 (1)	20:20	20 07:24 (4)	21:12	14 06:28 (8)	21:47	21 05:50 (7)
18	08:22	07:32	06:28	06:53 (1)	06:14	07:05 (4)	05:16	06:15 (8)	04:50	05:29 (6)
	16:35	17:34	18:26	20 07:13 (1)	20:22	18 07:23 (4)	21:14	12 06:27 (8)	21:48	21 05:50 (7)
19	08:21	07:29	06:25	06:53 (1)	06:12	07:07 (4)	05:14	06:16 (8)	04:50	05:29 (6)
	16:36	17:35	18:28	21 07:14 (1)	20:24	14 07:21 (4)	21:16	9 06:25 (8)	21:48	21 05:50 (7)
20	08:20	07:27	06:23	06:52 (1)	06:10	07:10 (4)	05:13	04:51	05:30 (6)	
	16:38	17:37	18:30	22 07:14 (1)	20:26	8 07:18 (4)	21:17	21:48	21 05:51 (7)	
21	08:19	07:25	06:20	06:51 (1)	06:08	05:12	05:12	04:51	05:30 (6)	
	16:40	17:39	18:32	23 07:14 (1)	20:27	21:19	21:19	21:49	21 05:51 (7)	
22	08:18	07:23	06:18	06:51 (1)	06:06	05:10	05:10	04:51	05:30 (6)	
	16:42	17:41	18:33	22 07:13 (1)	20:29	21:20	21:20	21:49	21 05:51 (7)	
23	08:17	07:21	06:16	06:51 (1)	06:03	05:09	05:09	04:51	05:30 (6)	
	16:43	17:43	18:35	22 07:13 (1)	20:31	21:22	21:22	21:49	21 05:51 (7)	
24	08:15	07:19	06:13	06:51 (1)	06:01	05:07	05:07	04:51	05:31 (6)	
	16:45	17:45	18:37	21 07:12 (1)	20:33	21:23	21:23	21:49	21 05:52 (7)	
25	08:14	07:16	06:11	06:51 (1)	05:59	05:06	05:06	04:52	05:31 (6)	
	16:47	17:47	18:39	20 07:11 (1)	20:35	21:24	4 05:40 (7)	21:49	21 05:52 (7)	
26	08:13	07:14	06:08	06:53 (1)	05:57	05:05	05:05	04:52	05:31 (6)	
	16:49	17:49	18:41	17 07:10 (1)	20:36	21:26	8 05:42 (7)	21:49	21 05:52 (7)	
27	08:11	07:12	06:06	06:53 (1)	05:55	05:04	05:04	04:53	05:31 (6)	
	16:51	17:51	18:42	14 07:07 (1)	20:38	21:27	11 05:44 (7)	21:49	22 05:53 (7)	
28	08:10	07:10	06:04	06:27 (3)	05:53	05:03	05:03	04:53	05:31 (6)	
	16:53	17:53	18:44	11 07:04 (1)	20:40	21:29	13 05:45 (7)	21:49	21 05:52 (7)	
29	08:08	07:01	06:00	07:24 (3)	05:51	05:02	05:02	04:54	05:32 (6)	
	16:55	19:46	8 07:32 (3)	20:42	05:00	21:30	13 05:45 (7)	21:49	21 05:53 (7)	
30	08:07	06:59	07:22 (3)	05:49	05:00	05:00	05:31 (7)	04:54	05:32 (6)	
	16:57	19:48	12 07:34 (3)	20:43	21:31	15 05:46 (7)	21:48	21 05:53 (7)		
31	08:05	06:56	07:20 (3)	05:48	05:00	05:00	05:31 (7)			
	16:58	19:50	15 07:35 (3)	20:44	21:32	15 05:46 (7)				
Sonnenscheinstunden	253	275	367	419	491	506				
astr.max.mögl.Beschattung			450	427	466	596				
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39				
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96				
Reduktion Windrichtung			0.68	0.72	0.73	0.72				
Gesamte Reduktion			0.18	0.26	0.30	0.27				
Met.wahrsch.Beschattung			81	109	139	159				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DC - IO107

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:33 (6)	05:34		06:17 (9)	06:26	07:03 (4)	07:18	07:59 (2)	07:14	08:08		
	21:48	05:53 (7)	21:14	24	06:41 (8)	20:09	25	07:28 (4)	18:57	13	08:12 (2)	16:48	16:05
2	04:56	05:34 (6)	05:35		06:17 (9)	06:28		07:03 (4)	07:20		07:58 (2)	07:16	08:09
	21:48	05:54 (7)	21:12	25	06:42 (8)	20:07	25	07:28 (4)	18:55	15	08:13 (2)	16:46	16:05
3	04:56	05:35 (6)	05:37		06:16 (9)	06:30		07:02 (4)	07:21		07:56 (2)	07:18	08:11
	21:47	05:54 (7)	21:11	25	06:41 (8)	20:05	25	07:27 (4)	18:52	17	08:13 (2)	16:44	16:04
4	04:57	05:36 (6)	05:38		06:16 (9)	06:31		07:03 (4)	07:23		07:55 (2)	07:20	08:12
	21:47	05:54 (7)	21:09	26	06:42 (8)	20:02	24	07:27 (3)	18:50	18	08:13 (2)	16:42	16:03
5	04:58	05:37 (6)	05:40		06:17 (9)	06:33		07:04 (4)	07:25		07:55 (2)	07:22	08:14
	21:46	05:54 (7)	21:07	25	06:42 (8)	20:00	24	07:28 (3)	18:48	18	08:13 (2)	16:41	16:03
6	04:59	05:37 (7)	05:42		06:16 (9)	06:35		07:04 (4)	07:27		07:55 (2)	07:24	08:15
	21:46	05:55 (7)	21:05	25	06:41 (8)	19:58	24	07:28 (3)	18:45	18	08:13 (2)	16:39	16:02
7	05:00	05:37 (7)	05:43		06:17 (9)	06:36		07:06 (4)	07:28		07:55 (2)	07:26	08:16
	21:45	05:55 (7)	21:03	24	06:41 (8)	19:55	23	07:29 (3)	18:43	18	08:13 (2)	16:37	16:02
8	05:01	05:38 (7)	05:45		06:16 (9)	06:38		07:08 (4)	07:30		07:56 (2)	07:28	08:18
	21:45	05:55 (7)	21:01	24	06:40 (8)	19:53	21	07:29 (3)	18:41	15	08:11 (2)	16:35	16:01
9	05:02	05:38 (7)	05:47		06:17 (9)	06:40		07:09 (3)	07:32		07:58 (2)	07:30	08:19
	21:44	05:55 (7)	20:59	22	06:39 (8)	19:50	20	07:29 (3)	18:38	12	08:10 (2)	16:33	16:01
10	05:03	05:38 (7)	05:48		06:17 (9)	06:42		07:10 (3)	07:34		08:00 (2)	07:31	08:20
	21:43	05:55 (7)	20:57	21	06:38 (8)	19:48	18	07:28 (3)	18:36	8	08:08 (2)	16:32	16:01
11	05:04	05:39 (7)	05:50		06:19 (9)	06:43		07:10 (3)	07:36		08:02 (2)	07:33	08:21
	21:42	05:55 (7)	20:55	18	06:37 (8)	19:46	18	07:28 (3)	18:34	4	08:06 (2)	16:30	16:01
12	05:05	05:39 (7)	05:52		06:21 (9)	06:45		07:11 (3)	07:37		07:35	08:22	
	21:41	05:55 (7)	20:53	13	06:34 (8)	19:43	15	07:26 (3)	18:31		16:28	16:00	
13	05:06	05:39 (7)	05:54		06:47			07:13 (3)	07:39		07:37	08:23	
	21:40	05:54 (7)	20:51		19:41	12	07:25 (3)	18:29			16:27	16:00	
14	05:07	05:40 (7)	05:55		06:48			07:15 (3)	07:41		07:39	08:24	
	21:39	05:54 (7)	20:49		19:38	9	07:24 (3)	18:27			16:25	16:00	
15	05:09	05:40 (7)	05:57		06:50			07:16 (3)	07:43		07:41	08:25	
	21:38	05:53 (7)	20:47		19:36	10	07:53 (1)	18:24			16:24	16:00	
16	05:10	05:41 (7)	05:59		06:52			07:43 (1)	07:45		07:43	08:26	
	21:37	05:53 (7)	20:45		19:33	13	07:56 (1)	18:22			16:22	16:00	
17	05:11	05:43 (7)	06:00		06:54			07:41 (1)	07:46		07:44	08:27	
	21:36	05:53 (7)	20:43		19:31	17	07:58 (1)	18:20			16:21	16:01	
18	05:13	05:44 (7)	06:02		06:55			07:39 (1)	07:48		07:46	08:28	
	21:35	05:51 (7)	20:41		19:29	19	07:58 (1)	18:18			16:19	16:01	
19	05:14		06:04		06:57			07:38 (1)	07:50		07:48	08:28	
	21:34		20:39		19:26	21	07:59 (1)	18:15			16:18	16:01	
20	05:15		06:05		06:59			07:38 (1)	07:52		07:50	08:29	
	21:32		20:37		19:24	21	07:59 (1)	18:13			16:17	16:01	
21	05:17		06:07		07:00			07:36 (1)	07:54		07:51	08:30	
	21:31		20:34		19:21	23	07:59 (1)	18:11			16:15	16:02	
22	05:18		06:09		07:02			07:36 (1)	07:56		07:53	08:30	
	21:30		20:32		19:19	23	07:59 (1)	18:09			16:14	16:02	
23	05:20		06:11		07:13 (4)	07:04		07:36 (1)	07:58		07:55	08:31	
	21:28		20:30	9	07:22 (4)	19:16	22	07:58 (1)	18:07		16:13	16:03	
24	05:21	06:28 (8)	06:12		07:11 (4)	07:06		07:36 (1)	07:59		07:57	08:31	
	21:27	6	06:34 (8)	20:28	14	07:25 (4)	19:14	22	07:58 (1)	18:05	16:12	16:03	
25	05:23	06:26 (8)	06:14		07:09 (4)	07:07		07:36 (1)	07:01		07:58	08:32	
	21:26	10	06:36 (8)	20:25	18	07:27 (4)	19:12	20	07:56 (1)	17:02	16:11	16:04	
26	05:24	06:25 (8)	06:16		07:07 (4)	07:09		07:37 (1)	07:03		08:00	08:32	
	21:24	13	06:38 (8)	20:23	20	07:27 (4)	19:09	18	07:55 (1)	17:00	16:10	16:05	
27	05:26	06:23 (8)	06:18		07:06 (4)	07:11		07:38 (1)	07:05		08:02	08:32	
	21:22	16	06:39 (8)	20:21	22	07:28 (4)	19:07	16	07:54 (1)	16:58	16:09	16:06	
28	05:27	06:23 (8)	06:19		07:04 (4)	07:13		07:38 (1)	07:07		08:03	08:32	
	21:21	17	06:40 (8)	20:19	24	07:28 (4)	19:04	13	07:51 (1)	16:56	16:08	16:06	
29	05:29	06:22 (9)	06:21		07:04 (4)	07:14		07:42 (1)	07:09		08:05	08:32	
	21:19	18	06:40 (8)	20:16	24	07:28 (4)	19:02	6	07:48 (1)	16:54	16:07	16:07	
30	05:30	06:19 (9)	06:23		07:04 (4)	07:16		08:01 (2)	07:11		08:06	08:32	
	21:18	21	06:40 (8)	20:14	25	07:29 (4)	19:00	9	08:10 (2)	16:52	16:06	16:08	
31	05:32	06:19 (9)	06:24		07:03 (4)				07:13			08:32	
	21:16	22	06:41 (8)	20:12	25	07:28 (4)			16:50			16:09	
	Sonnenscheinstunden	509	458		382			330		262	237		
	astr.max.mögl.Beschattung	407		453		556			156				
	Red.Sonnenscheinwahrsch.	0.38		0.42		0.35			0.29				
	Reduktion Betriebsdauer	0.96		0.96		0.96			0.96				
	Reduktion Windrichtung	0.72		0.72		0.70			0.66				
	Gesamte Reduktion	0.26		0.29		0.23			0.18				
	Met.wahrsch.Beschattung	106		133		130			29				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DD - IO108

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:18 (3)	05:46	06:12 (9)	04:59
	16:10	17:00	17:55	19:51	19 07:37 (3)	20:45	21 06:33 (8)	17 05:50 (7)
2	08:32	08:02	07:05	06:52	07:18 (3)	05:44	06:11 (9)	04:58
	16:12	17:02	17:57	19:53	19 07:37 (3)	20:47	23 06:34 (8)	18 05:51 (7)
3	08:32	08:00	07:03	06:49	07:15 (4)	05:42	06:10 (9)	04:57
	16:13	17:04	17:58	19:55	22 07:37 (3)	20:49	24 06:34 (8)	18 05:51 (7)
4	08:32	07:58	07:01	06:47	07:13 (4)	05:41	06:09 (9)	04:56
	16:14	17:06	18:00	19:57	23 07:36 (3)	20:50	26 06:35 (8)	19 05:51 (7)
5	08:32	07:57	06:58	06:45	07:11 (4)	05:39	06:09 (9)	04:55
	16:15	17:08	18:02	19:59	24 07:35 (3)	20:52	26 06:35 (8)	19 05:51 (7)
6	08:31	07:55	06:56	06:42	07:09 (4)	05:37	06:09 (9)	04:55
	16:16	17:10	18:04	20:00	24 07:33 (3)	20:54	26 06:35 (8)	21 05:51 (7)
7	08:31	07:53	06:54	06:40	07:09 (4)	05:35	06:09 (9)	04:54
	16:18	17:12	18:06	20:02	23 07:32 (4)	20:56	26 06:35 (8)	21 05:52 (7)
8	08:30	07:51	06:51	06:37	07:08 (4)	05:33	06:09 (9)	04:53
	16:19	17:14	18:08	20:04	24 07:32 (4)	20:57	26 06:35 (8)	21 05:51 (7)
9	08:30	07:49	06:49	06:35	07:08 (4)	05:31	06:10 (9)	04:53
	16:20	17:16	18:10	20:06	25 07:33 (4)	20:59	24 06:34 (8)	21 05:52 (7)
10	08:29	07:48	06:47	06:33	07:07 (4)	05:29	06:11 (9)	04:52
	16:22	17:18	18:12	20:08	25 07:32 (4)	21:01	24 06:35 (8)	21 05:51 (7)
11	08:29	07:46	06:44	06:30	07:07 (4)	05:27	06:11 (9)	04:52
	16:23	17:20	18:13	20:09	25 07:32 (4)	21:03	23 06:34 (8)	22 05:52 (7)
12	08:28	07:44	06:42	06:28	07:07 (4)	05:26	06:12 (9)	04:52
	16:25	17:22	18:15	20:11	24 07:31 (4)	21:04	21 06:33 (8)	22 05:52 (7)
13	08:27	07:42	06:40	07:06 (1)	06:26	07:06 (4)	05:24	06:15 (9)
	16:26	17:24	18:17	1 07:07 (1)	20:13	24 07:30 (4)	21:06	17 06:32 (8)
14	08:26	07:40	06:37	07:01 (1)	06:24	07:07 (4)	05:22	06:16 (8)
	16:28	17:26	18:19	12 07:13 (1)	20:15	22 07:29 (4)	21:08	15 06:31 (8)
15	08:25	07:38	06:35	06:58 (1)	06:21	07:08 (4)	05:21	06:18 (8)
	16:30	17:28	18:21	16 07:14 (1)	20:17	20 07:28 (4)	21:09	12 06:30 (8)
16	08:24	07:36	06:32	06:57 (1)	06:19	07:09 (4)	05:19	06:19 (8)
	16:31	17:30	18:23	18 07:15 (1)	20:18	18 07:27 (4)	21:11	9 06:28 (8)
17	08:23	07:34	06:30	06:55 (1)	06:17	07:10 (4)	05:17	2 06:23 (8)
	16:33	17:32	18:24	20 07:15 (1)	20:20	14 07:24 (4)	21:12	9 06:25 (8)
18	08:22	07:32	06:28	06:55 (1)	06:14	07:12 (4)	05:16	04:50
	16:35	17:34	18:26	21 07:16 (1)	20:22	9 07:21 (4)	21:14	21:48
19	08:21	07:29	06:25	06:55 (1)	06:12	05:14	04:50	05:30 (6)
	16:36	17:35	18:28	22 07:17 (1)	20:24	21:16	21:48	22 05:52 (7)
20	08:20	07:27	06:23	06:54 (1)	06:10	05:13	04:51	05:31 (6)
	16:38	17:37	18:30	22 07:16 (1)	20:26	21:17	21:48	22 05:53 (7)
21	08:19	07:25	06:21	06:54 (1)	06:08	05:12	04:51	05:32 (6)
	16:40	17:39	18:32	22 07:16 (1)	20:27	21:19	21:49	21 05:53 (7)
22	08:18	07:23	06:18	06:53 (1)	06:06	05:10	04:51	05:32 (6)
	16:42	17:41	18:33	22 07:15 (1)	20:29	21:20	21:49	21 05:53 (7)
23	08:17	07:21	06:16	06:54 (1)	06:03	05:09	05:37 (7)	04:51
	16:43	17:43	18:35	20 07:14 (1)	20:31	21:22	7 05:44 (7)	21:49
24	08:15	07:19	06:13	06:54 (1)	06:01	05:07	05:36 (7)	04:51
	16:45	17:45	18:37	18 07:12 (1)	20:33	21:23	10 05:46 (7)	21:49
25	08:14	07:16	06:11	06:55 (1)	05:59	05:06	05:35 (7)	04:52
	16:47	17:47	18:39	16 07:11 (1)	20:35	21:24	12 05:47 (7)	21:49
26	08:13	07:14	06:08	06:57 (1)	05:57	05:05	05:34 (7)	04:52
	16:49	17:49	18:41	12 07:09 (1)	20:36	21:26	14 05:48 (7)	21:49
27	08:11	07:12	06:06	06:29 (3)	05:55	05:04	05:34 (7)	04:53
	16:51	17:51	18:42	8 07:05 (1)	20:38	21:27	14 05:48 (7)	21:49
28	08:10	07:10	06:04	06:27 (3)	05:53	05:03	05:34 (7)	04:53
	16:53	17:53	18:44	8 06:35 (3)	20:40	21:29	15 05:49 (7)	21:49
29	08:08	07:01	07:24 (3)	05:51	06:16 (9)	05:02	05:33 (7)	04:54
	16:55	19:46	12 07:36 (3)	20:42	14 06:30 (8)	21:30	16 05:49 (7)	21:49
30	08:07	06:59	07:22 (3)	05:49	06:14 (9)	05:00	05:33 (7)	04:54
	16:57	19:48	15 07:37 (3)	20:43	18 06:32 (8)	21:31	17 05:50 (7)	21:48
31	08:05	06:56	07:20 (3)	05:47	05:00	05:33 (7)	04:54	05:33 (6)
	16:58	19:50	18 07:38 (3)	05:47	21:32	17 05:50 (7)	04:54	05:33 (6)
Sonnenscheinstunden	253	275	367	419	491	506	631	631
astr.max.mögl.Beschattung			303	416	467	506	631	631
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.50	0.39	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.69	0.72	0.73	0.72	0.72	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.27	0.27	0.27
Met.wahrsch.Beschattung			56	106	139	168	168	168

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DD - IO108

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:34 (6)	05:34	06:22 (9)	06:26	07:06 (4)	07:18	07:14	08:08			
	21:48	05:56 (7)	21:14	21	06:43 (8)	20:09	25	07:31 (4)	18:57	16:48	16:05	
2	04:56	05:35 (6)	05:35	06:21 (9)	06:28	07:06 (4)	07:20	07:16	08:09			
	21:48	05:56 (7)	21:12	23	06:44 (8)	20:07	25	07:31 (4)	18:55	16:46	16:05	
3	04:56	05:36 (6)	05:37	06:20 (9)	06:30	07:05 (4)	07:21	07:18	08:11			
	21:47	05:57 (7)	21:11	24	06:44 (8)	20:05	25	07:30 (4)	18:52	16:44	16:04	
4	04:57	05:35 (6)	05:38	06:20 (9)	06:31	07:05 (4)	07:23	07:20	08:12			
	21:47	05:56 (7)	21:09	25	06:45 (8)	20:02	24	07:29 (4)	18:50	16:42	16:03	
5	04:58	05:36 (6)	05:40	06:20 (9)	06:33	07:06 (4)	07:25	07:22	08:14			
	21:46	21	05:57 (7)	21:07	25	06:45 (8)	20:00	23	07:29 (4)	18:48	16:41	16:03
6	04:59	05:37 (6)	05:42	06:19 (9)	06:35	07:05 (4)	07:27	07:24	08:15			
	21:46	20	05:57 (7)	21:05	26	06:45 (8)	19:58	24	07:29 (3)	18:45	16:39	16:02
7	05:00	05:38 (6)	05:43	06:19 (9)	06:36	07:06 (4)	07:28	07:26	08:16			
	21:45	20	05:58 (7)	21:03	26	06:45 (8)	19:55	24	07:30 (3)	18:43	16:37	16:02
8	05:01	05:39 (6)	05:45	06:18 (9)	06:38	07:08 (4)	07:30	07:28	08:18			
	21:45	19	05:58 (7)	21:01	26	06:44 (8)	19:53	23	07:31 (3)	18:41	16:35	16:01
9	05:02	05:40 (6)	05:47	06:19 (9)	06:40	07:08 (4)	07:32	07:30	08:19			
	21:44	18	05:58 (7)	20:59	25	06:44 (8)	19:50	22	07:30 (3)	18:38	16:33	16:01
10	05:03	05:41 (7)	05:48	06:19 (9)	06:42	07:12 (3)	07:34	07:31	08:20			
	21:43	17	05:58 (7)	20:57	24	06:43 (8)	19:48	18	07:30 (3)	18:36	16:32	16:01
11	05:04	05:41 (7)	05:50	06:20 (9)	06:43	07:12 (3)	07:36	07:33	08:21			
	21:42	17	05:58 (7)	20:55	22	06:42 (8)	19:46	18	07:30 (3)	18:34	16:30	16:01
12	05:05	05:41 (7)	05:52	06:21 (9)	06:45	07:11 (3)	07:37	07:35	08:22			
	21:41	17	05:58 (7)	20:53	20	06:41 (8)	19:43	18	07:29 (3)	18:31	16:28	16:00
13	05:06	05:41 (7)	05:54	06:22 (9)	06:47	07:13 (3)	07:39	07:37	08:23			
	21:40	17	05:58 (7)	20:51	17	06:39 (8)	19:41	15	07:28 (3)	18:29	16:27	16:00
14	05:07	05:42 (7)	05:55	06:24 (9)	06:48	07:15 (3)	07:41	07:39	08:24			
	21:39	16	05:58 (7)	20:49	13	06:37 (8)	19:38	12	07:27 (3)	18:27	16:25	16:00
15	05:09	05:42 (7)	05:57	06:50	07:16 (3)	07:43	07:41	08:25				
	21:38	16	05:58 (7)	20:47	19:36	9	07:25 (3)	18:24	16:24	16:00		
16	05:10	05:42 (7)	05:59	06:52	07:18 (3)	07:45	07:43	08:26				
	21:37	15	05:57 (7)	20:45	19:33	4	07:22 (3)	18:22	16:22	16:00		
17	05:11	05:44 (7)	06:00	06:54	07:46 (1)	07:46	07:44	08:27				
	21:36	14	05:58 (7)	20:43	19:31	11	07:57 (1)	18:20	16:21	16:01		
18	05:13	05:44 (7)	06:02	06:55	07:43 (1)	07:48	07:46	08:28				
	21:35	13	05:57 (7)	20:41	19:29	15	07:58 (1)	18:18	16:19	16:01		
19	05:14	05:45 (7)	06:04	06:57	07:42 (1)	07:50	07:48	08:28				
	21:34	11	05:56 (7)	20:39	19:26	18	08:00 (1)	18:15	16:18	16:01		
20	05:15	05:46 (7)	06:05	06:59	07:41 (1)	07:52	07:50	08:29				
	21:32	8	05:54 (7)	20:37	19:24	19	08:00 (1)	18:13	16:17	16:01		
21	05:17	05:49 (7)	06:07	07:00	07:39 (1)	07:54	07:51	08:30				
	21:31	4	05:53 (7)	20:34	19:21	21	08:00 (1)	18:11	16:15	16:02		
22	05:18		06:09	07:02	07:38 (1)	07:56	07:53	08:30				
	21:30		20:32	19:19	22	08:00 (1)	18:09	16:14	16:02			
23	05:20		06:11	07:04	07:38 (1)	07:58	07:55	08:31				
	21:28		20:30	19:16	22	08:00 (1)	18:07	16:13	16:03			
24	05:21		06:12	07:06	07:38 (1)	07:59	07:57	08:31				
	21:27		20:28	19:14	22	08:00 (1)	18:05	16:12	16:03			
25	05:23		06:14	07:07	07:37 (1)	07:01	07:58	08:32				
	21:26		20:25	10	07:26 (4)	19:12	22	07:59 (1)	17:02	16:11	16:04	
26	05:24		06:16	07:09	07:38 (1)	07:03	08:00	08:32				
	21:24		20:23	15	07:27 (4)	19:09	20	07:58 (1)	17:00	16:10	16:05	
27	05:26		06:18	07:11 (4)	07:11	07:38 (1)	07:05	08:02	08:32			
	21:22	6	06:37 (8)	20:21	18	07:29 (4)	19:07	19	07:57 (1)	16:58	16:09	16:06
28	05:27		06:30 (8)	06:19	07:09 (4)	07:13	07:38 (1)	07:07	08:03	08:32		
	21:21	10	06:40 (8)	20:19	20	07:29 (4)	19:04	17	07:55 (1)	16:56	16:08	16:06
29	05:29		06:28 (8)	06:21	07:08 (4)	07:14	07:40 (1)	07:09	08:05	08:32		
	21:19	13	06:41 (8)	20:16	22	07:30 (4)	19:02	13	07:53 (1)	16:54	16:07	16:07
30	05:30		06:26 (8)	06:23	07:07 (4)	07:16	07:43 (1)	07:11	08:06	08:32		
	21:18	16	06:42 (8)	20:14	24	07:31 (4)	19:00	7	07:50 (1)	16:52	16:06	16:08
31	05:32		06:24 (9)	06:24	07:06 (4)			07:13	08:32			
	21:16	19	06:43 (8)	20:12	24	07:30 (4)		16:50	16:09			
Sonnenscheinstunden	509		458		382		330	262	237			
astr. max.mögl. Beschattung	412		450		557							
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.70							
Gesamte Reduktion	0.26		0.29		0.23							
Met. wahrsch. Beschattung	108		132		131							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DE - IO109

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:19 (3)	05:46	06:12 (9)	04:59
	16:10	17:00	17:55	19:51	19 07:38 (3)	20:45	22 06:34 (8)	21:34
2	08:32	08:02	07:05	06:52	07:18 (4)	05:44	06:11 (9)	04:58
	16:12	17:02	17:57	19:53	20 07:38 (3)	20:47	24 06:35 (8)	21:35
3	08:32	08:00	07:03	06:49	07:15 (4)	05:42	06:10 (9)	04:57
	16:13	17:04	17:58	19:55	23 07:38 (3)	20:49	25 06:35 (8)	21:36
4	08:32	07:58	07:01	06:47	07:13 (4)	05:41	06:10 (9)	04:56
	16:14	17:06	18:00	19:57	23 07:36 (3)	20:50	25 06:35 (8)	21:37
5	08:32	07:57	06:58	06:45	07:12 (4)	05:39	06:09 (9)	04:55
	16:15	17:08	18:02	19:59	23 07:35 (3)	20:52	26 06:35 (8)	21:38
6	08:31	07:55	06:56	06:42	07:10 (4)	05:37	06:09 (9)	04:55
	16:16	17:10	18:04	20:00	23 07:33 (3)	20:54	26 06:35 (8)	21:39
7	08:31	07:53	06:54	06:40	07:09 (4)	05:35	06:10 (9)	04:54
	16:18	17:12	18:06	20:02	24 07:33 (4)	20:56	26 06:36 (8)	21:40
8	08:30	07:51	06:51	06:37	07:09 (4)	05:33	06:10 (9)	04:53
	16:19	17:14	18:08	20:04	24 07:33 (4)	20:57	25 06:35 (8)	21:41
9	08:30	07:49	06:49	06:35	07:09 (4)	05:31	06:10 (9)	04:53
	16:20	17:16	18:10	20:06	25 07:34 (4)	20:59	25 06:35 (8)	21:42
10	08:29	07:48	06:47	06:33	07:07 (4)	05:29	06:12 (9)	04:52
	16:22	17:18	18:12	20:08	26 07:33 (4)	21:01	23 06:35 (8)	21:43
11	08:29	07:46	06:44	06:30	07:08 (4)	05:27	06:12 (9)	04:52
	16:23	17:20	18:13	20:09	24 07:32 (4)	21:03	22 06:34 (8)	21:44
12	08:28	07:44	06:42	06:28	07:08 (4)	05:26	06:13 (9)	04:52
	16:25	17:22	18:15	20:11	24 07:32 (4)	21:04	20 06:33 (8)	21:44
13	08:27	07:42	06:40	07:04 (1)	06:26	07:07 (4)	05:24	06:17 (8)
	16:26	17:24	18:17	7 07:11 (1)	20:13	24 07:31 (4)	21:06	16 06:33 (8)
14	08:26	07:40	06:37	07:01 (1)	06:24	07:08 (4)	05:22	06:17 (8)
	16:28	17:26	18:19	14 07:15 (1)	20:15	22 07:30 (4)	21:08	14 06:31 (8)
15	08:25	07:38	06:35	06:59 (1)	06:21	07:09 (4)	05:21	06:19 (8)
	16:30	17:28	18:21	16 07:15 (1)	20:17	20 07:29 (4)	21:09	11 06:30 (8)
16	08:24	07:36	06:32	06:57 (1)	06:19	07:10 (4)	05:19	06:20 (8)
	16:31	17:30	18:23	20 07:17 (1)	20:18	17 07:27 (4)	21:11	8 06:28 (8)
17	08:23	07:34	06:30	06:56 (1)	06:17	07:11 (4)	05:17	06:20 (8)
	16:33	17:32	18:24	21 07:17 (1)	20:20	13 07:24 (4)	21:12	21:47
18	08:22	07:32	06:28	06:55 (1)	06:14	07:15 (4)	05:16	06:20 (8)
	16:35	17:34	18:26	22 07:17 (1)	20:22	6 07:21 (4)	21:14	21:48
19	08:21	07:29	06:25	06:55 (1)	06:12	05:14	05:14	06:20 (8)
	16:36	17:35	18:28	23 07:18 (1)	20:24	21:16	21:48	22 05:53 (7)
20	08:20	07:27	06:23	06:54 (1)	06:10	05:13	04:51	05:32 (6)
	16:38	17:37	18:30	23 07:17 (1)	20:26	21:17	21:48	22 05:54 (7)
21	08:19	07:25	06:21	06:55 (1)	06:08	05:12	04:51	05:32 (6)
	16:40	17:39	18:32	22 07:17 (1)	20:27	21:19	21:49	22 05:54 (7)
22	08:18	07:23	06:18	06:54 (1)	06:06	05:10	04:51	05:32 (6)
	16:42	17:41	18:33	21 07:15 (1)	20:29	21:20	2 05:42 (7)	21:49
23	08:17	07:21	06:16	06:55 (1)	06:03	05:09	05:37 (7)	04:51
	16:43	17:43	18:35	20 07:15 (1)	20:31	21:22	8 05:45 (7)	21:49
24	08:15	07:19	06:13	06:55 (1)	06:01	05:07	05:36 (7)	04:51
	16:45	17:45	18:37	18 07:13 (1)	20:33	21:23	10 05:46 (7)	21:49
25	08:14	07:16	06:11	06:57 (1)	05:59	05:06	05:35 (7)	04:52
	16:47	17:47	18:39	14 07:11 (1)	20:35	21:24	12 05:47 (7)	21:49
26	08:13	07:14	06:08	06:59 (1)	05:57	05:05	05:35 (7)	04:52
	16:49	17:49	18:41	10 07:09 (1)	20:36	21:26	13 05:48 (7)	21:49
27	08:11	07:12	06:06	06:29 (3)	05:55	05:04	05:34 (7)	04:53
	16:51	17:51	18:42	5 06:34 (3)	20:38	21:27	15 05:49 (7)	21:49
28	08:10	07:10	06:04	06:27 (3)	05:53	05:03	05:34 (7)	04:53
	16:53	17:53	18:44	9 06:36 (3)	20:40	4 06:28 (8)	21:29	15 05:49 (7)
29	08:08	07:01	07:24 (3)	05:51	06:16 (9)	05:02	05:34 (7)	04:54
	16:55	19:46	13 07:37 (3)	20:42	16 06:32 (8)	21:30	16 05:50 (7)	21:49
30	08:07	06:59	07:22 (3)	05:49	06:14 (9)	05:00	05:33 (7)	04:54
	16:57	19:48	16 07:38 (3)	20:43	19 06:33 (8)	21:31	17 05:50 (7)	21:48
31	08:05	06:56	07:20 (3)	05:47	05:00	05:00	05:33 (7)	04:53
	16:58	19:50	18 07:38 (3)	20:44	21:32	17 05:50 (7)	21:49	22 05:55 (7)
Sonnenscheinstunden	253	275	367	419	491	506	633	
astr.max.mögl.Beschattung			312	419	463	633		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.69	0.72	0.72	0.72		
Gesamte Reduktion			0.18	0.26	0.30	0.27		
Met.wahrsch.Beschattung			57	107	138	169		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DE - IO109

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:34 (6)	05:34	06:23 (9)	06:26	07:07 (4)	07:18	07:14	08:08			
	21:48	05:56 (7)	21:14	21	06:44 (8)	20:09	24	07:31 (4)	18:57	16:48	16:05	
2	04:56	05:35 (6)	05:35	06:22 (9)	06:28	07:06 (4)	07:20	07:16	08:09			
	21:48	05:57 (7)	21:12	23	06:45 (8)	20:07	26	07:32 (4)	18:55	16:46	16:05	
3	04:56	05:36 (6)	05:37	06:21 (9)	06:30	07:06 (4)	07:21	07:18	08:11			
	21:47	05:57 (7)	21:11	24	06:45 (8)	20:05	25	07:31 (4)	18:52	16:44	16:04	
4	04:57	05:36 (6)	05:38	06:20 (9)	06:31	07:06 (4)	07:23	07:20	08:12			
	21:47	05:57 (7)	21:09	25	06:45 (8)	20:02	24	07:30 (4)	18:50	16:42	16:03	
5	04:58	05:37 (6)	05:40	06:20 (9)	06:33	07:06 (4)	07:25	07:22	08:14			
	21:46	05:57 (7)	21:07	26	06:46 (8)	20:00	24	07:30 (4)	18:48	16:41	16:03	
6	04:59	05:37 (6)	05:42	06:19 (9)	06:35	07:06 (4)	07:27	07:24	08:15			
	21:46	05:58 (7)	21:05	26	06:45 (8)	19:58	23	07:29 (3)	18:45	16:39	16:02	
7	05:00	05:38 (6)	05:43	06:19 (9)	06:36	07:07 (4)	07:28	07:26	08:16			
	21:45	05:58 (7)	21:03	27	06:46 (8)	19:55	23	07:30 (3)	18:43	16:37	16:02	
8	05:01	05:39 (6)	05:45	06:19 (9)	06:38	07:08 (4)	07:30	07:28	08:18			
	21:45	05:58 (7)	21:01	26	06:45 (8)	19:53	23	07:31 (3)	18:41	16:35	16:01	
9	05:02	05:40 (6)	05:47	06:19 (9)	06:40	07:08 (4)	07:32	07:30	08:19			
	21:44	05:59 (7)	20:59	26	06:45 (8)	19:50	23	07:31 (3)	18:38	16:33	16:01	
10	05:03	05:41 (7)	05:48	06:19 (9)	06:42	07:11 (4)	07:34	07:31	08:20			
	21:43	05:59 (7)	20:57	25	06:44 (8)	19:48	20	07:31 (3)	18:36	16:32	16:01	
11	05:04	05:41 (7)	05:50	06:20 (9)	06:43	07:12 (3)	07:36	07:33	08:21			
	21:42	05:59 (7)	20:55	23	06:43 (8)	19:46	19	07:31 (3)	18:34	16:30	16:01	
12	05:05	05:42 (7)	05:52	06:21 (9)	06:45	07:11 (3)	07:37	07:35	08:22			
	21:41	05:59 (7)	20:53	22	06:43 (8)	19:43	19	07:30 (3)	18:31	16:28	16:00	
13	05:06	05:42 (7)	05:54	06:22 (9)	06:47	07:13 (3)	07:39	07:37	08:23			
	21:40	05:59 (7)	20:51	18	06:40 (8)	19:41	16	07:29 (3)	18:29	16:27	16:00	
14	05:07	05:42 (7)	05:55	06:24 (9)	06:48	07:15 (3)	07:41	07:39	08:24			
	21:39	05:58 (7)	20:49	15	06:39 (8)	19:38	13	07:28 (3)	18:27	16:25	16:00	
15	05:09	05:42 (7)	05:57	06:50	07:16 (3)	07:43	07:41	08:25				
	21:38	05:58 (7)	20:47	19:36	10	07:26 (3)	18:24	16:24	16:00			
16	05:10	05:42 (7)	05:59	06:52	07:18 (3)	07:45	07:43	08:26				
	21:37	05:58 (7)	20:45	19:33	6	07:24 (3)	18:22	16:22	16:00			
17	05:11	05:44 (7)	06:00	06:54	07:48 (1)	07:46	07:44	08:27				
	21:36	05:58 (7)	20:43	19:31	9	07:57 (1)	18:20	16:21	16:01			
18	05:13	05:44 (7)	06:02	06:55	07:44 (1)	07:48	07:46	08:28				
	21:35	05:57 (7)	20:41	19:29	14	07:58 (1)	18:18	16:19	16:01			
19	05:14	05:45 (7)	06:04	06:57	07:43 (1)	07:50	07:48	08:28				
	21:34	05:56 (7)	20:39	19:26	17	08:00 (1)	18:15	16:18	16:01			
20	05:15	05:46 (7)	06:05	06:59	07:42 (1)	07:52	07:50	08:29				
	21:32	05:55 (7)	20:37	19:24	19	08:01 (1)	18:13	16:17	16:01			
21	05:17	05:48 (7)	06:07	07:00	07:40 (1)	07:54	07:51	08:30				
	21:31	05:54 (7)	20:34	19:21	21	08:01 (1)	18:11	16:15	16:02			
22	05:18	06:09	06:09	07:02	07:39 (1)	07:56	07:53	08:30				
	21:30	06:32	06:32	19:19	22	08:01 (1)	18:09	16:14	16:02			
23	05:20	06:11	06:11	07:04	07:39 (1)	07:58	07:55	08:31				
	21:28	06:30	06:30	19:16	22	08:01 (1)	18:07	16:13	16:03			
24	05:21	06:12	06:12	07:06	07:39 (1)	07:59	07:57	08:31				
	21:27	06:28	06:28	19:14	22	08:01 (1)	18:05	16:12	16:03			
25	05:23	06:14	06:14	07:18 (4)	07:07	07:38 (1)	07:01	07:58	08:32			
	21:26	06:25	7	07:25 (4)	19:12	22	08:00 (1)	17:02	16:11	16:04		
26	05:24	06:16	06:16	07:14 (4)	07:09	07:38 (1)	07:03	08:00	08:32			
	21:24	06:23	13	07:27 (4)	19:09	22	08:00 (1)	17:00	16:10	16:05		
27	05:26	06:33 (8)	06:18	07:12 (4)	07:11	07:39 (1)	07:05	08:02	08:32			
	21:22	06:37 (8)	20:21	17	07:29 (4)	19:07	20	07:59 (1)	16:58	16:09	16:06	
28	05:27	06:31 (8)	06:19	07:10 (4)	07:13	07:39 (1)	07:07	08:03	08:32			
	21:21	06:40 (8)	20:19	20	07:30 (4)	19:04	18	07:57 (1)	16:56	16:08	16:06	
29	05:29	06:29 (8)	06:21	07:09 (4)	07:14	07:40 (1)	07:09	08:05	08:32			
	21:19	06:41 (8)	20:16	22	07:31 (4)	19:02	15	07:55 (1)	16:54	16:07	16:07	
30	05:30	06:27 (8)	06:23	07:08 (4)	07:16	07:42 (1)	07:11	08:06	08:32			
	21:18	06:42 (8)	20:14	23	07:31 (4)	19:00	11	07:53 (1)	16:52	16:06	16:08	
31	05:32	06:26 (9)	06:24	07:07 (4)			07:13	08:32				
	21:16	06:44 (8)	20:12	24	07:31 (4)		16:50	16:09				
	Sonnenscheinstunden	509	458		382		330	262	237			
	astr. max.mögl. Beschattung	414		453	572							
	Red. Sonnenscheinwahrsch.	0.38		0.42	0.35							
	Reduktion Betriebsdauer	0.96		0.96	0.96							
	Reduktion Windrichtung	0.72		0.72	0.70							
	Gesamte Reduktion	0.26		0.29	0.23							
	Met. wahrsch. Beschattung	108		133	134							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DF - IO110

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:20 (4)	05:46	06:13 (9)	04:59
	16:10	17:00	17:55	19:51	20	07:40 (3)	20:45	24
2	08:32	08:02	07:05	06:52	07:18 (4)	05:44	06:12 (9)	04:58
	16:12	17:02	17:57	19:53	22	07:40 (3)	20:47	26
3	08:32	08:00	07:03	06:49	07:16 (4)	05:42	06:12 (9)	04:57
	16:13	17:04	17:58	19:55	23	07:39 (3)	20:49	26
4	08:32	07:58	07:01	06:47	07:14 (4)	05:41	06:11 (9)	04:56
	16:14	17:06	18:00	19:57	24	07:38 (3)	20:50	27
5	08:32	07:57	06:58	06:45	07:13 (4)	05:39	06:11 (9)	04:55
	16:15	17:08	18:02	19:59	23	07:36 (3)	20:52	27
6	08:31	07:55	06:56	06:42	07:12 (4)	05:37	06:11 (9)	04:55
	16:16	17:10	18:04	20:00	24	07:36 (4)	20:54	27
7	08:31	07:53	06:54	06:40	07:11 (4)	05:35	06:12 (9)	04:54
	16:18	17:12	18:06	20:02	25	07:36 (4)	20:56	26
8	08:30	07:51	06:51	06:37	07:11 (4)	05:33	06:12 (9)	04:53
	16:19	17:14	18:08	20:04	25	07:36 (4)	20:57	25
9	08:30	07:49	06:49	06:35	07:11 (4)	05:31	06:12 (9)	04:53
	16:20	17:16	18:10	20:06	25	07:36 (4)	20:59	25
10	08:29	07:48	06:47	06:33	07:10 (4)	05:29	06:14 (9)	04:52
	16:22	17:18	18:12	20:08	25	07:35 (4)	21:01	23
11	08:29	07:46	06:44	06:30	07:11 (4)	05:27	06:15 (9)	04:52
	16:23	17:20	18:13	20:09	24	07:35 (4)	21:03	21
12	08:28	07:44	06:42	07:07 (1)	06:28	07:11 (4)	05:26	06:17 (9)
	16:25	17:22	18:15	9	07:16 (1)	20:11	23	07:34 (4)
13	08:27	07:42	06:40	07:03 (1)	06:26	07:11 (4)	05:24	06:19 (8)
	16:26	17:24	18:17	15	07:18 (1)	20:13	22	07:33 (4)
14	08:26	07:40	06:37	07:02 (1)	06:24	07:12 (4)	05:22	06:20 (8)
	16:28	17:26	18:19	17	07:19 (1)	20:15	19	07:31 (4)
15	08:25	07:38	06:35	07:00 (1)	06:21	07:13 (4)	05:21	06:23 (8)
	16:30	17:28	18:21	20	07:20 (1)	20:17	17	07:30 (4)
16	08:24	07:36	06:32	06:59 (1)	06:19	07:15 (4)	05:19	06:31 (8)
	16:31	17:30	18:23	21	07:20 (1)	20:18	13	07:28 (4)
17	08:23	07:34	06:30	06:58 (1)	06:17	07:18 (4)	05:17	07:23 (4)
	16:33	17:32	18:24	22	07:20 (1)	20:20	5	07:23 (4)
18	08:22	07:32	06:28	06:58 (1)	06:14	05:16	05:16	05:16
	16:35	17:34	18:26	22	07:20 (1)	20:22	21:14	21:14
19	08:21	07:29	06:25	06:58 (1)	06:12	05:14	04:50	04:50
	16:36	17:35	18:28	23	07:21 (1)	20:24	21:16	21:16
20	08:20	07:27	06:23	06:57 (1)	06:10	05:13	04:51	04:51
	16:38	17:37	18:30	22	07:19 (1)	20:26	21:17	21:17
21	08:19	07:25	06:20	06:58 (1)	06:08	05:12	04:51	04:51
	16:40	17:39	18:32	21	07:19 (1)	20:27	21:19	21:19
22	08:18	07:23	06:18	06:58 (1)	06:06	05:10	04:51	04:51
	16:42	17:41	18:33	19	07:17 (1)	20:29	21:20	7
23	08:17	07:21	06:16	06:59 (1)	06:03	05:09	05:37 (7)	04:51
	16:43	17:43	18:35	17	07:16 (1)	20:31	21:22	10
24	08:15	07:19	06:13	06:59 (1)	06:01	05:07	05:36 (7)	04:51
	16:45	17:45	18:37	15	07:14 (1)	20:33	21:23	12
25	08:14	07:16	06:11	07:02 (1)	05:59	05:06	05:36 (7)	04:52
	16:47	17:47	18:39	10	07:12 (1)	20:35	21:24	13
26	08:13	07:14	06:08	06:32 (3)	05:57	05:05	05:35 (7)	04:52
	16:49	17:49	18:41	5	06:37 (3)	20:36	21:26	15
27	08:11	07:12	06:06	06:29 (3)	05:55	05:04	05:35 (7)	04:53
	16:51	17:51	18:42	9	06:38 (3)	20:38	21:27	15
28	08:10	07:10	06:04	06:27 (3)	05:53	05:03	05:35 (7)	04:53
	16:53	17:53	18:44	13	06:40 (3)	20:40	16	06:33 (8)
29	08:08	07:01	06:01	07:24 (3)	05:51	05:02	05:34 (7)	04:54
	16:55	19:46	16	07:40 (3)	20:42	20	06:36 (8)	21:30
30	08:07	06:59	07:22 (3)	05:49	06:14 (9)	05:00	05:34 (7)	04:54
	16:57	19:48	19	07:41 (3)	20:43	23	06:37 (8)	21:31
31	08:05	06:56	07:22 (3)	05:47	06:14 (9)	05:00	05:34 (7)	04:54
	16:58	19:50	19	07:41 (3)	20:43	23	06:37 (8)	21:31
Sonnenscheinstunden	253	275	367	419	491	491	506	639
astr.max.mögl.Beschattung			334	420	470	470	639	639
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.43	0.39	0.39
Reduktion Betriebsdauer			0.69	0.96	0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.69	0.72	0.72	0.72	0.72	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.30	0.27	0.27
Met.wahrsch.Beschattung			61	107	140	140	171	171

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DF - IO110

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:35 (6)	05:34		06:26 (9)	06:26	07:09 (4)	07:18	07:44 (1)	07:14	08:08		
	21:48	05:57 (7)	21:14	19	06:45 (8)	20:09	25	07:34 (4)	18:57	12	07:56 (1)	16:48	16:05
2	04:56	05:36 (6)	05:35		06:24 (9)	06:28		07:09 (4)	07:20		07:49 (1)	07:16	08:09
	21:48	05:58 (7)	21:12	22	06:46 (8)	20:07	25	07:34 (4)	18:55	3	07:52 (1)	16:46	16:05
3	04:56	05:37 (6)	05:37		06:23 (9)	06:30		07:08 (4)	07:21			07:18	08:11
	21:47	05:58 (7)	21:11	23	06:46 (8)	20:05	26	07:34 (4)	18:52			16:44	16:04
4	04:57	05:37 (6)	05:38		06:22 (9)	06:31		07:08 (4)	07:23			07:20	08:12
	21:47	05:58 (7)	21:09	25	06:47 (8)	20:02	26	07:34 (4)	18:50			16:42	16:03
5	04:58	05:37 (6)	05:40		06:22 (9)	06:33		07:08 (4)	07:25			07:22	08:14
	21:46	05:58 (7)	21:07	26	06:48 (8)	20:00	25	07:33 (4)	18:48			16:41	16:03
6	04:59	05:38 (6)	05:42		06:21 (9)	06:35		07:08 (4)	07:27			07:24	08:15
	21:46	05:59 (7)	21:05	27	06:48 (8)	19:58	24	07:32 (4)	18:45			16:39	16:02
7	05:00	05:39 (6)	05:43		06:21 (9)	06:36		07:08 (4)	07:28			07:26	08:16
	21:45	05:59 (7)	21:03	27	06:48 (8)	19:55	23	07:31 (3)	18:43			16:37	16:02
8	05:01	05:40 (6)	05:45		06:20 (9)	06:38		07:09 (4)	07:30			07:28	08:18
	21:45	06:00 (7)	21:01	27	06:47 (8)	19:53	24	07:33 (3)	18:41			16:35	16:01
9	05:02	05:41 (6)	05:47		06:21 (9)	06:40		07:09 (4)	07:32			07:30	08:19
	21:44	06:00 (7)	20:59	26	06:47 (8)	19:50	24	07:33 (3)	18:38			16:33	16:01
10	05:03	05:42 (6)	05:48		06:20 (9)	06:42		07:11 (4)	07:34			07:31	08:20
	21:43	06:00 (7)	20:57	26	06:46 (8)	19:48	22	07:33 (3)	18:36			16:32	16:01
11	05:04	05:42 (7)	05:50		06:21 (9)	06:43		07:13 (4)	07:36			07:33	08:21
	21:42	06:00 (7)	20:55	25	06:46 (8)	19:46	20	07:33 (3)	18:34			16:30	16:01
12	05:05	05:42 (7)	05:52		06:22 (9)	06:45		07:13 (3)	07:37			07:35	08:22
	21:41	06:00 (7)	20:53	24	06:46 (8)	19:43	19	07:32 (3)	18:31			16:28	16:00
13	05:06	05:43 (7)	05:54		06:22 (9)	06:47		07:13 (3)	07:39			07:37	08:23
	21:40	06:00 (7)	20:51	22	06:44 (8)	19:41	19	07:32 (3)	18:29			16:27	16:00
14	05:07	05:43 (7)	05:55		06:24 (9)	06:48		07:15 (3)	07:41			07:39	08:24
	21:39	06:00 (7)	20:49	19	06:43 (8)	19:38	16	07:31 (3)	18:27			16:25	16:00
15	05:09	05:43 (7)	05:57		06:26 (9)	06:50		07:16 (3)	07:43			07:41	08:25
	21:38	05:59 (7)	20:47	14	06:40 (8)	19:36	13	07:29 (3)	18:24			16:24	16:00
16	05:10	05:43 (7)	05:59			06:52		07:18 (3)	07:45			07:43	08:26
	21:37	05:59 (7)	20:45			19:33	10	07:28 (3)	18:22			16:22	16:00
17	05:11	05:45 (7)	06:00			06:54		07:20 (3)	07:46			07:44	08:27
	21:36	06:00 (7)	20:43			19:31	6	07:26 (3)	18:20			16:21	16:01
18	05:13	05:45 (7)	06:02			06:55		07:50 (1)	07:48			07:46	08:28
	21:35	05:59 (7)	20:41			19:29	8	07:58 (1)	18:18			16:19	16:01
19	05:14	05:45 (7)	06:04			06:57		07:47 (1)	07:50			07:48	08:28
	21:34	05:58 (7)	20:39			19:26	14	08:01 (1)	18:15			16:18	16:01
20	05:15	05:46 (7)	06:05			06:59		07:46 (1)	07:52			07:50	08:29
	21:32	05:57 (7)	20:37			19:24	17	08:03 (1)	18:13			16:17	16:01
21	05:17	05:48 (7)	06:07			07:00		07:43 (1)	07:54			07:51	08:30
	21:31	05:56 (7)	20:34			19:21	20	08:03 (1)	18:11			16:15	16:02
22	05:18	05:50 (7)	06:09			07:02		07:43 (1)	07:56			07:53	08:30
	21:30	05:54 (7)	20:32			19:19	20	08:03 (1)	18:09			16:14	16:02
23	05:20		06:11			07:04		07:42 (1)	07:58			07:55	08:31
	21:28		20:30			19:16	22	08:04 (1)	18:07			16:13	16:03
24	05:21		06:12			07:06		07:42 (1)	07:59			07:57	08:31
	21:27		20:28			19:14	22	08:04 (1)	18:05			16:12	16:03
25	05:23		06:14			07:07		07:41 (1)	07:01			07:58	08:32
	21:26		20:25			19:12	22	08:03 (1)	17:02			16:11	16:04
26	05:24		06:16			07:20 (4)	07:09	07:41 (1)	07:03			08:00	08:32
	21:24		20:23	7		07:27 (4)	19:09	22	08:03 (1)	17:00		16:10	16:05
27	05:26		06:18			07:17 (4)	07:11		07:41 (1)	07:05		08:02	08:32
	21:22		20:21	13		07:30 (4)	19:07	21	08:02 (1)	16:58		16:09	16:05
28	05:27	06:35 (8)	06:19			07:14 (4)	07:13		07:40 (1)	07:07		08:03	08:32
	21:21	06:40 (8)	20:19	17		07:31 (4)	19:04	21	08:01 (1)	16:56		16:08	16:06
29	05:29	06:32 (8)	06:21			07:13 (4)	07:14		07:41 (1)	07:09		08:05	08:32
	21:19	06:42 (8)	20:16	19		07:32 (4)	19:02	19	08:00 (1)	16:54		16:07	16:07
30	05:30	06:30 (8)	06:23			07:12 (4)	07:16		07:42 (1)	07:11		08:06	08:32
	21:18	06:43 (8)	20:14	22		07:34 (4)	19:00	16	07:58 (1)	16:52		16:06	16:08
31	05:32	06:29 (8)	06:24			07:10 (4)				07:13			08:32
	21:16	06:45 (8)	20:12	23		07:33 (4)				16:50			16:09
	Sonnenscheinstunden	509	458			382			330			262	237
	astr.max.mögl.Beschattung	416		453		591			15				
	Red.Sonnenscheinwahrsch.	0.38		0.42		0.35			0.29				
	Reduktion Betriebsdauer	0.96		0.96		0.96			0.96				
	Reduktion Windrichtung	0.72		0.72		0.70			0.69				
	Gesamte Reduktion	0.26		0.29		0.23			0.19				
	Met.wahrsch.Beschattung	109		133		138			3				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DG - IO111

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
302	339	467	706	786	617	554	815	1,348	1,328	721	398	8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni					
1	08:32	08:03	07:08	07:32 (2)	06:54	07:20 (4)	05:46	06:13 (9)	04:59	05:34 (7)	
	16:10	17:00	17:55	8 07:40 (2)	19:51	21 07:41 (3)	20:45	25 06:38 (8)	21:34	18 05:52 (7)	
2	08:32	08:02	07:05	07:29 (2)	06:52	07:18 (4)	05:44	06:13 (9)	04:58	05:35 (6)	
	16:12	17:02	17:57	12 07:41 (2)	19:53	22 07:40 (3)	20:47	25 06:38 (8)	21:35	18 05:53 (7)	
3	08:32	08:00	07:03	07:27 (2)	06:49	07:16 (4)	05:42	06:12 (9)	04:57	05:34 (6)	
	16:13	17:04	17:58	15 07:42 (2)	19:55	24 07:40 (3)	20:49	27 06:39 (8)	21:36	19 05:53 (7)	
4	08:32	07:58	07:01	07:25 (2)	06:47	07:14 (4)	05:41	06:12 (9)	04:56	05:33 (6)	
	16:14	17:06	18:00	18 07:43 (2)	19:57	24 07:38 (3)	20:50	27 06:39 (8)	21:37	20 05:53 (7)	
5	08:32	07:57	06:58	07:24 (2)	06:45	07:14 (4)	05:39	06:11 (9)	04:55	05:33 (6)	
	16:15	17:08	18:02	18 07:42 (2)	19:59	23 07:37 (3)	20:52	27 06:38 (8)	21:38	20 05:53 (7)	
6	08:31	07:55	06:56	07:24 (2)	06:42	07:12 (4)	05:37	06:11 (9)	04:55	05:32 (6)	
	16:16	17:10	18:04	18 07:42 (2)	20:00	25 07:37 (4)	20:54	27 06:38 (8)	21:39	21 05:53 (7)	
7	08:31	07:53	06:54	07:24 (2)	06:40	07:12 (4)	05:35	06:12 (9)	04:54	05:32 (6)	
	16:18	17:12	18:06	18 07:42 (2)	20:02	25 07:37 (4)	20:56	27 06:39 (8)	21:40	22 05:54 (7)	
8	08:30	07:51	06:51	07:24 (2)	06:37	07:12 (4)	05:33	06:12 (9)	04:53	05:32 (6)	
	16:19	17:14	18:08	17 07:41 (2)	20:04	25 07:37 (4)	20:57	26 06:38 (8)	21:41	21 05:53 (7)	
9	08:30	07:49	06:49	07:25 (2)	06:35	07:12 (4)	05:31	06:13 (9)	04:53	05:32 (6)	
	16:20	17:16	18:10	15 07:40 (2)	20:06	25 07:37 (4)	20:59	24 06:37 (8)	21:42	22 05:54 (7)	
10	08:29	07:48	06:47	07:25 (2)	06:33	07:11 (4)	05:29	06:14 (9)	04:52	05:31 (6)	
	16:22	17:18	18:11	13 07:38 (2)	20:08	25 07:36 (4)	21:01	23 06:37 (8)	21:43	22 05:53 (7)	
11	08:29	07:46	06:44	07:28 (2)	06:30	07:11 (4)	05:27	06:15 (9)	04:52	05:31 (6)	
	16:23	17:20	18:13	7 07:35 (2)	20:09	25 07:36 (4)	21:03	21 06:36 (8)	21:44	22 05:53 (7)	
12	08:28	07:44	06:42	07:06 (1)	06:28	07:12 (4)	05:26	06:18 (9)	04:52	05:32 (6)	
	16:25	17:22	18:15	12 07:18 (1)	20:11	23 07:35 (4)	21:04	17 06:35 (8)	21:44	22 05:54 (7)	
13	08:27	07:42	06:40	07:03 (1)	06:26	07:12 (4)	05:24	06:20 (8)	04:51	05:32 (6)	
	16:26	17:24	18:17	16 07:19 (1)	20:13	21 07:33 (4)	21:06	14 06:34 (8)	21:45	22 05:54 (7)	
14	08:26	07:40	06:37	07:02 (1)	06:24	07:13 (4)	05:22	06:21 (8)	04:51	05:31 (6)	
	16:28	17:26	18:19	19 07:21 (1)	20:15	19 07:32 (4)	21:08	11 06:32 (8)	21:46	22 05:53 (7)	
15	08:25	07:38	06:35	07:00 (1)	06:21	07:14 (4)	05:21	06:24 (8)	04:51	05:31 (6)	
	16:30	17:28	18:21	21 07:21 (1)	20:17	16 07:30 (4)	21:09	7 06:31 (8)	21:46	22 05:53 (7)	
16	08:24	07:36	06:32	07:00 (1)	06:19	07:17 (4)	05:19		04:51	05:32 (6)	
	16:31	17:30	18:23	21 07:21 (1)	20:18	11 07:28 (4)	21:11		21:47	22 05:54 (7)	
17	08:23	07:34	06:30	06:59 (1)	06:17		05:17		04:50	05:32 (6)	
	16:33	17:32	18:24	22 07:21 (1)	20:20		21:12		21:47	22 05:54 (7)	
18	08:22	07:32	06:28	06:59 (1)	06:14		05:16		04:50	05:32 (6)	
	16:35	17:34	18:26	22 07:21 (1)	20:22		21:14		21:48	22 05:54 (7)	
19	08:21	07:29	06:25	06:59 (1)	06:12		05:14		04:50	05:32 (6)	
	16:36	17:35	18:28	22 07:21 (1)	20:24		21:16		21:48	22 05:54 (7)	
20	08:20	07:27	06:23	06:58 (1)	06:10		05:13		04:51	05:33 (6)	
	16:38	17:37	18:30	22 07:20 (1)	20:26		21:17		21:48	22 05:55 (7)	
21	08:19	07:25	06:20	06:59 (1)	06:08		05:12		04:51	05:33 (6)	
	16:40	17:39	18:32	21 07:20 (1)	20:27		21:19		21:49	22 05:55 (7)	
22	08:18	07:23	06:18	06:59 (1)	06:06		05:10	05:38 (7)	04:51	05:33 (6)	
	16:42	17:41	18:33	19 07:18 (1)	20:29		21:20	7 05:45 (7)	21:49	22 05:55 (7)	
23	08:17	07:21	06:16	07:00 (1)	06:03		05:09	05:37 (7)	04:51	05:33 (6)	
	16:43	17:43	18:35	17 07:17 (1)	20:31		21:22	10 05:47 (7)	21:49	22 05:55 (7)	
24	08:15	07:19	06:13	07:01 (1)	06:01		05:07	05:36 (7)	04:51	05:34 (6)	
	16:45	17:45	18:37	13 07:14 (1)	20:33		21:23	13 05:49 (7)	21:49	22 05:56 (7)	
25	08:14	07:16	06:11	07:04 (1)	05:59		05:06	05:36 (7)	04:52	05:34 (6)	
	16:47	17:47	18:39	7 07:11 (1)	20:35		21:24	13 05:49 (7)	21:49	22 05:56 (7)	
26	08:13	07:14	06:08	06:32 (3)	05:57		05:05	05:35 (7)	04:52	05:34 (6)	
	16:49	17:49	18:41	6 06:38 (3)	20:36		21:26	15 05:50 (7)	21:49	22 05:56 (7)	
27	08:11	07:12	06:06	06:29 (3)	05:55	6 06:25 (8)	05:04	05:35 (7)	04:53	05:35 (6)	
	16:50	17:51	18:42	10 06:39 (3)	20:38		21:27	16 05:51 (7)	21:49	22 05:57 (7)	
28	08:10	07:10	06:04	06:27 (3)	05:53		05:03	05:35 (7)	04:53	05:34 (6)	
	16:53	17:53	4 07:34 (2)	18:44	14 06:41 (3)	20:40	17 06:34 (8)	21:29	16 05:51 (7)	21:49	22 05:56 (7)
29	08:08		07:01	07:24 (3)	05:51		06:16 (9)	05:02	05:35 (7)	04:54	05:35 (6)
	16:55		19:46	17 07:41 (3)	20:42	21 06:37 (8)	21:30	17 05:52 (7)	21:49	22 05:57 (7)	
30	08:07		06:59	07:23 (3)	05:49		06:14 (9)	05:00	05:34 (7)	04:54	05:35 (6)
	16:57		19:48	18 07:41 (3)	20:43	23 06:37 (8)	21:31	18 05:52 (7)	21:48	22 05:57 (7)	
31	08:05		06:56	07:22 (3)			04:59	05:34 (7)			
	16:58		19:50	20 07:42 (3)			21:32	18 05:52 (7)			
Sonnenscheinstunden	253	275	367	419	421	491	471	506	643		
astr.max.mögl.Beschattung		4	498	421	471	506	643				
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.43	0.39				
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96	0.96				
Reduktion Windrichtung		0.65	0.68	0.72	0.72	0.72	0.72				
Gesamte Reduktion		0.15	0.18	0.26	0.30	0.30	0.27				
Met.wahrsch.Beschattung		1	90	108	140	171					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DG - IO111

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:36 (6)	05:34	06:27 (9)	06:26	07:10 (4)	07:18	07:44 (1)	07:14	08:08			
	21:48	05:58 (7)	21:14	19	06:46 (8)	20:09	25	07:35 (4)	18:57	14	07:58 (1)	16:48	16:05
2	04:56	05:36 (6)	05:35	06:25 (9)	06:28	07:10 (4)	07:20	07:47 (1)	07:16	08:09			
	21:48	05:58 (7)	21:12	22	06:47 (8)	20:07	25	07:35 (4)	18:55	11	08:12 (2)	16:46	16:05
3	04:56	05:37 (6)	05:37	06:23 (9)	06:30	07:09 (4)	07:21	07:09 (4)	07:21	08:04 (2)	07:18	08:11	
	21:47	05:59 (7)	21:11	24	06:47 (8)	20:05	25	07:34 (4)	18:52	11	08:15 (2)	16:44	16:04
4	04:57	05:37 (6)	05:38	06:23 (9)	06:31	07:09 (4)	07:23	07:09 (4)	07:23	08:02 (2)	07:20	08:12	
	21:47	05:58 (7)	21:09	25	06:48 (8)	20:02	25	07:34 (4)	18:50	14	08:16 (2)	16:42	16:03
5	04:58	05:37 (6)	05:40	06:23 (9)	06:33	07:09 (4)	07:25	07:09 (4)	07:25	08:01 (2)	07:22	08:14	
	21:46	05:59 (7)	21:07	26	06:49 (8)	20:00	25	07:34 (4)	18:48	16	08:17 (2)	16:41	16:03
6	04:59	05:38 (6)	05:42	06:21 (9)	06:35	07:08 (4)	07:27	07:08 (4)	07:27	08:00 (2)	07:24	08:15	
	21:46	05:59 (7)	21:05	27	06:48 (8)	19:58	25	07:33 (4)	18:45	18	08:18 (2)	16:39	16:02
7	05:00	05:39 (6)	05:43	06:21 (9)	06:36	07:09 (4)	07:28	07:09 (4)	07:28	08:00 (2)	07:26	08:16	
	21:45	06:00 (7)	21:03	28	06:49 (8)	19:55	23	07:32 (3)	18:43	18	08:18 (2)	16:37	16:02
8	05:01	05:40 (6)	05:45	06:21 (9)	06:38	07:09 (4)	07:30	07:09 (4)	07:30	07:59 (2)	07:28	08:18	
	21:45	06:00 (7)	21:01	27	06:48 (8)	19:53	24	07:33 (3)	18:41	18	08:17 (2)	16:35	16:01
9	05:02	05:41 (6)	05:47	06:21 (9)	06:40	07:09 (4)	07:32	07:09 (4)	07:32	07:59 (2)	07:30	08:19	
	21:44	06:00 (7)	20:59	27	06:48 (8)	19:50	24	07:33 (3)	18:38	18	08:17 (2)	16:33	16:01
10	05:03	05:42 (6)	05:48	06:20 (9)	06:42	07:11 (4)	07:34	07:11 (4)	07:34	08:00 (2)	07:31	08:20	
	21:43	06:00 (7)	20:57	27	06:47 (8)	19:48	22	07:33 (3)	18:36	17	08:17 (2)	16:32	16:01
11	05:04	05:43 (6)	05:50	06:21 (9)	06:43	07:13 (4)	07:36	07:13 (4)	07:36	08:02 (2)	07:33	08:21	
	21:42	06:00 (7)	20:55	26	06:47 (8)	19:46	21	07:34 (3)	18:34	14	08:16 (2)	16:30	16:01
12	05:05	05:43 (7)	05:52	06:22 (9)	06:45	07:14 (3)	07:37	07:14 (3)	07:37	08:04 (2)	07:35	08:22	
	21:41	06:00 (7)	20:53	24	06:46 (8)	19:43	19	07:33 (3)	18:31	11	08:15 (2)	16:28	16:00
13	05:06	05:43 (7)	05:54	06:22 (9)	06:47	07:14 (3)	07:39	07:14 (3)	07:39	08:06 (2)	07:37	08:23	
	21:40	06:00 (7)	20:51	23	06:45 (8)	19:41	19	07:33 (3)	18:29	7	08:13 (2)	16:27	16:00
14	05:07	05:43 (7)	05:55	06:24 (9)	06:48	07:15 (3)	07:41	07:15 (3)	07:41	08:08 (2)	07:39	08:24	
	21:39	06:00 (7)	20:49	20	06:44 (8)	19:38	17	07:32 (3)	18:27	1	08:09 (2)	16:25	16:00
15	05:09	05:43 (7)	05:57	06:25 (9)	06:50	07:16 (3)	07:43	07:16 (3)	07:43	07:41	08:25		
	21:38	06:00 (7)	20:47	16	06:41 (8)	19:36	14	07:30 (3)	18:24		16:24	16:00	
16	05:10	05:43 (7)	05:59	06:34 (8)	06:52	07:18 (3)	07:45	07:18 (3)	07:45	07:43	08:26		
	21:37	05:59 (7)	20:45	3	06:37 (8)	19:33	11	07:29 (3)	18:22		16:22	16:00	
17	05:11	05:45 (7)	06:00		06:54	07:20 (3)	07:46	07:20 (3)	07:46		07:44	08:27	
	21:36	06:00 (7)	20:43		19:31	7	07:27 (3)	18:20			16:21	16:01	
18	05:13	05:45 (7)	06:02		06:55	07:53 (1)	07:48	07:53 (1)	07:48		07:46	08:28	
	21:35	05:59 (7)	20:41		19:29	4	07:57 (1)	18:18			16:19	16:01	
19	05:14	05:46 (7)	06:04		06:57	07:49 (1)	07:50	07:49 (1)	07:50		07:48	08:28	
	21:34	05:59 (7)	20:39		19:26	12	08:01 (1)	18:15			16:18	16:01	
20	05:15	05:46 (7)	06:05		06:59	07:47 (1)	07:52	07:47 (1)	07:52		07:50	08:29	
	21:32	05:57 (7)	20:37		19:24	16	08:03 (1)	18:13			16:17	16:01	
21	05:17	05:48 (7)	06:07		07:00	07:45 (1)	07:54	07:45 (1)	07:54		07:51	08:30	
	21:31	05:57 (7)	20:34		19:21	18	08:03 (1)	18:11			16:15	16:02	
22	05:18	05:50 (7)	06:09		07:02	07:44 (1)	07:56	07:44 (1)	07:56		07:53	08:30	
	21:30	05:55 (7)	20:32		19:19	20	08:04 (1)	18:09			16:14	16:02	
23	05:20		06:11		07:04	07:43 (1)	07:58	07:43 (1)	07:58		07:55	08:31	
	21:28		20:30		19:16	22	08:05 (1)	18:07			16:13	16:03	
24	05:21		06:12		07:06	07:42 (1)	07:59	07:42 (1)	07:59		07:57	08:31	
	21:27		20:28		19:14	23	08:05 (1)	18:05			16:12	16:03	
25	05:23		06:14		07:07	07:41 (1)	07:01	07:41 (1)	07:01		07:58	08:32	
	21:26		20:25		19:12	23	08:04 (1)	17:02			16:11	16:04	
26	05:24		06:16		07:23 (4)	07:09	07:41 (1)	07:03			08:00	08:32	
	21:24		20:23	2	07:25 (4)	19:09	23	08:04 (1)	17:00		16:10	16:05	
27	05:26		06:18		07:18 (4)	07:11	07:41 (1)	07:05			08:02	08:32	
	21:22		20:21	12	07:30 (4)	19:07	22	08:03 (1)	16:58		16:09	16:05	
28	05:27		06:19		07:15 (4)	07:13	07:41 (1)	07:07			08:03	08:32	
	21:21		20:19	16	07:31 (4)	19:04	21	08:02 (1)	16:56		16:08	16:06	
29	05:29	06:33 (8)	06:21		07:14 (4)	07:14	07:42 (1)	07:09			08:05	08:32	
	21:19	9	06:42 (8)	20:16	19	07:33 (4)	19:02	19	08:01 (1)	16:54	16:07	16:07	
30	05:30	06:31 (8)	06:23		07:13 (4)	07:16	07:43 (1)	07:11			08:06	08:32	
	21:18	13	06:44 (8)	20:14	21	07:34 (4)	19:00	17	08:00 (1)	16:52	16:06	16:08	
31	05:32	06:30 (8)	06:24		07:11 (4)			07:13			08:32		
	21:16	15	06:45 (8)	20:12	23	07:34 (4)		16:50			16:09	16:09	
Sonnenscheinstunden	509		458		382		330		262		237		
astr.max.mögl.Beschattung	413		457		591		188						
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29						
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96						
Reduktion Windrichtung	0.72		0.72		0.70		0.66						
Gesamte Reduktion	0.26		0.29		0.23		0.18						
Met.wahrsch.Beschattung	108		134		138		34						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DH - IO112

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
302	339	467	706	786	617	554	815	1,348	1,328	721	398	8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni						
1	08:32	08:03	07:08	07:32 (2)	06:54	07:20 (4)	05:46	06:15 (9)	04:59	05:35 (6)		
	16:10	17:00	17:55	13 07:45 (2)	19:51	23 07:43 (3)	20:45	27 06:42 (8)	21:34	19 05:54 (7)		
2	08:32	08:02	07:05	07:29 (2)	06:52	07:19 (4)	05:44	06:14 (9)	04:58	05:35 (6)		
	16:12	17:02	17:57	16 07:45 (2)	19:53	23 07:42 (3)	20:47	28 06:42 (8)	21:35	20 05:55 (7)		
3	08:32	08:00	07:03	07:27 (2)	06:49	07:18 (4)	05:42	06:14 (9)	04:57	05:34 (6)		
	16:13	17:04	17:58	19 07:46 (2)	19:55	24 07:42 (4)	20:49	28 06:42 (8)	21:36	21 05:55 (7)		
4	08:32	07:58	07:01	07:27 (2)	06:47	07:17 (4)	05:41	06:14 (9)	04:56	05:34 (6)		
	16:14	17:06	18:00	19 07:46 (2)	19:57	24 07:41 (4)	20:50	28 06:42 (8)	21:37	20 05:54 (7)		
5	08:32	07:57	06:58	07:27 (2)	06:45	07:16 (4)	05:39	06:14 (9)	04:55	05:34 (6)		
	16:15	17:08	18:02	18 07:45 (2)	19:59	26 07:42 (4)	20:52	28 06:42 (8)	21:38	21 05:55 (7)		
6	08:31	07:55	06:56	07:27 (2)	06:42	07:15 (4)	05:37	06:14 (9)	04:55	05:33 (6)		
	16:16	17:10	18:04	18 07:45 (2)	20:00	26 07:41 (4)	20:54	27 06:41 (8)	21:39	22 05:55 (7)		
7	08:31	07:53	06:54	07:28 (2)	06:40	07:15 (4)	05:35	06:15 (9)	04:54	05:34 (6)		
	16:18	17:12	18:06	16 07:44 (2)	20:02	26 07:41 (4)	20:56	26 06:41 (8)	21:40	21 05:55 (7)		
8	08:30	07:51	06:51	07:28 (2)	06:37	07:15 (4)	05:33	06:16 (9)	04:53	05:33 (6)		
	16:19	17:14	18:08	15 07:43 (2)	20:04	26 07:41 (4)	20:57	25 06:41 (8)	21:41	22 05:55 (7)		
9	08:30	07:49	06:49	07:30 (2)	06:35	07:16 (4)	05:31	06:16 (9)	04:53	05:33 (6)		
	16:20	17:16	18:10	11 07:41 (2)	20:06	25 07:41 (4)	20:59	24 06:40 (8)	21:42	22 05:55 (7)		
10	08:29	07:48	06:47	07:11 (1)	06:33	07:15 (4)	05:29	06:19 (9)	04:52	05:33 (6)		
	16:22	17:18	18:11	13 07:37 (2)	20:08	24 07:39 (4)	21:01	20 06:39 (8)	21:43	22 05:55 (7)		
11	08:29	07:46	06:44	07:08 (1)	06:30	07:16 (4)	05:27	06:23 (8)	04:52	05:33 (6)		
	16:23	17:20	18:13	15 07:23 (1)	20:09	22 07:38 (4)	21:03	15 06:38 (8)	21:44	22 05:55 (7)		
12	08:28	07:44	06:42	07:07 (1)	06:28	07:17 (4)	05:26	06:23 (8)	04:52	05:33 (6)		
	16:25	17:22	18:15	18 07:25 (1)	20:11	20 07:37 (4)	21:04	13 06:36 (8)	21:44	22 05:55 (7)		
13	08:27	07:42	06:40	07:05 (1)	06:26	07:17 (4)	05:24	06:26 (8)	04:51	05:34 (6)		
	16:26	17:24	18:17	20 07:25 (1)	20:13	18 07:35 (4)	21:06	9 06:35 (8)	21:45	21 05:55 (6)		
14	08:26	07:40	06:37	07:04 (1)	06:24	07:19 (4)	05:22		04:51	05:33 (6)		
	16:28	17:26	18:19	22 07:26 (1)	20:15	14 07:33 (4)	21:08		21:46	22 05:55 (6)		
15	08:25	07:38	06:35	07:03 (1)	06:21	07:23 (4)	05:21		04:51	05:33 (6)		
	16:30	17:28	18:21	22 07:25 (1)	20:17	6 07:29 (4)	21:09		21:46	22 05:55 (6)		
16	08:24	07:36	06:32	07:03 (1)	06:19		05:19		04:51	05:33 (6)		
	16:31	17:30	18:23	23 07:26 (1)	20:18		21:11		21:47	22 05:55 (6)		
17	08:23	07:34	06:30	07:02 (1)	06:17		05:17		04:50	05:34 (6)		
	16:33	17:32	18:24	23 07:25 (1)	20:20		21:12		21:47	22 05:56 (6)		
18	08:22	07:32	06:28	07:02 (1)	06:14		05:16		04:50	05:34 (6)		
	16:35	17:34	18:26	23 07:25 (1)	20:22		21:14		21:48	22 05:56 (6)		
19	08:21	07:29	06:25	07:03 (1)	06:12		05:14		04:50	05:34 (6)		
	16:36	17:35	18:28	21 07:24 (1)	20:24		21:16		21:48	22 05:56 (6)		
20	08:20	07:27	06:23	07:03 (1)	06:10		05:13		04:51	05:35 (6)		
	16:38	17:37	18:30	20 07:23 (1)	20:26		21:17	2 05:43 (7)	21:48	22 05:56 (6)		
21	08:19	07:25	06:20	07:04 (1)	06:08		05:12		04:51	05:35 (6)		
	16:40	17:39	18:32	07:22 (1)	20:27		21:19	8 05:49 (7)	21:49	22 05:57 (6)		
22	08:18	07:23	06:18	07:04 (1)	06:06		05:10		04:51	05:35 (6)		
	16:42	17:41	18:33	15 07:19 (1)	20:29		21:20	11 05:49 (7)	21:49	22 05:57 (6)		
23	08:17	07:21	06:16	07:07 (1)	06:03		05:09		04:51	05:35 (6)		
	16:43	17:43	18:35	10 07:17 (1)	20:31		21:22	13 05:51 (7)	21:49	22 05:57 (6)		
24	08:15	07:19	06:13	06:36 (3)	06:01		05:07		04:51	05:36 (6)		
	16:45	17:45	18:37	1 06:37 (3)	20:33		21:23	14 05:51 (7)	21:49	22 05:58 (6)		
25	08:14	07:16	06:11	06:34 (3)	05:59		05:06		04:52	05:36 (6)		
	16:47	17:47	18:39	8 06:42 (3)	20:35		21:24	15 05:52 (7)	21:49	22 05:58 (6)		
26	08:13	07:14	06:08	06:32 (3)	05:57		05:05		04:52	05:35 (6)		
	16:49	17:49	18:41	12 06:44 (3)	20:36	9 06:36 (8)	21:26	16 05:53 (7)	21:49	22 05:57 (6)		
27	08:11	07:12	06:06	06:29 (3)	05:55		05:04		04:53	05:36 (6)		
	16:51	17:51	6 07:42 (2)	18:42	15 06:44 (3)	20:38	19 06:38 (8)	21:27	17 05:53 (7)	21:49	22 05:58 (6)	
28	08:10	07:10	06:04	06:27 (3)	05:53		05:03		04:53	05:36 (6)		
	16:53	17:53	10 07:44 (2)	18:44	18 06:45 (3)	20:40	23 06:40 (8)	21:29	18 05:54 (7)	21:49	22 05:58 (6)	
29	08:08		07:01	07:25 (3)	05:51		05:02		04:54	05:37 (6)		
	16:55		19:46	19 07:44 (3)	20:42	24 06:41 (8)	21:30	18 05:54 (7)	21:49	22 05:59 (7)		
30	08:07		06:59	07:25 (3)	05:49		05:00		04:54	05:36 (6)		
	16:57		19:48	19 07:44 (3)	20:43	26 06:42 (8)	21:31	18 05:54 (7)	21:48	22 05:58 (6)		
31	08:05		06:56	07:23 (4)			04:59		04:51	05:36 (6)		
	16:58		19:50	21 07:44 (3)			21:32	18 05:54 (7)				
Sonnenscheinstunden	253	275	367	419	428	491	466	506	649			
astr. max.mögl. Beschattung		16	521	428	466	506	649					
Red. Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.43	0.39					
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96	0.96					
Reduktion Windrichtung		0.65	0.68	0.72	0.72	0.72	0.72					
Gesamte Reduktion		0.15	0.18	0.26	0.30	0.30	0.27					
Met. wahrsch. Beschattung		2	94	109	139	173						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattenende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DH - IO112

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:37 (6)	05:34	06:33 (8)	06:26	07:15 (4)	07:18	07:45 (1)	07:14	08:08			
	21:48	05:59 (7)	21:14	06:47 (8)	20:09	22	07:37 (4)	18:57	19	08:04 (1)	16:48	16:05	
2	04:56	05:38 (6)	05:35	06:30 (9)	06:28	07:14 (4)	07:20	07:47 (1)	07:16	08:09			
	21:48	06:00 (7)	21:12	06:49 (8)	20:07	24	07:38 (4)	18:55	15	08:02 (1)	16:46	16:05	
3	04:56	05:38 (6)	05:37	06:27 (9)	06:30	07:13 (4)	07:21	07:47 (1)	07:18	08:11			
	21:47	06:00 (7)	21:11	22	06:49 (8)	20:05	25	07:38 (4)	18:52	12	07:59 (1)	16:44	16:04
4	04:57	05:38 (6)	05:38	06:26 (9)	06:31	07:12 (4)	07:23	07:52 (1)	07:20	08:12			
	21:47	06:00 (7)	21:09	24	06:50 (8)	20:02	26	07:38 (4)	18:50	12	08:17 (2)	16:42	16:03
5	04:58	05:39 (6)	05:40	06:26 (9)	06:33	07:12 (4)	07:25	08:06 (2)	07:22	08:14			
	21:46	06:01 (7)	21:07	25	06:51 (8)	20:00	26	07:38 (4)	18:48	13	08:19 (2)	16:41	16:03
6	04:59	05:39 (6)	05:42	06:24 (9)	06:35	07:11 (4)	07:27	08:04 (2)	07:24	08:15			
	21:46	06:01 (7)	21:05	27	06:51 (8)	19:58	26	07:37 (4)	18:45	16	08:20 (2)	16:39	16:02
7	05:00	05:40 (6)	05:43	06:24 (9)	06:36	07:12 (4)	07:28	08:03 (2)	07:26	08:16			
	21:45	06:01 (7)	21:03	28	06:52 (8)	19:55	25	07:37 (4)	18:43	18	08:21 (2)	16:37	16:02
8	05:01	05:41 (6)	05:45	06:23 (9)	06:38	07:12 (4)	07:30	08:02 (2)	07:28	08:18			
	21:45	06:02 (7)	21:01	28	06:51 (8)	19:53	25	07:37 (4)	18:41	18	08:20 (2)	16:35	16:01
9	05:02	05:41 (6)	05:47	06:23 (9)	06:40	07:11 (4)	07:32	08:02 (2)	07:30	08:19			
	21:44	06:02 (7)	20:59	28	06:51 (8)	19:50	24	07:35 (3)	18:38	18	08:20 (2)	16:33	16:01
10	05:03	05:42 (6)	05:48	06:23 (9)	06:42	07:12 (4)	07:34	08:01 (2)	07:31	08:20			
	21:43	06:02 (7)	20:57	28	06:51 (8)	19:48	24	07:36 (3)	18:36	19	08:20 (2)	16:32	16:01
11	05:04	05:43 (6)	05:50	06:23 (9)	06:43	07:13 (4)	07:36	08:02 (2)	07:33	08:21			
	21:42	06:02 (7)	20:55	28	06:51 (8)	19:46	23	07:36 (3)	18:34	18	08:20 (2)	16:30	16:01
12	05:05	05:44 (6)	05:52	06:24 (9)	06:45	07:14 (4)	07:37	08:04 (2)	07:35	08:22			
	21:41	06:03 (7)	20:53	27	06:51 (8)	19:43	22	07:36 (3)	18:31	15	08:19 (2)	16:28	16:00
13	05:06	05:44 (7)	05:54	06:23 (9)	06:47	07:16 (3)	07:39	08:06 (2)	07:37	08:23			
	21:40	06:02 (7)	20:51	26	06:49 (8)	19:41	20	07:36 (3)	18:29	12	08:18 (2)	16:27	16:00
14	05:07	05:45 (7)	05:55	06:24 (9)	06:48	07:16 (3)	07:41	08:08 (2)	07:39	08:24			
	21:39	06:02 (7)	20:49	25	06:49 (8)	19:38	19	07:35 (3)	18:27	9	08:17 (2)	16:25	16:00
15	05:09	05:45 (7)	05:57	06:25 (9)	06:50	07:16 (3)	07:43	08:10 (2)	07:41	08:25			
	21:38	06:02 (7)	20:47	22	06:47 (8)	19:36	18	07:34 (3)	18:24	4	08:14 (2)	16:24	16:00
16	05:10	05:45 (7)	05:59	06:27 (9)	06:52	07:18 (3)	07:45	08:14 (2)	07:43	08:26			
	21:37	06:02 (7)	20:45	18	06:45 (8)	19:33	15	07:33 (3)	18:22	16	16:22	16:00	
17	05:11	05:46 (7)	06:00	06:35 (8)	06:54	07:20 (3)	07:46	07:44	08:27				
	21:36	06:03 (7)	20:43	8	06:43 (8)	19:31	12	07:32 (3)	18:20	16	16:21	16:01	
18	05:13	05:46 (7)	06:02		06:55	07:21 (3)	07:48	07:46	08:28				
	21:35	06:02 (7)	20:41		19:29	9	07:30 (3)	18:18	16	16:19	16:01		
19	05:14	05:47 (7)	06:04		06:57	07:23 (3)	07:50	07:48	08:28				
	21:34	06:01 (7)	20:39		19:26	3	07:26 (3)	18:15	16	16:18	16:01		
20	05:15	05:47 (7)	06:05		06:59	07:54 (1)	07:52	07:50	08:29				
	21:32	06:01 (7)	20:37		19:24	9	08:03 (1)	18:13	16	16:17	16:01		
21	05:17	05:49 (7)	06:07		07:00	07:50 (1)	07:54	07:51	08:30				
	21:31	06:00 (7)	20:34		19:21	15	08:05 (1)	18:11	16	16:15	16:02		
22	05:18	05:49 (7)	06:09		07:02	07:49 (1)	07:56	07:53	08:30				
	21:30	05:59 (7)	20:32		19:19	17	08:06 (1)	18:09	16	16:14	16:02		
23	05:20	05:51 (7)	06:11		07:04	07:48 (1)	07:58	07:55	08:31				
	21:28	6	05:57 (7)	20:30	19:16	19	08:07 (1)	18:07	16	16:13	16:03		
24	05:21		06:12		07:06	07:47 (1)	07:59	07:57	08:31				
	21:27		20:28		19:14	21	08:08 (1)	18:05	16	16:12	16:03		
25	05:23		06:14		07:07	07:45 (1)	07:01	07:58	08:32				
	21:26		20:25		19:12	22	08:07 (1)	17:02	16	16:11	16:04		
26	05:24		06:16		07:09	07:45 (1)	07:03	08:00	08:32				
	21:24		20:23		19:09	22	08:07 (1)	17:00	16	16:10	16:05		
27	05:26		06:18		07:11	07:45 (1)	07:05	08:02	08:32				
	21:22		20:21		19:07	22	08:07 (1)	16:58	16	16:09	16:05		
28	05:27		06:19		07:23 (4)	07:13	07:44 (1)	07:07	08:03	08:32			
	21:21		20:19	8	07:31 (4)	19:04	22	08:06 (1)	16:56	16	16:08	16:06	
29	05:29		06:21		07:20 (4)	07:14	07:44 (1)	07:09	08:05	08:32			
	21:19		20:16	14	07:34 (4)	19:02	22	08:06 (1)	16:54	16	16:07	16:07	
30	05:30		06:23		07:18 (4)	07:16	07:44 (1)	07:11	08:06	08:32			
	21:18	6	06:43 (8)	20:14	18	07:36 (4)	19:00	21	08:05 (1)	16:52	16	16:08	
31	05:32		06:35 (8)	06:24	07:16 (4)			07:13	08:33				
	21:16	11	06:46 (8)	20:12	20	07:36 (4)		16:50	16:09				
	Sonnenscheinstunden	509	458		382		330		262		237		
	astr.max.mögl.Beschattung	427		457		600		218					
	Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29					
	Reduktion Betriebsdauer	0.96		0.96		0.96		0.96					
	Reduktion Windrichtung	0.72		0.72		0.70		0.66					
	Gesamte Reduktion	0.26		0.29		0.23		0.18					
	Met.wahrsch.Beschattung	112		134		140		40					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DI - IO113

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	07:26 (4)	05:46	06:23 (9)	04:59	05:40 (6)	
	16:10	17:00	17:55	19:51	26 07:52 (4)	20:45	29 06:52 (8)	21:34	23 06:03 (6)	
2	08:32	08:02	07:05	06:52	07:26 (4)	05:44	06:23 (9)	04:58	05:41 (6)	
	16:12	17:02	17:57	19:53	26 07:52 (4)	20:47	28 06:51 (8)	21:35	23 06:04 (6)	
3	08:32	08:00	07:03	06:49	07:26 (4)	05:42	06:24 (9)	04:57	05:41 (6)	
	16:13	17:04	17:58	19:55	26 07:52 (4)	20:49	26 06:50 (8)	21:36	23 06:04 (6)	
4	08:32	07:58	07:01	06:47	07:26 (4)	05:41	06:25 (9)	04:56	05:41 (6)	
	16:14	17:06	18:00	19:57	24 07:50 (4)	20:50	24 06:49 (8)	21:37	23 06:04 (6)	
5	08:32	07:57	06:58	06:45	07:26 (4)	05:39	06:26 (9)	04:55	05:41 (6)	
	16:15	17:08	18:02	19:59	24 07:50 (4)	20:52	21 06:47 (8)	21:38	24 06:05 (6)	
6	08:31	07:55	06:56	07:21 (1)	06:42	07:26 (4)	05:37	06:35 (8)	04:55	05:41 (6)
	16:16	17:10	18:04	6 07:27 (1)	20:00	22 07:48 (4)	20:54	10 06:45 (8)	21:39	24 06:05 (6)
7	08:31	07:53	06:54	07:18 (1)	06:40	07:27 (4)	05:35	06:39 (8)	04:54	05:42 (6)
	16:18	17:12	18:06	13 07:31 (1)	20:02	20 07:47 (4)	20:56	3 06:42 (8)	21:40	23 06:05 (6)
8	08:30	07:51	06:51	07:15 (1)	06:37	07:28 (4)	05:33		04:53	05:41 (6)
	16:19	17:14	18:08	17 07:32 (1)	20:04	18 07:46 (4)	20:57		21:41	24 06:05 (6)
9	08:30	07:49	06:49	07:14 (1)	06:35	07:30 (4)	05:31		04:53	05:42 (6)
	16:20	17:16	18:10	19 07:33 (1)	20:06	13 07:43 (4)	20:59		21:42	24 06:06 (6)
10	08:29	07:48	06:47	07:12 (1)	06:33	07:33 (4)	05:29		04:52	05:41 (6)
	16:22	17:18	18:11	21 07:33 (1)	20:08	6 07:39 (4)	21:01		21:43	24 06:05 (6)
11	08:29	07:46	06:44	07:12 (1)	06:30		05:27		04:52	05:42 (6)
	16:23	17:20	18:13	22 07:34 (1)	20:09		21:03		21:44	24 06:06 (6)
12	08:28	07:44	06:42	07:12 (1)	06:28		05:26		04:52	05:43 (6)
	16:25	17:22	18:15	22 07:34 (1)	20:11		21:04		21:44	23 06:06 (6)
13	08:27	07:42	06:40	07:11 (1)	06:26		05:24		04:51	05:43 (6)
	16:26	17:24	18:17	22 07:33 (1)	20:13		21:06		21:45	24 06:07 (6)
14	08:26	07:40	06:37	07:11 (1)	06:24		05:22		04:51	05:42 (6)
	16:28	17:26	18:19	22 07:33 (1)	20:15		21:08		21:46	24 06:06 (6)
15	08:25	07:38	06:35	07:11 (1)	06:21		05:21	05:49 (7)	04:51	05:43 (6)
	16:30	17:28	18:21	21 07:32 (1)	20:17		21:09	7 05:56 (7)	21:46	23 06:06 (6)
16	08:24	07:36	06:32	07:11 (1)	06:19		05:19	05:46 (7)	04:51	05:43 (6)
	16:31	17:30	18:23	20 07:31 (1)	20:18		21:11	11 05:57 (7)	21:47	23 06:06 (6)
17	08:23	07:34	06:30	07:12 (1)	06:17		05:17	05:46 (7)	04:50	05:43 (6)
	16:33	17:32	18:24	18 07:30 (1)	20:20		21:12	12 05:58 (7)	21:47	24 06:07 (6)
18	08:22	07:32	06:28	07:13 (1)	06:14		05:16	05:45 (7)	04:50	05:44 (6)
	16:35	17:34	18:26	15 07:28 (1)	20:22		21:14	15 06:00 (7)	21:48	23 06:07 (6)
19	08:21	07:29	06:25	07:15 (1)	06:12		05:14	05:44 (7)	04:50	05:44 (6)
	16:36	17:35	18:28	11 07:26 (1)	20:24		21:16	16 06:00 (7)	21:48	23 06:07 (6)
20	08:20	07:27	06:23	06:10		06:41 (8)	05:13	05:44 (7)	04:51	05:45 (6)
	16:38	17:37	18:30	20:26	4 06:45 (8)	21:17	17 06:01 (7)	21:48	23 06:08 (6)	
21	08:19	07:25	06:20	06:44 (3)	06:08	06:37 (8)	05:12	05:44 (7)	04:51	05:45 (6)
	16:40	17:39	18:32	4 06:48 (3)	20:27	12 06:49 (8)	21:19	06:01 (7)	21:49	23 06:08 (6)
22	08:18	07:23	06:18	06:41 (3)	06:06	06:32 (9)	05:10	05:43 (7)	04:51	05:45 (6)
	16:42	17:41	18:33	9 06:50 (3)	20:29	17 06:50 (8)	21:20	18 06:01 (7)	21:49	23 06:08 (6)
23	08:17	07:21	06:16	06:39 (3)	06:03	06:28 (9)	05:09	05:43 (7)	04:51	05:45 (6)
	16:43	17:43	18:35	12 06:51 (3)	20:31	23 06:51 (8)	21:22	18 06:01 (7)	21:49	23 06:08 (6)
24	08:15	07:19	06:13	06:36 (3)	06:01	06:26 (9)	05:07	05:43 (6)	04:51	05:46 (6)
	16:45	17:45	18:37	15 06:51 (3)	20:33	26 06:52 (8)	21:23	18 06:01 (7)	21:49	23 06:09 (6)
25	08:14	07:16	06:11	06:34 (3)	05:59	06:25 (9)	05:06	05:43 (6)	04:52	05:45 (6)
	16:47	17:47	18:39	18 06:52 (3)	20:35	28 06:53 (8)	21:24	19 06:02 (7)	21:49	24 06:09 (6)
26	08:13	07:14	06:08	06:34 (3)	05:57	06:23 (9)	05:05	05:42 (6)	04:52	05:45 (6)
	16:49	17:49	18:41	18 06:52 (3)	20:36	29 06:52 (8)	21:26	20 06:02 (7)	21:49	23 06:08 (6)
27	08:11	07:12	06:06	06:32 (4)	05:55	06:22 (9)	05:04	05:42 (6)	04:53	05:46 (6)
	16:40	17:39	18:42	20 06:52 (3)	20:38	30 06:52 (8)	21:27	20 06:02 (6)	21:49	23 06:09 (6)
28	08:10	07:10	06:04	06:30 (4)	05:53	06:22 (9)	05:03	05:41 (6)	04:53	05:46 (6)
	16:53	17:53	18:44	21 06:51 (3)	20:40	30 06:52 (8)	21:29	21 06:02 (6)	21:49	23 06:09 (6)
29	08:08		07:01	07:28 (4)	05:51	06:23 (9)	05:02	05:41 (6)	04:54	05:46 (6)
	16:55		19:46	23 07:51 (4)	20:42	30 06:53 (8)	21:30	22 06:03 (6)	21:49	24 06:10 (6)
30	08:07		06:59	07:28 (4)	05:49	06:23 (9)	05:00	05:41 (6)	04:54	05:46 (6)
	16:57		19:48	24 07:52 (4)	20:43	29 06:52 (8)	21:31	22 06:03 (6)	21:48	23 06:09 (6)
31	08:05		06:56	07:27 (4)			04:59	05:41 (6)		
	16:58		19:50	25 07:52 (4)			21:32	22 06:03 (6)		
Sonnenscheinstunden	253	275	367	419	463	491	506	701		
astr.max.mögl.Beschattung			438	463	436			0.39		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43			0.96		
Reduktion Betriebsdauer			0.69	0.95	0.96			0.73		
Gesamte Reduktion			0.18	0.26	0.30			0.27		
Met.wahrsch.Beschattung			80	118	130			188		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DI - IO113

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:46 (6)	05:34		06:26		07:18		07:51 (1)	07:14	08:08		
	21:48	06:10 (6)	21:14		20:09		18:57	22	08:13 (1)	16:48	16:05		
2	04:56	05:47 (6)	05:35		06:28		07:20		07:51 (1)	07:16	08:09		
	21:48	06:10 (6)	21:12		20:07	6	07:38 (4)	18:55	22	08:13 (1)	16:46	16:05	
3	04:56	05:47 (6)	05:37		06:30		07:21		07:50 (1)	07:18	08:11		
	21:47	06:11 (6)	21:11		20:05	12	07:40 (4)	18:52	21	08:11 (1)	16:44	16:04	
4	04:57	05:47 (6)	05:38		06:31		07:23		07:51 (1)	07:20	08:12		
	21:47	06:10 (6)	21:09		20:02	17	07:43 (4)	18:50	19	08:10 (1)	16:42	16:03	
5	04:58	05:47 (6)	05:40		06:33		07:25		07:51 (1)	07:22	08:14		
	21:46	06:11 (6)	21:07		20:00	20	07:44 (4)	18:48	18	08:09 (1)	16:41	16:03	
6	04:59	05:47 (6)	05:42		06:35		07:27		07:53 (1)	07:24	08:15		
	21:46	06:11 (6)	21:05	7	06:53 (8)	19:58	22	07:44 (4)	18:45	15	08:08 (1)	16:39	16:02
7	05:00	05:48 (6)	05:43		06:39 (9)	06:36		07:21 (4)	07:28		07:55 (1)	07:26	08:16
	21:45	06:11 (6)	21:03	15	06:56 (8)	19:55	24	07:45 (4)	18:43	10	08:05 (1)	16:37	16:02
8	05:01	05:48 (6)	05:45		06:35 (9)	06:38		07:21 (4)	07:30			07:28	08:18
	21:45	06:12 (6)	21:01	22	06:57 (8)	19:53	24	07:45 (4)	18:41			16:35	16:01
9	05:02	05:48 (6)	05:47		06:34 (9)	06:40		07:20 (4)	07:32			07:30	08:19
	21:44	06:12 (6)	20:59	25	06:59 (8)	19:50	25	07:45 (4)	18:38			16:33	16:01
10	05:03	05:48 (6)	05:48		06:32 (9)	06:42		07:19 (4)	07:34			07:31	08:20
	21:43	06:12 (6)	20:57	27	06:59 (8)	19:48	26	07:45 (4)	18:36			16:32	16:01
11	05:04	05:49 (6)	05:50		06:32 (9)	06:43		07:19 (4)	07:36			07:33	08:21
	21:42	06:12 (6)	20:55	28	07:00 (8)	19:46	26	07:45 (4)	18:34			16:30	16:01
12	05:05	05:49 (6)	05:52		06:31 (9)	06:45		07:19 (4)	07:37			07:35	08:22
	21:41	06:12 (6)	20:53	29	07:00 (8)	19:43	25	07:44 (4)	18:31			16:28	16:00
13	05:06	05:49 (6)	05:54		06:30 (9)	06:47		07:19 (4)	07:39			07:37	08:23
	21:40	06:11 (6)	20:51	30	07:00 (8)	19:41	24	07:43 (4)	18:29			16:27	16:00
14	05:07	05:50 (6)	05:55		06:30 (9)	06:48		07:20 (4)	07:41			07:39	08:24
	21:39	06:11 (6)	20:49	30	07:00 (8)	19:38	22	07:42 (4)	18:27			16:25	16:00
15	05:09	05:50 (6)	05:57		06:30 (9)	06:50		07:19 (4)	07:43			07:41	08:25
	21:38	06:11 (6)	20:47	30	07:00 (8)	19:36	22	07:41 (3)	18:24			16:24	16:00
16	05:10	05:50 (6)	05:59		06:30 (9)	06:52		07:21 (4)	07:45			07:43	08:26
	21:37	06:10 (6)	20:45	30	07:00 (8)	19:33	20	07:41 (3)	18:22			16:22	16:00
17	05:11	05:52 (6)	06:00		06:31 (9)	06:54		07:22 (3)	07:46			07:44	08:27
	21:36	06:11 (6)	20:43	29	07:00 (8)	19:31	19	07:41 (3)	18:20			16:21	16:01
18	05:13	05:52 (6)	06:02		06:31 (9)	06:55		07:21 (3)	07:48			07:46	08:28
	21:35	06:11 (7)	20:41	27	06:58 (8)	19:29	19	07:40 (3)	18:18			16:19	16:01
19	05:14	05:52 (6)	06:04		06:32 (9)	06:57		07:23 (3)	07:50			07:48	08:28
	21:34	06:11 (7)	20:39	26	06:58 (8)	19:26	16	07:39 (3)	18:15			16:18	16:01
20	05:15	05:53 (6)	06:05		06:33 (9)	06:59		07:25 (3)	07:52			07:50	08:29
	21:32	06:11 (7)	20:37	23	06:56 (8)	19:24	13	07:38 (3)	18:13			16:17	16:01
21	05:17	05:54 (7)	06:07		06:40 (8)	07:00		07:26 (3)	07:54			07:51	08:30
	21:31	06:11 (7)	20:34	15	06:55 (8)	19:21	10	07:36 (3)	18:11			16:15	16:02
22	05:18	05:53 (7)	06:09		06:42 (8)	07:02		07:28 (3)	07:56			07:53	08:30
	21:30	06:11 (7)	20:32	11	06:53 (8)	19:19	5	07:33 (3)	18:09			16:14	16:02
23	05:20	05:53 (7)	06:11			07:04			07:58			07:55	08:31
	21:28	06:10 (7)	20:30			19:16			18:07			16:13	16:03
24	05:21	05:55 (7)	06:12			07:06		08:00 (1)	07:59			07:57	08:31
	21:27	06:11 (7)	20:28			19:14	9	08:09 (1)	18:05			16:12	16:03
25	05:23	05:55 (7)	06:14			07:07		07:56 (1)	07:01			07:58	08:32
	21:26	06:10 (7)	20:25			19:12	14	08:10 (1)	17:02			16:11	16:04
26	05:24	05:56 (7)	06:16			07:09		07:55 (1)	07:03			08:00	08:32
	21:24	06:10 (7)	20:23			19:09	17	08:12 (1)	17:00			16:10	16:05
27	05:26	05:57 (7)	06:18			07:11		07:54 (1)	07:05			08:02	08:32
	21:22	06:08 (7)	20:21			19:07	19	08:13 (1)	16:58			16:09	16:05
28	05:27	05:58 (7)	06:19			07:13		07:52 (1)	07:07			08:03	08:32
	21:21	06:08 (7)	20:19			19:04	21	08:13 (1)	16:56			16:08	16:06
29	05:29	06:01 (7)	06:21			07:14		07:51 (1)	07:09			08:05	08:32
	21:19	06:05 (7)	20:16			19:02	22	08:13 (1)	16:54			16:07	16:07
30	05:30		06:23			07:16		07:51 (1)	07:11			08:06	08:32
	21:18		20:14			19:00	22	08:13 (1)	16:52			16:06	16:08
31	05:32		06:24						07:13				08:33
	21:16		20:12						16:50				16:09
Sonnenscheinstunden	509		458			382			330			262	237
astr.max.mögl.Beschattung	564		404			521			127				
Red.Sonnenscheinwahrsch.	0.38		0.42			0.35			0.29				
Reduktion Betriebsdauer	0.96		0.96			0.96			0.96				
Reduktion Windrichtung	0.73		0.72			0.70			0.67				
Gesamte Reduktion	0.26		0.29			0.23			0.19				
Met.wahrsch.Beschattung	148		118			121			24				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DJ - IO114

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni						
1	08:32	08:03	07:08	07:36 (2)	06:54	07:27 (4)	05:46	06:22 (9)	04:59		05:39 (6)	
	16:10	17:00	17:55	19 07:55 (2)	19:51	27 07:54 (4)	20:45	30 06:52 (8)	21:34	22 06:01 (6)		
2	08:32	08:02	07:05	07:36 (2)	06:52	07:27 (4)	05:44	06:22 (9)	04:58		05:40 (6)	
	16:12	17:02	17:57	18 07:54 (2)	19:53	27 07:54 (4)	20:47	30 06:52 (8)	21:35	22 06:02 (6)		
3	08:32	08:00	07:03	07:36 (2)	06:49	07:28 (4)	05:42	06:23 (9)	04:57		05:39 (6)	
	16:13	17:04	17:58	17 07:53 (2)	19:55	26 07:54 (4)	20:49	28 06:51 (8)	21:36	23 06:02 (6)		
4	08:32	07:58	07:01	07:37 (2)	06:47	07:27 (4)	05:41	06:23 (9)	04:56		05:39 (6)	
	16:14	17:06	18:00	16 07:53 (2)	19:57	25 07:52 (4)	20:50	27 06:50 (8)	21:37	23 06:02 (6)		
5	08:32	07:57	06:58	07:23 (1)	06:45	07:28 (4)	05:39	06:24 (9)	04:55		05:39 (6)	
	16:15	17:08	18:02	19 07:50 (2)	19:59	24 07:52 (4)	20:52	25 06:49 (8)	21:38	24 06:03 (6)		
6	08:31	07:55	06:56	07:20 (1)	06:42	07:27 (4)	05:37	06:25 (9)	04:55		05:39 (6)	
	16:16	17:10	18:04	20 07:48 (2)	20:00	23 07:50 (4)	20:54	22 06:47 (8)	21:39	24 06:03 (6)		
7	08:31	07:53	06:54	07:19 (1)	06:40	07:28 (4)	05:35	06:34 (8)	04:54		05:40 (6)	
	16:18	17:12	18:06	16 07:35 (1)	20:02	21 07:49 (4)	20:56	13 06:47 (8)	21:40	24 06:04 (6)		
8	08:30	07:51	06:51	07:16 (1)	06:37	07:30 (4)	05:33	06:36 (8)	04:53		05:39 (6)	
	16:19	17:14	18:08	20 07:36 (1)	20:04	18 07:48 (4)	20:57	8 06:44 (8)	21:41	24 06:03 (6)		
9	08:30	07:49	06:49	07:16 (1)	06:35	07:32 (4)	05:31		04:53		05:40 (6)	
	16:20	17:16	18:10	21 07:37 (1)	20:06	14 07:46 (4)	20:59		21:42	24 06:04 (6)		
10	08:29	07:48	06:47	07:14 (1)	06:33	07:34 (4)	05:29		04:52		05:39 (6)	
	16:22	17:18	18:11	22 07:36 (1)	20:08	7 07:41 (4)	21:01		21:43	25 06:04 (6)		
11	08:29	07:46	06:44	07:14 (1)	06:30		05:27		04:52		05:40 (6)	
	16:23	17:20	18:13	23 07:37 (1)	20:09		21:03		21:44	24 06:04 (6)		
12	08:28	07:44	06:42	07:14 (1)	06:28		05:26		04:52		05:40 (6)	
	16:25	17:22	18:15	23 07:37 (1)	20:11		21:04		21:44	25 06:05 (6)		
13	08:27	07:42	06:40	07:13 (1)	06:26		05:24		04:51		05:41 (6)	
	16:26	17:24	18:17	23 07:36 (1)	20:13		21:06		21:45	24 06:05 (6)		
14	08:26	07:40	06:37	07:14 (1)	06:23		05:22		04:51		05:40 (6)	
	16:28	17:26	18:19	22 07:36 (1)	20:15		21:08		21:46	25 06:05 (6)		
15	08:25	07:38	06:35	07:13 (1)	06:21		05:21		04:51		05:40 (6)	
	16:30	17:28	18:21	22 07:35 (1)	20:17		21:09		21:46	25 06:05 (6)		
16	08:24	07:36	06:32	07:14 (1)	06:19		05:19		04:51		05:40 (6)	
	16:31	17:30	18:23	20 07:34 (1)	20:18		21:11	4 05:48 (7)	21:47	25 06:05 (6)		
17	08:23	07:34	06:30	07:15 (1)	06:17		05:17		04:50		05:41 (6)	
	16:33	17:32	18:24	17 07:32 (1)	20:20		21:12	9 05:55 (7)	21:47	24 06:05 (6)		
18	08:22	07:32	06:28	07:17 (1)	06:14		05:16		04:50		05:41 (6)	
	16:35	17:34	18:26	13 07:30 (1)	20:22		21:14	12 05:57 (7)	21:48	25 06:06 (6)		
19	08:21	07:29	06:25	07:20 (1)	06:12		05:14		04:50		05:41 (6)	
	16:36	17:35	18:28	7 07:27 (1)	20:24		21:16	13 05:57 (7)	21:48	25 06:06 (6)		
20	08:20	07:27	06:23		06:10		05:13		04:51		05:41 (6)	
	16:38	17:37	18:30		20:26		21:17	15 05:58 (7)	21:48	25 06:06 (6)		
21	08:19	07:25	06:20		06:08		05:12		04:51		05:42 (6)	
	16:40	17:39	18:32	7 06:44 (3)	20:27	8 06:39 (8)	05:12		04:51		05:42 (6)	
22	08:18	07:23	06:18	06:41 (3)	06:06		05:10		04:51		05:42 (6)	
	16:42	17:41	18:33	11 06:52 (3)	20:29	13 06:49 (8)	05:10		04:51		05:42 (6)	
23	08:17	07:21	06:16	06:39 (3)	06:03		05:09		04:51		05:42 (6)	
	16:43	17:43	5 07:45 (2)	18:35	14 06:53 (3)	20:31	22 06:51 (8)	21:22	18 06:00 (7)	21:49	25 06:07 (6)	
24	08:15	07:19	06:13	07:43 (2)	06:01		05:07		04:51		05:43 (6)	
	16:45	17:45	9 07:52 (2)	18:37	17 06:53 (3)	20:33	26 06:52 (8)	21:23	18 06:00 (7)	21:49	25 06:08 (6)	
25	08:14	07:16	06:11	07:41 (2)	05:59		05:06		04:52		05:43 (6)	
	16:47	17:47	13 07:54 (2)	18:39	19 06:54 (3)	20:35	28 06:52 (8)	21:24	18 06:00 (7)	21:49	24 06:07 (6)	
26	08:13	07:14	06:08	07:39 (2)	05:57		05:05		04:52		05:43 (6)	
	16:49	17:49	16 07:55 (2)	18:41	19 06:54 (3)	20:36	29 06:52 (8)	21:26	19 06:01 (7)	21:49	24 06:07 (6)	
27	08:11	07:12	06:06	07:36 (2)	05:55		05:04		04:53		05:43 (6)	
	16:50	17:51	18 07:54 (2)	18:42	20 06:53 (3)	20:38	30 06:52 (8)	21:27	20 06:01 (7)	21:49	25 06:08 (6)	
28	08:10	07:10	06:04	07:36 (2)	05:53		05:03		04:53		05:43 (6)	
	16:53	17:53	19 07:55 (2)	18:44	22 06:53 (3)	20:40	30 06:52 (8)	21:29	20 06:01 (7)	21:49	25 06:08 (6)	
29	08:08		07:01		05:51		05:02		04:54		05:44 (6)	
	16:55		19:46	23 07:53 (4)	20:42	31 06:53 (8)	21:30	21 06:01 (7)	21:49	24 06:08 (6)		
30	08:07		06:59	07:29 (4)	05:49		05:00		04:54		05:43 (6)	
	16:57		19:48	25 07:54 (4)	20:43	31 06:53 (8)	21:31	21 06:01 (7)	21:48	25 06:08 (6)		
31	08:05		06:56	07:29 (4)			04:59		05:39 (6)			
	16:58		19:50	25 07:54 (4)			21:32	21 06:00 (6)				
Sonnenscheinstunden	253	275	367	419	460	491	445	506	729			
astr.max.mögl.Beschattung		80	560	460	445		0.43		0.39			
Red.Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43		0.43		0.39			
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96		0.96		0.96			
Reduktion Windrichtung		0.65	0.68	0.72	0.72		0.72		0.72			
Gesamte Reduktion		0.15	0.18	0.25	0.30		0.30		0.27			
Met.wahrsch.Beschattung		12	100	117	132		195					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	--	---------------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DJ - IO114

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:44 (6)	05:34		06:26		07:18		07:53 (1)	07:14	08:08		
	21:48	06:08 (6)	21:14		20:09		18:57	23	08:16 (1)	16:48	16:05		
2	04:56	05:44 (6)	05:35		06:28		07:20		07:53 (1)	07:16	08:09		
	21:48	06:09 (6)	21:12		20:07	7	07:40 (4)	18:55	23	08:16 (1)	16:46	16:05	
3	04:56	05:45 (6)	05:37		06:30		07:29 (4)	07:21		07:52 (1)	07:18	08:11	
	21:47	06:09 (6)	21:11		20:05	14	07:43 (4)	18:52	22	08:14 (1)	16:44	16:04	
4	04:57	05:44 (6)	05:38		06:31		07:27 (4)	07:23		07:52 (1)	07:20	08:12	
	21:47	06:09 (6)	21:09		20:02	18	07:45 (4)	18:50	22	08:14 (1)	16:42	16:03	
5	04:58	05:45 (6)	05:40		06:33		07:26 (4)	07:25		07:53 (1)	07:22	08:14	
	21:46	06:09 (6)	21:07	9	06:55 (8)	20:00	20	07:46 (4)	18:48	20	08:13 (1)	16:41	16:03
6	04:59	05:45 (6)	05:42		06:38 (9)	06:35		07:24 (4)	07:27		07:54 (1)	07:24	08:15
	21:46	06:09 (6)	21:05	17	06:57 (8)	19:58	22	07:46 (4)	18:45	18	08:12 (1)	16:39	16:02
7	05:00	05:46 (6)	05:43		06:35 (9)	06:36		07:23 (4)	07:28		07:55 (1)	07:26	08:16
	21:45	06:09 (6)	21:03	23	06:58 (8)	19:55	24	07:47 (4)	18:43	15	08:10 (1)	16:37	16:02
8	05:01	05:46 (6)	05:45		06:33 (9)	06:38		07:22 (4)	07:30		07:57 (1)	07:28	08:18
	21:45	06:10 (6)	21:01	26	06:59 (8)	19:53	26	07:48 (4)	18:41	20	08:24 (2)	16:35	16:01
9	05:02	05:47 (6)	05:47		06:32 (9)	06:40		07:21 (4)	07:32		08:12 (2)	07:30	08:19
	21:44	06:10 (6)	20:59	28	07:00 (8)	19:50	26	07:47 (4)	18:38	14	08:26 (2)	16:33	16:01
10	05:03	05:47 (6)	05:48		06:31 (9)	06:42		07:21 (4)	07:34		08:11 (2)	07:31	08:20
	21:43	06:09 (6)	20:57	29	07:00 (8)	19:48	26	07:47 (4)	18:36	16	08:27 (2)	16:32	16:01
11	05:04	05:47 (6)	05:50		06:31 (9)	06:43		07:21 (4)	07:36		08:10 (2)	07:33	08:21
	21:42	06:09 (6)	20:55	29	07:00 (8)	19:46	26	07:47 (4)	18:34	18	08:28 (2)	16:30	16:01
12	05:05	05:48 (6)	05:52		06:30 (9)	06:45		07:20 (4)	07:37		08:09 (2)	07:35	08:22
	21:41	06:09 (6)	20:53	31	07:01 (8)	19:43	26	07:46 (4)	18:31	19	08:28 (2)	16:28	16:00
13	05:06	05:48 (6)	05:54		06:30 (9)	06:47		07:20 (4)	07:39		08:09 (2)	07:37	08:23
	21:40	06:09 (6)	20:51	30	07:00 (8)	19:41	25	07:45 (4)	18:29	19	08:28 (2)	16:27	16:00
14	05:07	05:49 (6)	05:55		06:30 (9)	06:48		07:21 (4)	07:41		08:09 (2)	07:39	08:24
	21:39	06:09 (7)	20:49	31	07:01 (8)	19:38	24	07:45 (4)	18:27	19	08:28 (2)	16:25	16:00
15	05:09	05:49 (6)	05:57		06:29 (9)	06:50		07:21 (4)	07:43		08:10 (2)	07:41	08:25
	21:38	06:09 (7)	20:47	31	07:00 (8)	19:36	22	07:43 (4)	18:24	17	08:27 (2)	16:24	16:00
16	05:10	05:50 (6)	05:59		06:30 (9)	06:52		07:22 (4)	07:45		08:11 (2)	07:43	08:26
	21:37	06:09 (7)	20:45	30	07:00 (8)	19:33	21	07:43 (3)	18:22	15	08:26 (2)	16:22	16:00
17	05:11	05:51 (6)	06:00		06:31 (9)	06:54		07:23 (3)	07:46		08:13 (2)	07:44	08:27
	21:36	06:10 (7)	20:43	29	07:00 (8)	19:31	20	07:43 (3)	18:20	12	08:25 (2)	16:21	16:01
18	05:13	05:51 (7)	06:02		06:31 (9)	06:55		07:22 (3)	07:48		08:15 (2)	07:46	08:28
	21:35	06:10 (7)	20:41	27	06:58 (8)	19:29	19	07:41 (3)	18:18	8	08:23 (2)	16:19	16:01
19	05:14	05:51 (7)	06:04		06:32 (9)	06:57		07:23 (3)	07:50		08:17 (2)	07:48	08:28
	21:34	06:10 (7)	20:39	25	06:57 (8)	19:26	18	07:41 (3)	18:15	4	08:21 (2)	16:18	16:01
20	05:15	05:51 (7)	06:05		06:34 (9)	06:59		07:25 (3)	07:52		07:50	08:29	
	21:32	06:09 (7)	20:37	21	06:55 (8)	19:24	15	07:40 (3)	18:13		16:17	16:01	
21	05:17	05:52 (7)	06:07		06:41 (8)	07:00		07:26 (3)	07:54		07:51	08:30	
	21:31	06:10 (7)	20:34	13	06:54 (8)	19:21	12	07:38 (3)	18:11		16:15	16:02	
22	05:18	05:52 (7)	06:09		06:44 (8)	07:02		07:28 (3)	07:56		07:53	08:30	
	21:30	06:09 (7)	20:32	7	06:51 (8)	19:19	8	07:36 (3)	18:09		16:14	16:02	
23	05:20	05:53 (7)	06:11		07:04	07:30 (3)	07:58				07:55	08:31	
	21:28	06:08 (7)	20:30		19:16	2	07:32 (3)	18:07			16:13	16:03	
24	05:21	05:54 (7)	06:12		07:06	08:05 (1)	07:59				07:57	08:31	
	21:27	06:09 (7)	20:28		19:14	4	08:09 (1)	18:05			16:12	16:03	
25	05:23	05:54 (7)	06:14		07:07	08:00 (1)	07:01				07:58	08:32	
	21:26	06:07 (7)	20:25		19:12	12	08:12 (1)	17:02			16:11	16:04	
26	05:24	05:56 (7)	06:16		07:09	07:58 (1)	07:03				08:00	08:32	
	21:24	06:07 (7)	20:23		19:09	16	08:14 (1)	17:00			16:10	16:05	
27	05:26	05:57 (7)	06:18		07:11	07:56 (1)	07:05				08:02	08:32	
	21:22	06:05 (7)	20:21		19:07	19	08:15 (1)	16:58			16:09	16:05	
28	05:27		06:19		07:13	07:54 (1)	07:07				08:03	08:32	
	21:21		20:19		19:04	21	08:15 (1)	16:56			16:08	16:06	
29	05:29		06:21		07:14	07:54 (1)	07:09				08:05	08:32	
	21:19		20:16		19:02	22	08:16 (1)	16:54			16:07	16:07	
30	05:30		06:23		07:16	07:53 (1)	07:11				08:06	08:32	
	21:18		20:14		19:00	23	08:16 (1)	16:52			16:06	16:08	
31	05:32		06:24				07:13					08:33	
	21:16		20:12				16:50					16:09	
Sonnenscheinstunden	509		458		382		330			262		237	
astr.max.mögl.Beschattung	533		436		538		324						
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29						
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96						
Reduktion Windrichtung	0.72		0.72		0.70		0.66						
Gesamte Reduktion	0.26		0.29		0.23		0.18						
Met.wahrsch.Beschattung	140		127		125		59						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DK - IO115
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	07:24 (4)	05:46	06:20 (9)	04:59	05:38 (6)	
	16:10	17:00	17:55	19:51	24 07:48 (4)	20:45	29 06:49 (8)	21:34	21 05:59 (6)	
2	08:32	08:02	07:05	06:52	07:23 (4)	05:44	06:20 (9)	04:58	05:39 (6)	
	16:12	17:02	17:57	19:53	26 07:49 (4)	20:47	29 06:49 (8)	21:35	21 06:00 (6)	
3	08:32	08:00	07:03	06:49	07:23 (4)	05:42	06:20 (9)	04:57	05:38 (6)	
	16:13	17:04	17:58	19:55	26 07:49 (4)	20:49	28 06:48 (8)	21:36	22 06:00 (6)	
4	08:32	07:58	07:01	06:47	07:22 (4)	05:41	06:21 (9)	04:56	05:38 (6)	
	16:14	17:06	18:00	19:57	26 07:48 (4)	20:50	26 06:47 (8)	21:37	22 06:00 (6)	
5	08:32	07:57	06:58	06:45	07:23 (4)	05:39	06:21 (9)	04:55	05:38 (6)	
	16:15	17:08	18:02	19:59	25 07:48 (4)	20:52	25 06:46 (8)	21:38	23 06:01 (6)	
6	08:31	07:55	06:56	06:42	07:22 (4)	05:37	06:22 (9)	04:55	05:38 (6)	
	16:16	17:10	18:04	20:00	24 07:46 (4)	20:54	23 06:45 (8)	21:39	23 06:01 (6)	
7	08:31	07:53	06:54	07:19 (1)	06:40	07:23 (4)	05:35	06:26 (9)	04:54	05:39 (6)
	16:18	17:12	18:06	5 07:24 (1)	20:02	23 07:46 (4)	20:56	18 06:44 (8)	21:40	23 06:02 (6)
8	08:30	07:51	06:51	07:15 (1)	06:37	07:24 (4)	05:33	06:32 (8)	04:53	05:38 (6)
	16:19	17:14	18:08	12 07:27 (1)	20:04	21 07:45 (4)	20:57	10 06:42 (8)	21:41	24 06:02 (6)
9	08:30	07:49	06:49	07:13 (1)	06:35	07:25 (4)	05:31	4 06:35 (8)	04:53	05:39 (6)
	16:20	17:16	18:10	16 07:29 (1)	20:06	19 07:44 (4)	20:59	4 06:39 (8)	21:42	23 06:02 (6)
10	08:29	07:48	06:47	07:11 (1)	06:33	07:25 (4)	05:29	04:52	05:38 (6)	
	16:22	17:18	18:11	19 07:30 (1)	20:08	16 07:41 (4)	21:01	21:43	24 06:02 (6)	
11	08:29	07:46	06:44	07:10 (1)	06:30	07:28 (4)	05:27	04:52	05:39 (6)	
	16:23	17:20	18:13	21 07:31 (1)	20:09	10 07:38 (4)	21:03	21:44	23 06:02 (6)	
12	08:28	07:44	06:42	07:10 (1)	06:28		05:26	04:52	05:39 (6)	
	16:25	17:22	18:15	21 07:31 (1)	20:11		21:04	21:44	24 06:03 (6)	
13	08:27	07:42	06:40	07:09 (1)	06:26		05:24	04:51	05:40 (6)	
	16:26	17:24	18:17	22 07:31 (1)	20:13		21:06	21:45	23 06:03 (6)	
14	08:26	07:40	06:37	07:09 (1)	06:24		05:22	04:51	05:39 (6)	
	16:28	17:26	18:19	22 07:31 (1)	20:15		21:08	21:46	24 06:03 (6)	
15	08:25	07:38	06:35	07:08 (1)	06:21		05:21	04:51	05:39 (6)	
	16:30	17:28	18:21	22 07:30 (1)	20:17		21:09	21:46	24 06:03 (6)	
16	08:24	07:36	06:32	07:08 (1)	06:19		05:19	04:51	05:40 (6)	
	16:31	17:30	18:23	22 07:30 (1)	20:18		21:11	1 05:50 (7)	21:47	23 06:03 (6)
17	08:23	07:34	06:30	07:08 (1)	06:17		05:17	05:45 (7)	04:50	05:40 (6)
	16:33	17:32	18:24	20 07:28 (1)	20:20		21:12	9 05:54 (7)	21:47	24 06:04 (6)
18	08:22	07:32	06:28	07:09 (1)	06:14		05:16	05:44 (7)	04:50	05:40 (6)
	16:35	17:34	18:26	19 07:28 (1)	20:22		21:14	12 05:56 (7)	21:48	24 06:04 (6)
19	08:21	07:29	06:25	07:10 (1)	06:12		05:14	05:43 (7)	04:50	05:40 (6)
	16:36	17:35	18:28	16 07:26 (1)	20:24		21:16	13 05:56 (7)	21:48	24 06:04 (6)
20	08:20	07:27	06:23	07:12 (1)	06:10		05:13	05:42 (7)	04:51	05:41 (6)
	16:38	17:37	18:30	12 07:24 (1)	20:26		21:17	15 05:57 (7)	21:48	24 06:05 (6)
21	08:19	07:25	06:20	07:16 (1)	06:08		05:12	05:42 (7)	04:51	05:41 (6)
	16:40	17:39	18:32	4 07:20 (1)	20:27		21:19	16 05:58 (7)	21:49	24 06:05 (6)
22	08:18	07:23	06:18	06:41 (3)	06:06	06:36 (8)	05:10	05:41 (7)	04:51	05:41 (6)
	16:42	17:41	18:33	3 06:44 (3)	20:29	7 06:43 (8)	21:20	17 05:58 (7)	21:49	24 06:05 (6)
23	08:17	07:21	06:16	06:39 (3)	06:03	06:33 (8)	05:09	05:41 (7)	04:51	05:41 (6)
	16:43	17:43	18:35	9 06:48 (3)	20:31	13 06:46 (8)	21:22	17 05:58 (7)	21:49	24 06:05 (6)
24	08:15	07:19	06:13	06:36 (3)	06:01	06:26 (9)	05:07	05:41 (7)	04:51	05:42 (6)
	16:45	17:45	18:37	12 06:48 (3)	20:33	21 06:47 (8)	21:23	18 05:59 (7)	21:49	24 06:06 (6)
25	08:14	07:16	06:11	06:34 (3)	05:59	06:24 (9)	05:06	05:41 (7)	04:52	05:42 (6)
	16:47	17:47	18:39	15 06:49 (3)	20:35	24 06:48 (8)	21:24	18 05:59 (7)	21:49	24 06:06 (6)
26	08:13	07:14	06:08	06:32 (3)	05:57	06:22 (9)	05:05	05:41 (6)	04:52	05:42 (6)
	16:49	17:49	18:41	18 06:50 (3)	20:36	26 06:48 (8)	21:26	18 05:59 (7)	21:49	23 06:05 (6)
27	08:11	07:12	06:06	06:30 (3)	05:55	06:21 (9)	05:04	05:40 (6)	04:53	05:42 (6)
	16:51	17:51	18:42	19 06:49 (3)	20:38	28 06:49 (8)	21:27	19 05:59 (7)	21:49	24 06:06 (6)
28	08:10	07:10	06:04	06:29 (4)	05:53	06:20 (9)	05:03	05:40 (6)	04:53	05:42 (6)
	16:53	17:53	18:44	21 06:50 (3)	20:40	29 06:49 (8)	21:29	19 05:59 (7)	21:49	24 06:06 (6)
29	08:08		07:01	07:27 (4)	05:51	06:20 (9)	05:02	05:39 (6)	04:54	05:43 (6)
	16:55		19:46	21 07:48 (3)	20:42	30 06:50 (8)	21:30	20 05:59 (7)	21:49	24 06:07 (6)
30	08:07		06:59	07:26 (4)	05:49	06:20 (9)	05:00	05:39 (6)	04:54	05:42 (6)
	16:57		19:48	22 07:48 (3)	20:43	30 06:50 (8)	21:31	20 05:59 (7)	21:48	24 06:06 (6)
31	08:05		06:56	07:25 (4)			04:59	05:38 (6)		
	16:58		19:50	24 07:49 (4)			21:32	21 05:59 (6)		
Sonnenscheinstunden 253 275 367 419 491 491 506										
astr. max.mögl. Beschattung 417 702										
Red. Sonnenscheinwahrsch. 0.28 0.39										
Reduktion Betriebsdauer 0.96 0.96										
Reduktion Windrichtung 0.69 0.72										
Gesamte Reduktion 0.18 0.27										
Met. wahrsch. Beschattung 76 188										

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DL - IO116

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni					
1 08:32	08:03		07:08	07:32 (2) 06:54	07:20 (3) 05:46	06:12 (9) 04:59					05:31 (7)
16:10	17:00		17:55	7 07:39 (2) 19:51	19 07:39 (3) 20:45	20 06:32 (8) 21:34				17 05:48 (7)	
2 08:32	08:02		07:05	07:29 (2) 06:52	07:19 (4) 05:44	06:11 (9) 04:58				05:32 (7)	
16:12	17:02		17:57	11 07:40 (2) 19:53	20 07:39 (3) 20:47	22 06:33 (8) 21:35				17 05:49 (7)	
3 08:32	08:00		07:03	07:27 (2) 06:49	07:16 (4) 05:42	06:10 (9) 04:57				05:31 (7)	
16:13	17:04		17:58	14 07:41 (2) 19:55	23 07:39 (3) 20:49	24 06:34 (8) 21:36				18 05:49 (7)	
4 08:32	07:58		07:01	07:25 (2) 06:47	07:14 (4) 05:41	06:09 (9) 04:56				05:31 (7)	
16:14	17:06		18:00	17 07:42 (2) 19:57	23 07:37 (3) 20:50	25 06:34 (8) 21:37				18 05:49 (7)	
5 08:32	07:57		06:58	07:23 (2) 06:45	07:12 (4) 05:39	06:08 (9) 04:55				05:32 (7)	
16:15	17:08		18:02	19 07:42 (2) 19:59	25 07:37 (3) 20:52	27 06:35 (8) 21:38				18 05:50 (7)	
6 08:31	07:55		06:56	07:23 (2) 06:42	07:10 (4) 05:37	06:08 (9) 04:55				05:32 (7)	
16:16	17:10		18:04	19 07:42 (2) 20:00	24 07:34 (3) 20:54	27 06:35 (8) 21:39				18 05:50 (7)	
7 08:31	07:53		06:54	07:22 (2) 06:40	07:10 (4) 05:35	06:09 (9) 04:54				05:32 (7)	
16:18	17:12		18:06	19 07:41 (2) 20:02	25 07:35 (4) 20:56	26 06:35 (8) 21:40				18 05:50 (7)	
8 08:30	07:51		06:51	07:23 (2) 06:37	07:09 (4) 05:33	06:08 (9) 04:53				05:32 (6)	
16:19	17:14		18:08	18 07:41 (2) 20:04	26 07:35 (4) 20:57	27 06:35 (8) 21:41				18 05:50 (7)	
9 08:30	07:49		06:49	07:24 (2) 06:35	07:09 (4) 05:31	06:08 (9) 04:53				05:31 (6)	
16:20	17:16		18:10	16 07:40 (2) 20:06	26 07:35 (4) 20:59	27 06:35 (8) 21:42				20 05:51 (7)	
10 08:29	07:48		06:47	07:24 (2) 06:33	07:08 (4) 05:29	06:09 (9) 04:52				05:30 (6)	
16:22	17:18		18:11	14 07:38 (2) 20:08	26 07:34 (4) 21:01	26 06:35 (8) 21:43				20 05:50 (7)	
11 08:29	07:46		06:44	07:26 (2) 06:30	07:08 (4) 05:27	06:10 (9) 04:52				05:30 (6)	
16:23	17:20		18:13	11 07:37 (2) 20:09	26 07:34 (4) 21:03	25 06:35 (8) 21:44				21 05:51 (7)	
12 08:28	07:44		06:42	07:08 (1) 06:28	07:08 (4) 05:26	06:10 (9) 04:52				05:30 (6)	
16:25	17:22		18:15	9 07:33 (2) 20:11	26 07:34 (4) 21:04	24 06:34 (8) 21:44				21 05:51 (7)	
13 08:27	07:42		06:40	07:04 (1) 06:26	07:08 (4) 05:24	06:12 (9) 04:51				05:30 (6)	
16:26	17:24		18:17	12 07:16 (1) 20:13	24 07:32 (4) 21:06	22 06:34 (8) 21:45				21 05:51 (7)	
14 08:26	07:40		06:37	07:02 (1) 06:24	07:09 (4) 05:22	06:13 (9) 04:51				05:29 (6)	
16:28	17:26		18:19	16 07:18 (1) 20:15	23 07:32 (4) 21:08	20 06:33 (8) 21:46				22 05:51 (7)	
15 08:25	07:38		06:35	07:00 (1) 06:21	07:09 (4) 05:21	06:15 (8) 04:51				05:29 (6)	
16:30	17:28		18:21	19 07:19 (1) 20:17	22 07:31 (4) 21:09	17 06:32 (8) 21:46				22 05:51 (7)	
16 08:24	07:36		06:32	06:59 (1) 06:19	07:10 (4) 05:19	06:16 (8) 04:51				05:29 (6)	
16:31	17:30		18:23	21 07:20 (1) 20:18	20 07:30 (4) 21:11	15 06:31 (8) 21:47				22 05:51 (7)	
17 08:23	07:34		06:30	06:58 (1) 06:17	07:11 (4) 05:17	06:17 (8) 04:50				05:30 (6)	
16:33	17:32		18:24	22 07:20 (1) 20:20	16 07:27 (4) 21:12	13 06:30 (8) 21:47				21 05:51 (7)	
18 08:22	07:32		06:28	06:57 (1) 06:14	07:13 (4) 05:16	06:19 (8) 04:50				05:30 (6)	
16:35	17:34		18:26	23 07:20 (1) 20:22	11 07:24 (4) 21:14	10 06:29 (8) 21:48				22 05:52 (7)	
19 08:21	07:29		06:25	06:57 (1) 06:12	05:14	06:22 (8) 04:50				05:30 (6)	
16:36	17:35		18:28	23 07:20 (1) 20:24	21:16	3 06:25 (8) 21:48				22 05:52 (7)	
20 08:20	07:27		06:23	06:56 (1) 06:10	05:13	04:51				05:31 (6)	
16:38	17:37		18:30	23 07:19 (1) 20:26	21:17	21:48				22 05:53 (7)	
21 08:19	07:25		06:20	06:57 (1) 06:08	05:12	04:51				05:31 (6)	
16:40	17:39		18:32	22 07:19 (1) 20:27	21:19	21:49				22 05:53 (7)	
22 08:18	07:23		06:18	06:56 (1) 06:06	05:10	04:51				05:31 (6)	
16:42	17:41		18:33	22 07:18 (1) 20:29	21:20	21:49				22 05:53 (7)	
23 08:17	07:21		06:16	06:57 (1) 06:03	05:09	04:51				05:31 (6)	
16:43	17:43		18:35	20 07:17 (1) 20:31	21:22	21:49				22 05:53 (7)	
24 08:15	07:19		06:13	06:58 (1) 06:01	05:07	04:51				05:32 (6)	
16:45	17:45		18:37	17 07:15 (1) 20:33	21:23	21:49				22 05:54 (7)	
25 08:14	07:16		06:11	06:59 (1) 05:59	05:06	05:36 (7) 04:52				05:32 (6)	
16:47	17:47		18:39	14 07:13 (1) 20:35	21:24	6 05:42 (7) 21:49				22 05:54 (7)	
26 08:13	07:14		06:08	07:02 (1) 05:57	05:05	05:34 (7) 04:52				05:31 (6)	
16:49	17:49		18:41	9 07:11 (1) 20:36	21:26	10 05:44 (7) 21:49				22 05:53 (7)	
27 08:11	07:12		06:06	06:29 (3) 05:55	05:04	05:34 (7) 04:53				05:32 (6)	
16:50	17:51		18:42	7 06:36 (3) 20:38	21:27	11 05:45 (7) 21:49				22 05:54 (7)	
28 08:10	07:10		06:04	06:27 (3) 05:53	05:03	05:33 (7) 04:53				05:32 (6)	
16:53	17:53	1 07:34 (2)	18:44	11 06:38 (3) 20:40	21:29	13 05:46 (7) 21:49				22 05:54 (7)	
29 08:08			07:01	07:24 (3) 05:51	06:24 (8) 05:02	05:32 (7) 04:54				05:33 (6)	
16:55			19:46	14 07:38 (3) 20:42	3 06:27 (8) 21:30	15 05:47 (7) 21:49				22 05:55 (7)	
30 08:07			06:59	07:22 (3) 05:49	06:14 (9) 05:00	05:32 (7) 04:54				05:33 (6)	
16:57			19:48	17 07:39 (3) 20:43	17 06:31 (8) 21:31	15 05:47 (7) 21:48				21 05:54 (7)	
31 08:05			06:56	07:21 (3)	04:59	05:32 (7)					
16:58			19:50	19 07:40 (3)	21:32	16 05:48 (7)					
Sonnenscheinstunden	253	275	367	419	491	506	617				
astr. max. mögl. Beschattung		1	505	425	486	617	0.39				
Red. Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39	0.96				
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96	0.72				
Reduktion Windrichtung		0.66	0.68	0.72	0.73	0.72	0.27				
Gesamte Reduktion		0.15	0.18	0.26	0.30	0.27	0.164				
Met. wahrsch. Beschattung		0	91	108	145	164					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattenende	(WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DL - IO116

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Oktober	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
302	339	467	706	786	617	554	815	1,348	1,328	721	398	8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:34 (6)	05:34	06:20 (9)	06:26	07:07 (4)	07:18	07:45 (1)	07:14	08:08			
	21	05:55 (7)	21:14	24	06:44 (8)	20:09	26	07:33 (4)	18:57	9	07:54 (1)	16:48	16:05
2	04:56	05:35 (6)	05:35	06:20 (9)	06:28	07:07 (4)	07:20	08:06 (2)	07:16	08:09			
	20	05:55 (7)	21:12	25	06:45 (8)	20:07	26	07:33 (4)	18:55	8	08:14 (2)	16:46	16:05
3	04:56	05:36 (6)	05:37	06:19 (9)	06:30	07:06 (4)	07:21	08:02 (2)	07:18	08:11			
	20	05:56 (7)	21:11	26	06:45 (8)	20:05	26	07:32 (4)	18:52	14	08:16 (2)	16:44	16:04
4	04:57	05:37 (6)	05:38	06:19 (9)	06:31	07:06 (4)	07:23	08:01 (2)	07:20	08:12			
	18	05:55 (7)	21:09	26	06:45 (8)	20:02	26	07:32 (4)	18:50	16	08:17 (2)	16:42	16:03
5	04:58	05:37 (7)	05:40	06:19 (9)	06:33	07:07 (4)	07:25	08:00 (2)	07:22	08:14			
	19	05:56 (7)	21:07	27	06:46 (8)	20:00	25	07:32 (4)	18:48	17	08:17 (2)	16:41	16:03
6	04:59	05:38 (7)	05:42	06:18 (9)	06:35	07:07 (4)	07:27	07:59 (2)	07:24	08:15			
	18	05:56 (7)	21:05	27	06:45 (8)	19:58	23	07:30 (3)	18:45	19	08:18 (2)	16:39	16:02
7	05:00	05:38 (7)	05:43	06:18 (9)	06:36	07:07 (4)	07:28	07:59 (2)	07:26	08:16			
	18	05:56 (7)	21:03	27	06:45 (8)	19:55	25	07:32 (3)	18:43	19	08:18 (2)	16:37	16:02
8	05:01	05:38 (7)	05:45	06:18 (9)	06:38	07:09 (4)	07:30	07:58 (2)	07:28	08:18			
	18	05:56 (7)	21:01	26	06:44 (8)	19:53	24	07:33 (3)	18:41	19	08:17 (2)	16:35	16:01
9	05:02	05:39 (7)	05:47	06:19 (9)	06:40	07:09 (4)	07:32	07:58 (2)	07:30	08:19			
	17	05:56 (7)	20:59	25	06:44 (8)	19:50	23	07:32 (3)	18:38	18	08:16 (2)	16:33	16:01
10	05:03	05:39 (7)	05:48	06:18 (9)	06:42	07:12 (4)	07:34	08:00 (2)	07:31	08:20			
	17	05:56 (7)	20:57	24	06:42 (8)	19:48	20	07:32 (3)	18:36	16	08:16 (2)	16:32	16:01
11	05:04	05:39 (7)	05:50	06:20 (9)	06:43	07:13 (3)	07:36	08:02 (2)	07:33	08:21			
	17	05:56 (7)	20:55	21	06:41 (8)	19:46	19	07:32 (3)	18:34	13	08:15 (2)	16:30	16:01
12	05:05	05:40 (7)	05:52	06:21 (9)	06:45	07:12 (3)	07:37	08:04 (2)	07:35	08:22			
	16	05:56 (7)	20:53	19	06:40 (8)	19:43	19	07:31 (3)	18:31	9	08:13 (2)	16:28	16:00
13	05:06	05:40 (7)	05:54	06:22 (9)	06:47	07:13 (3)	07:39	08:06 (2)	07:37	08:23			
	16	05:56 (7)	20:51	15	06:37 (8)	19:41	18	07:31 (3)	18:29	5	08:11 (2)	16:27	16:00
14	05:07	05:41 (7)	05:55	06:48	07:15 (3)	07:41	07:39	08:24	16:25	16:00			
	14	05:55 (7)	20:49	19:38	15	07:30 (3)	18:27	16:25	16:00				
15	05:09	05:41 (7)	05:57	06:50	07:16 (3)	07:43	07:41	08:25	16:24	16:00			
	14	05:55 (7)	20:47	19:36	12	07:28 (3)	18:24	16:24	16:00				
16	05:10	05:42 (7)	05:59	06:52	07:18 (3)	07:45	07:43	08:26	16:22	16:00			
	12	05:54 (7)	20:45	19:33	8	07:26 (3)	18:22	16:22	16:00				
17	05:11	05:43 (7)	06:00	06:54	07:25 (1)	07:46	07:44	08:27	16:21	16:01			
	11	05:54 (7)	20:43	19:31	6	07:58 (1)	18:20	16:21	16:01				
18	05:13	05:44 (7)	06:02	06:55	07:47 (1)	07:48	07:46	08:28	16:19	16:01			
	9	05:53 (7)	20:41	19:29	13	08:00 (1)	18:18	16:19	16:01				
19	05:14	05:46 (7)	06:04	06:57	07:45 (1)	07:50	07:48	08:28	16:18	16:01			
	5	05:51 (7)	20:39	19:26	17	08:02 (1)	18:15	16:18	16:01				
20	05:15	06:05	06:59	07:44 (1)	07:52	07:50	08:29	16:17	16:01				
	21:32	20:37	19:24	19	08:03 (1)	18:13	16:17	16:01					
21	05:17	06:07	07:00	07:42 (1)	07:54	07:51	08:30	16:16	16:02				
	21:31	20:34	19:21	21	08:03 (1)	18:11	16:15	16:02					
22	05:18	06:09	07:02	07:42 (1)	07:56	07:53	08:30	16:14	16:02				
	21:30	20:32	19:19	22	08:04 (1)	18:09	16:14	16:02					
23	05:20	06:11	07:04	07:41 (1)	07:58	07:55	08:31	16:13	16:03				
	21:28	20:30	19:16	23	08:04 (1)	18:07	16:13	16:03					
24	05:21	06:12	07:06	07:21 (4)	07:06	07:41 (1)	07:59	16:12	16:03				
	21:27	20:28	3	07:24 (4)	19:14	23	08:04 (1)	18:05	16:12	16:03			
25	05:23	06:30 (8)	06:14	07:17 (4)	07:07	07:40 (1)	07:01	16:12	16:03				
	21:26	7	06:37 (8)	20:25	12	07:29 (4)	19:12	23	08:03 (1)	17:02	16:11	16:04	
26	05:24	06:29 (8)	06:16	07:14 (4)	07:09	07:40 (1)	07:03	16:11	16:04				
	21:24	11	06:40 (8)	20:23	16	07:30 (4)	19:09	23	08:03 (1)	17:00	16:10	16:05	
27	05:26	06:27 (8)	06:18	07:12 (4)	07:11	07:41 (1)	07:05	16:10	16:05				
	21:22	14	06:41 (8)	20:21	19	07:31 (4)	19:07	21	08:02 (1)	16:58	16:09	16:05	
28	05:27	06:27 (8)	06:19	07:10 (4)	07:13	07:40 (1)	07:07	16:08	16:06				
	21:21	16	06:43 (8)	20:19	22	07:32 (4)	19:04	20	08:00 (1)	16:56	16:08	16:06	
29	05:29	06:25 (8)	06:21	07:09 (4)	07:14	07:41 (1)	07:09	16:07	16:07				
	21:19	18	06:43 (8)	20:16	24	07:33 (4)	19:02	18	07:59 (1)	16:54	16:07	16:07	
30	05:30	06:23 (9)	06:23	07:09 (4)	07:16	07:43 (1)	07:11	16:06	16:06				
	21:18	20	06:43 (8)	20:14	24	07:33 (4)	19:00	14	07:57 (1)	16:52	16:06	16:08	
31	05:32	06:22 (9)	06:24	07:07 (4)		07:13		16:06	16:06				
	21:16	22	06:44 (8)	20:12	26	07:33 (4)							
	Sonnenscheinstunden	509	458	382	330	262	237						
	astr.max.mögl.Beschattung	408	458	598	182								
	Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29								
	Reduktion Betriebsdauer	0.96	0.96	0.96	0.96								
	Reduktion Windrichtung	0.72	0.72	0.70	0.66								
	Gesamte Reduktion	0.26	0.29	0.23	0.18								
	Met.wahrsch.Beschattung	107	134	140	33								

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende	(WEA mit letztem Schatten)



Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DM - IO117

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	07:32 (2) 06:54	07:21 (4) 05:46	06:13 (9) 04:59	05:31 (7)	
	16:10	17:00	17:55	12 07:44 (2) 19:51	20 07:41 (3) 20:45	22 06:35 (8) 21:34	17 05:48 (7)	
2	08:32	08:02	07:05	07:29 (2) 06:52	07:19 (4) 05:44	06:11 (9) 04:58	05:32 (7)	
	16:12	17:02	17:57	15 07:44 (2) 19:53	22 07:41 (3) 20:47	24 06:35 (8) 21:35	17 05:49 (7)	
3	08:32	08:00	07:03	07:27 (2) 06:49	07:17 (4) 05:42	06:10 (9) 04:57	05:32 (7)	
	16:13	17:04	17:58	18 07:45 (2) 19:55	24 07:41 (3) 20:49	26 06:36 (8) 21:36	17 05:49 (7)	
4	08:32	07:58	07:01	07:26 (2) 06:47	07:15 (4) 05:41	06:10 (9) 04:56	05:31 (7)	
	16:14	17:06	18:00	19 07:45 (2) 19:57	24 07:39 (3) 20:50	26 06:36 (8) 21:37	18 05:49 (7)	
5	08:32	07:57	06:58	06:58	07:25 (2) 06:45	07:14 (4) 05:39	06:09 (9) 04:55	05:32 (7)
	16:15	17:08	18:02	20 07:45 (2) 19:59	24 07:38 (3) 20:52	27 06:36 (8) 21:38	18 05:50 (7)	
6	08:31	07:55	06:56	06:56	07:26 (2) 06:42	07:12 (4) 05:37	06:09 (9) 04:55	05:32 (7)
	16:16	17:10	18:04	19 07:45 (2) 20:00	25 07:37 (4) 20:54	27 06:36 (8) 21:39	18 05:50 (7)	
7	08:31	07:53	06:54	06:54	07:25 (2) 06:40	07:12 (4) 05:35	06:09 (9) 04:54	05:32 (7)
	16:18	17:12	18:06	18 07:43 (2) 20:02	26 07:38 (4) 20:56	28 06:37 (8) 21:40	19 05:51 (7)	
8	08:30	07:51	06:51	06:51	07:26 (2) 06:37	07:12 (4) 05:33	06:09 (9) 04:53	05:32 (7)
	16:19	17:14	18:08	17 07:43 (2) 20:04	26 07:38 (4) 20:57	28 06:37 (8) 21:41	19 05:51 (7)	
9	08:30	07:49	06:49	06:49	07:27 (2) 06:35	07:11 (4) 05:31	06:09 (9) 04:53	05:32 (6)
	16:20	17:16	18:10	15 07:42 (2) 20:06	27 07:38 (4) 20:59	27 06:36 (8) 21:42	19 05:51 (7)	
10	08:29	07:48	06:47	06:47	07:28 (2) 06:33	07:11 (4) 05:29	06:10 (9) 04:52	05:31 (6)
	16:22	17:18	18:11	11 07:39 (2) 20:08	26 07:37 (4) 21:01	27 06:37 (8) 21:43	20 05:51 (7)	
11	08:29	07:46	06:44	06:44	07:10 (1) 06:30	07:11 (4) 05:27	06:11 (9) 04:52	05:31 (6)
	16:23	17:20	18:13	12 07:36 (2) 20:09	26 07:37 (4) 21:03	25 06:36 (8) 21:44	20 05:51 (7)	
12	08:28	07:44	06:42	06:42	07:07 (1) 06:28	07:11 (4) 05:26	06:11 (9) 04:52	05:31 (6)
	16:25	17:22	18:15	14 07:21 (1) 20:11	25 07:36 (4) 21:04	24 06:35 (8) 21:44	21 05:52 (7)	
13	08:27	07:42	06:40	06:40	07:04 (1) 06:26	07:11 (4) 05:24	06:13 (9) 04:51	05:31 (6)
	16:26	17:24	18:17	18 07:22 (1) 20:13	24 07:35 (4) 21:06	22 06:35 (8) 21:45	21 05:52 (7)	
14	08:26	07:40	06:37	06:37	07:03 (1) 06:23	07:12 (4) 05:22	06:15 (9) 04:51	05:30 (6)
	16:28	17:26	18:19	20 07:23 (1) 20:15	22 07:34 (4) 21:08	19 06:34 (8) 21:46	21 05:51 (7)	
15	08:25	07:38	06:35	06:35	07:01 (1) 06:21	07:13 (4) 05:21	06:17 (8) 04:51	05:30 (6)
	16:30	17:28	18:21	22 07:23 (1) 20:17	20 07:33 (4) 21:09	17 06:34 (8) 21:46	22 05:52 (7)	
16	08:24	07:36	06:32	06:32	07:01 (1) 06:19	07:14 (4) 05:19	06:17 (8) 04:51	05:30 (6)
	16:31	17:30	18:23	23 07:24 (1) 20:18	17 07:31 (4) 21:11	15 06:32 (8) 21:47	22 05:52 (7)	
17	08:23	07:34	06:30	06:30	07:00 (1) 06:17	07:15 (4) 05:17	06:19 (8) 04:50	05:30 (6)
	16:33	17:32	18:24	23 07:23 (1) 20:20	13 07:28 (4) 21:12	12 06:31 (8) 21:47	22 05:52 (7)	
18	08:22	07:32	06:28	06:28	07:00 (1) 06:14	07:19 (4) 05:16	06:21 (8) 04:50	05:30 (6)
	16:35	17:34	18:26	23 07:23 (1) 20:22	4 07:23 (4) 21:14	9 06:30 (8) 21:48	22 05:52 (7)	
19	08:21	07:29	06:25	06:25	07:00 (1) 06:12	05:14	04:50	05:30 (6)
	16:36	17:35	18:28	23 07:23 (1) 20:24	05:14	21:16	21:48	22 05:52 (7)
20	08:20	07:27	06:23	06:23	07:00 (1) 06:10	05:13	04:51	05:31 (6)
	16:38	17:37	18:30	22 07:22 (1) 20:26	05:13	21:17	21:48	22 05:53 (7)
21	08:19	07:25	06:20	06:20	07:00 (1) 06:08	05:12	04:51	05:31 (6)
	16:40	17:39	18:32	22 07:22 (1) 20:27	21:19	05:10	21:49	22 05:53 (7)
22	08:18	07:23	06:18	06:18	07:00 (1) 06:06	05:10	04:51	05:31 (6)
	16:42	17:41	18:33	20 07:20 (1) 20:29	21:20	05:09	21:49	22 05:53 (7)
23	08:17	07:21	06:16	06:16	07:01 (1) 06:03	05:09	04:51	05:31 (6)
	16:43	17:43	18:35	18 07:19 (1) 20:31	21:22	05:07	21:49	22 05:53 (7)
24	08:15	07:19	06:13	06:13	07:02 (1) 06:01	05:07	04:51	05:32 (6)
	16:45	17:45	18:37	14 07:16 (1) 20:33	21:23	05:06	21:49	22 05:54 (7)
25	08:14	07:16	06:11	06:11	07:05 (1) 05:59	05:06	04:52	05:32 (6)
	16:47	17:47	18:39	8 07:13 (1) 20:35	21:24	7 05:43 (7) 21:49	22 05:54 (7)	
26	08:13	07:14	06:08	06:08	06:32 (3) 05:57	05:05	04:52	05:32 (6)
	16:49	17:49	18:41	6 06:38 (3) 20:36	21:26	10 05:45 (7) 21:49	22 05:54 (7)	
27	08:11	07:12	06:06	06:06	06:29 (3) 05:55	05:04	05:34 (7) 04:53	05:33 (6)
	16:51	17:51	3 07:39 (2) 18:42	11 06:40 (3) 20:38	21:27	12 05:46 (7) 21:49	22 05:55 (7)	
28	08:10	07:10	06:04	06:04	06:27 (3) 05:53	05:03	05:33 (7) 04:53	05:33 (6)
	16:53	17:53	8 07:42 (2) 18:44	14 06:41 (3) 20:40	21:29	14 05:47 (7) 21:49	21 05:54 (7)	
29	08:08		07:01	07:24 (3) 05:51	06:17 (9) 05:02	05:33 (7) 04:54	05:34 (6)	
	16:55		19:46	17 07:41 (3) 20:42	13 06:31 (8) 21:30	14 05:47 (7) 21:49	21 05:55 (7)	
30	08:07		06:59	07:23 (3) 05:49	06:14 (9) 05:00	05:32 (7) 04:54	05:34 (6)	
	16:57		19:48	19 07:42 (3) 20:43	19 06:33 (8) 21:31	16 05:48 (7) 21:48	21 05:55 (7)	
31	08:05		06:56	07:22 (3)	04:59	05:32 (7)	21:48	21 05:55 (7)
	16:58		19:50	20 07:42 (3)	21:32	16 05:48 (7)		
Sonnenscheinstunden	253	275	367	419	491	506	614	
astr. max. mögl. Beschattung		11	533	427	494		614	
Red. Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43		0.39	
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96		0.96	
Reduktion Windrichtung		0.65	0.68	0.72	0.73		0.72	
Gesamte Reduktion		0.15	0.18	0.26	0.30		0.27	
Met. wahrsch. Beschattung		2	96	109	147		163	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	Schattenanfang	Schattende
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	----------------	------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DM - IO117

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:35 (6)	05:34		06:21 (9)	06:26	07:10 (4)	07:18	07:45 (1)	07:14	08:08		
	21:48	05:55 (7)	21:14	25	06:46 (8)	20:09	26	07:36 (4)	18:57	15	08:00 (1)	16:48	16:05
2	04:56	05:36 (6)	05:35		06:21 (9)	06:28	07:09 (4)	07:20	07:47 (1)	07:16	08:09		
	21:48	05:56 (7)	21:12	26	06:47 (8)	20:07	27	07:36 (4)	18:55	11	07:58 (1)	16:46	16:05
3	04:56	05:37 (6)	05:37		06:20 (9)	06:30	07:08 (4)	07:21	08:07 (2)	07:18	08:11		
	21:47	05:56 (7)	21:11	26	06:46 (8)	20:05	27	07:35 (4)	18:52	9	08:16 (2)	16:44	16:04
4	04:57	05:37 (6)	05:38		06:20 (9)	06:31	07:09 (4)	07:23	08:05 (2)	07:20	08:12		
	21:47	05:56 (7)	21:09	27	06:47 (8)	20:02	26	07:35 (4)	18:50	13	08:18 (2)	16:42	16:03
5	04:58	05:38 (7)	05:40		06:20 (9)	06:33	07:09 (4)	07:25	08:03 (2)	07:22	08:14		
	21:46	05:56 (7)	21:07	27	06:47 (8)	20:00	26	07:35 (4)	18:48	16	08:19 (2)	16:41	16:03
6	04:59	05:38 (7)	05:42		06:19 (9)	06:35	07:08 (4)	07:27	08:02 (2)	07:24	08:15		
	21:46	05:56 (7)	21:05	28	06:47 (8)	19:58	25	07:33 (4)	18:45	18	08:20 (2)	16:39	16:02
7	05:00	05:38 (7)	05:43		06:19 (9)	06:36	07:09 (4)	07:28	08:02 (2)	07:26	08:16		
	21:45	05:57 (7)	21:03	28	06:47 (8)	19:55	24	07:33 (3)	18:43	18	08:20 (2)	16:37	16:02
8	05:01	05:39 (7)	05:45		06:19 (9)	06:38	07:10 (4)	07:30	08:00 (2)	07:28	08:18		
	21:45	05:57 (7)	21:01	27	06:46 (8)	19:53	24	07:34 (3)	18:41	20	08:20 (2)	16:35	16:01
9	05:02	05:39 (7)	05:47		06:19 (9)	06:40	07:10 (4)	07:32	08:00 (2)	07:30	08:19		
	21:44	05:57 (7)	20:59	27	06:46 (8)	19:50	24	07:34 (3)	18:38	19	08:19 (2)	16:33	16:01
10	05:03	05:39 (7)	05:48		06:19 (9)	06:42	07:12 (4)	07:34	08:00 (2)	07:31	08:20		
	21:43	05:57 (7)	20:57	25	06:44 (8)	19:48	22	07:34 (3)	18:36	19	08:19 (2)	16:32	16:01
11	05:04	05:40 (7)	05:50		06:20 (9)	06:43	07:14 (4)	07:36	08:02 (2)	07:33	08:21		
	21:42	05:57 (7)	20:55	24	06:44 (8)	19:46	20	07:34 (3)	18:34	16	08:18 (2)	16:30	16:01
12	05:05	05:40 (7)	05:52		06:21 (9)	06:45	07:14 (3)	07:37	08:04 (2)	07:35	08:22		
	21:41	05:57 (7)	20:53	22	06:43 (8)	19:43	19	07:33 (3)	18:31	14	08:18 (2)	16:28	16:00
13	05:06	05:40 (7)	05:54		06:22 (9)	06:47	07:14 (3)	07:39	08:06 (2)	07:37	08:23		
	21:40	05:56 (7)	20:51	18	06:40 (8)	19:41	19	07:33 (3)	18:29	10	08:16 (2)	16:27	16:00
14	05:07	05:41 (7)	05:55		06:26 (9)	06:48	07:15 (3)	07:41	08:08 (2)	07:39	08:24		
	21:39	05:56 (7)	20:49	9	06:38 (8)	19:38	18	07:33 (3)	18:27	6	08:14 (2)	16:25	16:00
15	05:09	05:41 (7)	05:57		06:50		07:16 (3)	07:43			07:41	08:25	
	21:38	05:55 (7)	20:47		19:36	15	07:31 (3)	18:24			16:24	16:00	
16	05:10	05:42 (7)	05:59		06:52		07:18 (3)	07:45			07:43	08:26	
	21:37	05:55 (7)	20:45		19:33	11	07:29 (3)	18:22			16:22	16:00	
17	05:11	05:44 (7)	06:00		06:54		07:20 (3)	07:46			07:44	08:27	
	21:36	05:55 (7)	20:43		19:31	7	07:27 (3)	18:20			16:21	16:01	
18	05:13	05:45 (7)	06:02		06:55		07:54 (1)	07:48			07:46	08:28	
	21:35	05:53 (7)	20:41		19:29	6	08:00 (1)	18:18			16:19	16:01	
19	05:14	05:47 (7)	06:04		06:57		07:50 (1)	07:50			07:48	08:28	
	21:34	05:51 (7)	20:39		19:26	13	08:03 (1)	18:15			16:18	16:01	
20	05:15		06:05		06:59		07:48 (1)	07:52			07:50	08:29	
	21:32		20:37		19:24	17	08:05 (1)	18:13			16:17	16:01	
21	05:17		06:07		07:00		07:46 (1)	07:54			07:51	08:30	
	21:31		20:34		19:21	19	08:05 (1)	18:11			16:15	16:02	
22	05:18		06:09		07:02		07:45 (1)	07:56			07:53	08:30	
	21:30		20:32		19:19	21	08:06 (1)	18:09			16:14	16:02	
23	05:20		06:11		07:04		07:44 (1)	07:58			07:55	08:31	
	21:28		20:30		19:16	23	08:07 (1)	18:07			16:13	16:03	
24	05:21		06:12		07:06		07:44 (1)	07:59			07:57	08:31	
	21:27		20:28		19:14	23	08:07 (1)	18:05			16:12	16:03	
25	05:23	06:33 (8)	06:14		07:22 (4)	07:07	07:43 (1)	07:01			07:58	08:32	
	21:26	06:38 (8)	20:25	6	07:28 (4)	19:12	23	08:06 (1)	17:02		16:11	16:04	
26	05:24	06:31 (8)	06:16		07:18 (4)	07:09	07:43 (1)	07:03			08:00	08:32	
	21:24	06:41 (8)	20:23	13	07:31 (4)	19:09	23	08:06 (1)	17:00		16:10	16:05	
27	05:26	06:29 (8)	06:18		07:16 (4)	07:11	07:43 (1)	07:05			08:02	08:32	
	21:22	06:42 (8)	20:21	17	07:33 (4)	19:07	23	08:06 (1)	16:58		16:09	16:05	
28	05:27	06:27 (8)	06:19		07:13 (4)	07:13	07:42 (1)	07:07			08:03	08:32	
	21:21	06:43 (8)	20:19	20	07:33 (4)	19:04	22	08:04 (1)	16:56		16:08	16:06	
29	05:29	06:27 (8)	06:21		07:12 (4)	07:14	07:43 (1)	07:09			08:05	08:32	
	21:19	06:45 (8)	20:16	23	07:35 (4)	19:02	20	08:03 (1)	16:54		16:07	16:07	
30	05:30	06:24 (9)	06:23		07:12 (4)	07:16	07:44 (1)	07:11			08:06	08:32	
	21:18	06:45 (8)	20:14	24	07:36 (4)	19:00	18	08:02 (1)	16:52		16:06	16:08	
31	05:32	06:23 (9)	06:24		07:10 (4)			07:13			08:32	08:32	
	21:16	06:46 (8)	20:12	25	07:35 (4)			16:50			16:09	16:09	
	Sonnenscheinstunden	509	458		382		330		262		237		
	astr.max.mögl.Beschattung	408	467		611		204						
	Red.Sonnenscheinwahrsch.	0.38	0.42		0.35		0.29						
	Reduktion Betriebsdauer	0.96	0.96		0.96		0.96						
	Reduktion Windrichtung	0.72	0.72		0.70		0.66						
	Gesamte Reduktion	0.26	0.29		0.23		0.18						
	Met.wahrsch.Beschattung	107	137		143		37						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DN - IO118

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	07:32 (2)	06:54	07:19 (3)	05:46	06:13 (9)	04:59	05:29 (7)
	16:10	17:00	17:55	9 07:41 (2)	19:51	20 07:39 (3)	20:45	11 06:25 (8)	21:34	14 05:43 (7)
2	08:32	08:02	07:05	07:29 (2)	06:52	07:19 (3)	05:44	06:10 (9)	04:58	05:30 (7)
	16:12	17:02	17:57	12 07:41 (2)	19:53	20 07:39 (3)	20:47	18 06:28 (8)	21:35	15 05:45 (7)
3	08:32	08:00	07:03	07:27 (2)	06:49	07:17 (4)	05:42	06:09 (9)	04:57	05:29 (7)
	16:13	17:04	17:58	15 07:42 (2)	19:55	22 07:39 (3)	20:49	20 06:29 (8)	21:36	16 05:45 (7)
4	08:32	07:58	07:01	07:25 (2)	06:47	07:14 (4)	05:41	06:08 (9)	04:56	05:29 (7)
	16:14	17:06	18:00	18 07:43 (2)	19:57	24 07:38 (3)	20:50	22 06:30 (8)	21:37	16 05:45 (7)
5	08:32	07:57	06:58	07:24 (2)	06:45	07:12 (4)	05:39	06:07 (9)	04:55	05:29 (7)
	16:15	17:08	18:02	19 07:43 (2)	19:59	25 07:37 (3)	20:52	24 06:31 (8)	21:38	17 05:46 (7)
6	08:31	07:55	06:56	07:24 (2)	06:42	07:10 (4)	05:37	06:06 (9)	04:55	05:29 (7)
	16:16	17:10	18:04	19 07:43 (2)	20:00	25 07:35 (3)	20:54	25 06:31 (8)	21:39	17 05:46 (7)
7	08:31	07:53	06:54	07:23 (2)	06:40	07:09 (4)	05:35	06:06 (9)	04:54	05:29 (7)
	16:18	17:12	18:06	19 07:42 (2)	20:02	25 07:34 (3)	20:56	27 06:33 (8)	21:40	18 05:47 (7)
8	08:30	07:51	06:51	07:23 (2)	06:37	07:09 (4)	05:33	06:06 (9)	04:53	05:29 (7)
	16:19	17:14	18:08	19 07:42 (2)	20:04	25 07:34 (4)	20:57	27 06:33 (8)	21:41	18 05:47 (7)
9	08:30	07:49	06:49	07:24 (2)	06:35	07:08 (4)	05:31	06:05 (9)	04:53	05:29 (7)
	16:20	17:16	18:10	17 07:41 (2)	20:06	27 07:35 (4)	20:59	28 06:33 (8)	21:42	18 05:47 (7)
10	08:29	07:48	06:47	07:25 (2)	06:33	07:07 (4)	05:29	06:06 (9)	04:52	05:29 (7)
	16:22	17:18	18:11	14 07:39 (2)	20:08	27 07:34 (4)	21:01	27 06:33 (8)	21:43	18 05:47 (7)
11	08:29	07:46	06:44	07:26 (2)	06:30	07:07 (4)	05:27	06:06 (9)	04:52	05:29 (7)
	16:23	17:20	18:13	12 07:38 (2)	20:09	27 07:34 (4)	21:03	27 06:33 (8)	21:44	19 05:48 (7)
12	08:28	07:44	06:42	07:09 (1)	06:28	07:07 (4)	05:26	06:06 (9)	04:52	05:30 (7)
	16:25	17:22	18:15	10 07:35 (2)	20:11	27 07:34 (4)	21:04	26 06:32 (8)	21:44	18 05:48 (7)
13	08:27	07:42	06:40	07:04 (1)	06:26	07:06 (4)	05:24	06:07 (9)	04:51	05:30 (7)
	16:26	17:24	18:17	13 07:17 (1)	20:13	27 07:33 (4)	21:06	26 06:33 (8)	21:45	18 05:48 (7)
14	08:26	07:40	06:37	07:02 (1)	06:23	07:07 (4)	05:22	06:08 (9)	04:51	05:29 (7)
	16:28	17:26	18:19	17 07:19 (1)	20:15	25 07:32 (4)	21:08	24 06:32 (8)	21:46	19 05:48 (7)
15	08:25	07:38	06:35	07:00 (1)	06:21	07:07 (4)	05:21	06:09 (9)	04:51	05:30 (7)
	16:30	17:28	18:21	20 07:20 (1)	20:17	24 07:31 (4)	21:09	23 06:32 (8)	21:46	18 05:48 (7)
16	08:24	07:36	06:32	06:59 (1)	06:19	07:08 (4)	05:19	06:10 (9)	04:51	05:30 (7)
	16:31	17:30	18:23	22 07:21 (1)	20:18	23 07:31 (4)	21:11	21 06:31 (8)	21:47	19 05:49 (7)
17	08:23	07:34	06:30	06:58 (1)	06:17	07:08 (4)	05:17	06:12 (8)	04:50	05:30 (7)
	16:33	17:32	18:24	22 07:20 (1)	20:20	20 07:28 (4)	21:12	19 06:31 (8)	21:47	19 05:49 (7)
18	08:22	07:32	06:28	06:58 (1)	06:14	07:09 (4)	05:16	06:13 (8)	04:50	05:30 (7)
	16:35	17:34	18:26	23 07:21 (1)	20:22	18 07:27 (4)	21:14	17 06:30 (8)	21:48	19 05:49 (7)
19	08:21	07:29	06:25	06:57 (1)	06:12	07:11 (4)	05:14	06:13 (8)	04:50	05:30 (7)
	16:36	17:35	18:28	24 07:21 (1)	20:24	14 07:25 (4)	21:16	16 06:29 (8)	21:48	19 05:49 (7)
20	08:20	07:27	06:23	06:57 (1)	06:10	07:14 (4)	05:13	06:14 (8)	04:51	05:32 (7)
	16:38	17:37	18:30	23 07:20 (1)	20:26	8 07:22 (4)	21:17	14 06:28 (8)	21:48	18 05:50 (7)
21	08:19	07:25	06:20	06:57 (1)	06:08		05:12	06:16 (8)	04:51	05:32 (7)
	16:40	17:39	18:32	23 07:20 (1)	20:27		21:19	11 06:27 (8)	21:49	18 05:50 (7)
22	08:18	07:23	06:18	06:56 (1)	06:06		05:10	06:17 (8)	04:51	05:32 (7)
	16:42	17:41	18:33	23 07:19 (1)	20:29		21:20	8 06:25 (8)	21:49	18 05:50 (7)
23	08:17	07:21	06:16	06:57 (1)	06:03		05:09		04:51	05:31 (7)
	16:43	17:43	18:35	21 07:18 (1)	20:31		21:22		21:49	19 05:50 (7)
24	08:15	07:19	06:13	06:57 (1)	06:01		05:07		04:51	05:32 (7)
	16:45	17:45	18:37	19 07:16 (1)	20:33		21:23		21:49	19 05:51 (7)
25	08:14	07:16	06:11	06:59 (1)	05:59		05:06		04:52	05:32 (7)
	16:47	17:47	18:39	16 07:15 (1)	20:35		21:24		21:49	19 05:51 (7)
26	08:13	07:14	06:08	07:01 (1)	05:57		05:05		04:52	05:32 (7)
	16:49	17:49	18:41	12 07:13 (1)	20:36		21:26		21:49	19 05:51 (7)
27	08:11	07:12	06:06	06:29 (3)	05:55		05:04		04:53	05:33 (7)
	16:49	17:51	18:42	5 06:34 (3)	20:38		21:27		21:49	18 05:51 (7)
28	08:10	07:10	06:04	06:27 (3)	05:53		05:03	05:33 (7)	04:53	05:32 (7)
	16:53	17:53	4 07:34 (2)	18:44	10 06:37 (3)	20:40	21:29	6 05:39 (7)	21:49	19 05:51 (7)
29	08:08		07:01	07:24 (3)	05:51		05:02	05:32 (7)	04:54	05:33 (7)
	16:55		19:46	14 07:38 (3)	20:42		21:30	9 05:41 (7)	21:49	19 05:52 (7)
30	08:07		06:59	07:22 (3)	05:49		05:00	05:31 (7)	04:54	05:33 (7)
	16:57		19:48	17 07:39 (3)	20:43		21:31	11 05:42 (7)	21:48	18 05:51 (7)
31	08:05		06:56	07:20 (3)			04:59	05:30 (7)		
	16:58		19:50	19 07:39 (3)			21:32	13 05:43 (7)		
Sonnenscheinstunden	253	275	367	419	453	491	500	506	539	
astr. max.mögl. Beschattung		4	526	526	526	526	526	526	526	526
Red. Sonnenscheinwahrsch.		0.24	0.28	0.37	0.37	0.43	0.43	0.43	0.39	
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Reduktion Windrichtung		0.65	0.68	0.72	0.72	0.73	0.73	0.73	0.72	
Gesamte Reduktion		0.15	0.18	0.26	0.26	0.30	0.30	0.30	0.27	
Met. wahrsch. Beschattung		1	94	116	149	149	149	149	143	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattenende (WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DN - IO118

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:33 (7)	05:34	06:16 (9)	06:26	07:06 (4)	07:18	07:46 (1)	07:14	08:08		
	21:48	05:52 (7)	21:14	06:43 (8)	20:09	07:33 (4)	18:57	9	07:55 (1)	16:48	16:05	
2	04:56	05:34 (7)	05:35	06:16 (9)	06:28	07:06 (4)	07:20	08:06 (2)	07:16	08:09		
	21:48	05:52 (7)	21:12	06:43 (8)	20:07	07:33 (4)	18:55	10	08:16 (2)	16:46	16:05	
3	04:56	05:35 (7)	05:37	06:16 (9)	06:30	07:05 (4)	07:21	08:03 (2)	07:18	08:11		
	21:47	05:53 (7)	21:11	06:43 (8)	20:05	07:32 (4)	18:52	14	08:17 (2)	16:44	16:04	
4	04:57	05:34 (7)	05:38	06:16 (9)	06:31	07:06 (4)	07:23	08:02 (2)	07:20	08:12		
	21:47	05:52 (7)	21:09	06:43 (8)	20:02	07:31 (4)	18:50	16	08:18 (2)	16:42	16:03	
5	04:58	05:35 (7)	05:40	06:16 (9)	06:33	07:06 (4)	07:25	08:01 (2)	07:22	08:14		
	21:46	05:52 (7)	21:07	06:43 (8)	20:00	07:31 (3)	18:48	18	08:19 (2)	16:41	16:03	
6	04:59	05:35 (7)	05:42	06:16 (9)	06:35	07:06 (4)	07:27	08:00 (2)	07:24	08:15		
	21:46	05:52 (7)	21:05	06:42 (8)	19:58	07:31 (3)	18:45	19	08:19 (2)	16:39	16:02	
7	05:00	05:36 (7)	05:43	06:16 (9)	06:36	07:07 (4)	07:28	08:00 (2)	07:26	08:16		
	21:45	05:52 (7)	21:03	06:42 (8)	19:55	07:32 (3)	18:43	19	08:19 (2)	16:37	16:02	
8	05:01	05:36 (7)	05:45	06:16 (9)	06:38	07:09 (4)	07:30	07:59 (2)	07:28	08:18		
	21:45	05:52 (7)	21:01	06:40 (8)	19:53	07:33 (3)	18:41	19	08:18 (2)	16:35	16:01	
9	05:02	05:36 (7)	05:47	06:17 (9)	06:40	07:10 (4)	07:32	07:59 (2)	07:30	08:19		
	21:44	05:52 (7)	20:59	06:40 (8)	19:50	07:32 (3)	18:38	19	08:18 (2)	16:33	16:01	
10	05:03	05:37 (7)	05:48	06:18 (9)	06:42	07:12 (3)	07:34	08:00 (2)	07:31	08:20		
	21:43	05:52 (7)	20:57	06:37 (8)	19:48	07:32 (3)	18:36	17	08:17 (2)	16:32	16:01	
11	05:04	05:38 (7)	05:50	06:19 (9)	06:43	07:12 (3)	07:36	08:02 (2)	07:33	08:21		
	21:42	05:52 (7)	20:55	06:36 (8)	19:46	07:32 (3)	18:34	14	08:16 (2)	16:30	16:01	
12	05:05	05:38 (7)	05:52	06:23 (9)	06:45	07:12 (3)	07:37	08:04 (2)	07:35	08:22		
	21:41	05:51 (7)	20:53	06:26 (9)	19:43	07:31 (3)	18:31	11	08:15 (2)	16:28	16:00	
13	05:06	05:39 (7)	05:54	06:47	06:47	07:13 (3)	07:39	08:06 (2)	07:37	08:23		
	21:40	05:51 (7)	20:51	19:41	17	07:30 (3)	18:29	7	08:13 (2)	16:27	16:00	
14	05:07	05:40 (7)	05:55	06:48	06:48	07:15 (3)	07:41	07:39	08:24			
	21:39	05:50 (7)	20:49	19:38	14	07:29 (3)	18:27		16:25	16:00		
15	05:09	05:41 (7)	05:57	06:50	07:16 (3)	07:43	07:41	08:25				
	21:38	05:49 (7)	20:47	19:36	11	07:27 (3)	18:24		16:24	16:00		
16	05:10	05:43 (7)	05:59	06:52	07:18 (3)	07:45	07:43	08:26				
	21:37	05:46 (7)	20:45	19:33	6	07:24 (3)	18:22		16:22	16:00		
17	05:11	06:00	06:54	07:50 (1)	07:46	08:01 (1)	07:46	07:44	08:27			
	21:36	06:02	20:43	19:31	11	08:01 (1)	18:20		16:21	16:01		
18	05:13	06:02	06:55	07:47 (1)	07:48	08:02 (1)	07:48	07:46	08:28			
	21:35	06:01	20:41	19:29	15	08:02 (1)	18:18		16:19	16:01		
19	05:14	06:04	06:57	07:45 (1)	07:50	08:04 (1)	07:50	07:48	08:28			
	21:34	06:03	20:39	19:26	19	08:04 (1)	18:15		16:18	16:01		
20	05:15	06:05	06:59	07:44 (1)	07:52	08:05 (1)	07:52	07:50	08:29			
	21:32	06:05	20:37	19:24	21	08:05 (1)	18:13		16:17	16:01		
21	05:17	06:29 (8)	06:07	07:00	07:42 (1)	07:54	07:51	08:30				
	21:31	06:34 (8)	20:34	19:21	22	08:04 (1)	18:11		16:15	16:02		
22	05:18	06:27 (8)	06:09	07:02	07:42 (1)	07:56	07:53	08:30				
	21:30	06:36 (8)	20:32	19:19	23	08:05 (1)	18:09		16:14	16:02		
23	05:20	06:25 (8)	06:11	07:17 (4)	07:04	07:41 (1)	07:58	07:55	08:31			
	21:28	06:37 (8)	20:30	9	07:26 (4)	19:16	24	08:05 (1)	18:07	16:13	16:03	
24	05:21	06:24 (8)	06:12	07:14 (4)	07:06	07:41 (1)	07:59	07:57	08:31			
	21:27	06:39 (8)	20:28	15	07:29 (4)	19:14	24	08:05 (1)	18:05	16:12	16:03	
25	05:23	06:23 (8)	06:14	07:13 (4)	07:07	07:40 (1)	07:01	07:58	08:32			
	21:26	06:40 (8)	20:25	18	07:31 (4)	19:12	24	08:04 (1)	17:02	16:11	16:04	
26	05:24	06:23 (8)	06:16	07:11 (4)	07:09	07:40 (1)	07:03	08:00	08:32			
	21:24	06:41 (8)	20:23	20	07:31 (4)	19:09	23	08:03 (1)	17:00	16:10	16:05	
27	05:26	06:22 (8)	06:18	07:10 (4)	07:11	07:41 (1)	07:05	08:02	08:32			
	21:22	06:41 (8)	20:21	23	07:33 (4)	19:07	22	08:03 (1)	16:58	16:09	16:05	
28	05:27	06:20 (8)	06:19	07:08 (4)	07:13	07:41 (1)	07:07	08:03	08:32			
	21:21	06:42 (8)	20:19	24	07:32 (4)	19:04	20	08:01 (1)	16:56	16:08	16:06	
29	05:29	06:19 (8)	06:21	07:07 (4)	07:14	07:42 (1)	07:09	08:05	08:32			
	21:19	06:43 (8)	20:16	26	07:33 (4)	19:02	17	07:59 (1)	16:54	16:07	16:07	
30	05:30	06:18 (8)	06:23	07:07 (4)	07:16	07:43 (1)	07:11	08:06	08:32			
	21:18	06:42 (8)	20:14	27	07:34 (4)	19:00	15	07:58 (1)	16:52	16:06	16:08	
31	05:32	06:17 (8)	06:24	07:06 (4)	07:13	07:43 (1)	07:13	08:06	08:32			
	21:16	06:43 (8)	20:12	27	07:33 (4)	19:00	15	07:58 (1)	16:50	16:09	16:09	
	Sonnenscheinstunden	509	458		382		330		262		237	
	astr.max.mögl.Beschattung	421		462		614		192				
	Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29				
	Reduktion Betriebsdauer	0.96		0.96		0.96		0.96				
	Reduktion Windrichtung	0.72		0.72		0.70		0.66				
	Gesamte Reduktion	0.26		0.29		0.23		0.18				
	Met.wahrsch.Beschattung	110		135		143		35				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DO - IO119

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46	04:59	05:29 (7)
	16:10	17:00	17:55	19:51	18 07:35 (3)	20:45	21:34	8 05:37 (7)
2	08:32	08:02	07:05	07:29 (2)	06:52	07:16 (3)	05:44	04:58
	16:12	17:02	17:57	19:53	19 07:35 (3)	20:47	21:35	10 05:39 (7)
3	08:32	08:00	07:03	07:27 (2)	06:49	07:16 (3)	05:42	04:57
	16:13	17:04	17:58	19:55	20 07:36 (3)	20:49	6 06:15 (9)	21:36 12 05:40 (7)
4	08:32	07:58	07:01	07:25 (2)	06:47	07:15 (3)	05:41	06:06 (9)
	16:14	17:06	18:00	19:57	20 07:35 (3)	20:50	16 06:22 (8)	21:37 13 05:40 (7)
5	08:32	07:57	06:58	07:22 (2)	06:45	07:12 (4)	05:39	06:05 (9)
	16:15	17:08	18:02	19:59	22 07:35 (3)	20:52	19 06:24 (8)	21:38 14 05:41 (7)
6	08:31	07:55	06:56	07:21 (2)	06:42	07:09 (4)	05:37	06:04 (9)
	16:16	17:10	18:04	19 07:40 (2)	20:00	24 07:33 (3)	20:54	21 06:25 (8)
7	08:31	07:53	06:54	07:20 (2)	06:40	07:07 (4)	05:35	06:04 (9)
	16:18	17:12	18:06	19 07:39 (2)	20:02	26 07:33 (3)	20:56	23 06:27 (8)
8	08:30	07:51	06:51	07:20 (2)	06:37	07:06 (4)	05:33	06:03 (9)
	16:19	17:14	18:08	19 07:39 (2)	20:04	25 07:31 (3)	20:57	24 06:27 (8)
9	08:30	07:49	06:49	07:20 (2)	06:35	07:05 (4)	05:31	06:02 (9)
	16:20	17:16	18:10	19 07:39 (2)	20:06	25 07:30 (3)	20:59	25 06:27 (8)
10	08:29	07:48	06:47	07:20 (2)	06:33	07:03 (4)	05:29	06:03 (9)
	16:22	17:18	18:11	18 07:38 (2)	20:08	26 07:29 (4)	21:01	25 06:28 (8)
11	08:29	07:46	06:44	07:21 (2)	06:30	07:03 (4)	05:27	06:02 (9)
	16:23	17:20	18:13	16 07:37 (2)	20:09	26 07:29 (4)	21:03	26 06:28 (8)
12	08:28	07:44	06:42	07:22 (2)	06:28	07:03 (4)	05:26	06:02 (9)
	16:25	17:22	18:15	14 07:36 (2)	20:11	27 07:30 (4)	21:04	26 06:28 (8)
13	08:27	07:42	06:40	07:24 (2)	06:26	07:02 (4)	05:24	06:03 (9)
	16:26	17:24	18:17	9 07:33 (2)	20:13	27 07:29 (4)	21:06	26 06:29 (8)
14	08:26	07:40	06:37	07:04 (1)	06:23	07:02 (4)	05:22	06:03 (9)
	16:28	17:26	18:19	6 07:10 (1)	20:15	27 07:29 (4)	21:08	25 06:28 (8)
15	08:25	07:38	06:35	06:59 (1)	06:21	07:02 (4)	05:21	06:04 (9)
	16:30	17:28	18:21	14 07:13 (1)	20:17	26 07:28 (4)	21:09	24 06:28 (8)
16	08:24	07:36	06:32	06:58 (1)	06:19	07:02 (4)	05:19	06:04 (9)
	16:31	17:30	18:23	17 07:15 (1)	20:18	26 07:28 (4)	21:11	24 06:28 (8)
17	08:23	07:34	06:30	06:55 (1)	06:17	07:01 (4)	05:17	06:05 (9)
	16:33	17:32	18:24	20 07:15 (1)	20:20	25 07:26 (4)	21:12	23 06:28 (8)
18	08:22	07:32	06:28	06:55 (1)	06:14	07:02 (4)	05:16	06:07 (9)
	16:35	17:34	18:26	21 07:16 (1)	20:22	23 07:25 (4)	21:14	21 06:28 (8)
19	08:21	07:29	06:25	06:54 (1)	06:12	07:03 (4)	05:14	06:06 (8)
	16:36	17:35	18:28	23 07:17 (1)	20:24	21 07:24 (4)	21:16	21 06:27 (8)
20	08:20	07:27	06:23	06:53 (1)	06:10	07:04 (4)	05:13	06:07 (8)
	16:38	17:37	18:30	24 07:17 (1)	20:26	19 07:23 (4)	21:17	20 06:27 (8)
21	08:19	07:25	06:20	06:53 (1)	06:08	07:06 (4)	05:12	06:08 (8)
	16:40	17:39	18:32	24 07:17 (1)	20:27	15 07:21 (4)	21:19	18 06:26 (8)
22	08:18	07:23	06:18	06:52 (1)	06:06	07:08 (4)	05:10	06:08 (8)
	16:42	17:41	18:33	24 07:16 (1)	20:29	11 07:19 (4)	21:20	17 06:25 (8)
23	08:17	07:21	06:16	06:52 (1)	06:03	07:09 (4)	05:09	06:09 (8)
	16:43	17:43	18:35	24 07:16 (1)	20:31	21:22	15 06:24 (8)	
24	08:15	07:19	06:13	06:52 (1)	06:01	05:07	06:11 (8)	
	16:45	17:45	18:37	22 07:14 (1)	20:33	21:23	12 06:23 (8)	
25	08:14	07:16	06:11	06:53 (1)	05:59	05:06	06:12 (8)	
	16:47	17:47	18:39	21 07:14 (1)	20:35	21:24	10 06:22 (8)	
26	08:13	07:14	06:08	06:54 (1)	05:57	05:05	06:15 (8)	
	16:49	17:49	18:41	19 07:13 (1)	20:36	21:26	5 06:20 (8)	
27	08:11	07:12	06:06	06:54 (1)	05:55	05:04	06:16 (8)	
	16:51	17:51	18:42	16 07:10 (1)	20:38	21:27	18 06:26 (8)	
28	08:10	07:10	06:04	06:57 (1)	05:53	05:03	06:17 (8)	
	16:53	17:53	18:44	11 07:08 (1)	20:40	21:29	17 06:25 (8)	
29	08:08	07:01	06:01	07:24 (3)	05:51	05:02	06:18 (8)	
	16:55	19:46	7 07:31 (3)	20:42	21:30	05:00	17 06:27 (8)	
30	08:07	06:59	07:22 (3)	05:49	05:00	21:31	17 06:27 (8)	
	16:57	19:48	12 07:34 (3)	20:43	05:00	21:31	17 06:27 (8)	
31	08:05	06:56	07:20 (3)	05:47	04:59	6 05:30 (7)	17 06:27 (8)	
	16:58	19:50	15 07:35 (3)	20:44	21:32	6 05:36 (7)	17 06:27 (8)	
Sonnenscheinstunden	253	275	367	419	491	506	491	506
astr.max.mögl.Beschattung			502	498	478	491	491	491
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39	0.39	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.68	0.72	0.73	0.72	0.72	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.27	0.27	0.27
Met.wahrsch.Beschattung			90	127	143	130	130	130

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: **GBSchattenrezeptor: DO - IO119**

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November		Dezember			
1 04:55		05:31 (7)	05:34		06:12 (9)	06:26	07:02 (4)	07:18		08:02 (2)	07:14	08:08	
21:48	17	05:48 (7)	21:14	26	06:38 (8)	20:09	26	07:28 (4)	18:57	12	08:14 (2)	16:48	16:05
2 04:56		05:31 (7)	05:35		06:13 (9)	06:28		07:02 (4)	07:20		08:00 (2)	07:16	08:09
21:48	17	05:48 (7)	21:12	25	06:38 (8)	20:07	26	07:28 (4)	18:55	16	08:16 (2)	16:46	16:05
3 04:56		05:32 (7)	05:37		06:12 (9)	06:30		07:02 (4)	07:21		07:58 (2)	07:18	08:11
21:47	17	05:49 (7)	21:11	26	06:38 (8)	20:05	25	07:27 (3)	18:52	17	08:15 (2)	16:44	16:04
4 04:57		05:32 (7)	05:38		06:13 (9)	06:31		07:03 (4)	07:23		07:57 (2)	07:20	08:12
21:47	16	05:48 (7)	21:09	24	06:37 (8)	20:02	25	07:28 (3)	18:50	19	08:16 (2)	16:42	16:03
5 04:58		05:32 (7)	05:40		06:13 (9)	06:33		07:04 (4)	07:25		07:57 (2)	07:22	08:14
21:46	16	05:48 (7)	21:07	24	06:37 (8)	20:00	26	07:30 (3)	18:48	19	08:16 (2)	16:41	16:03
6 04:59		05:33 (7)	05:42		06:13 (9)	06:35		07:05 (4)	07:27		07:57 (2)	07:24	08:15
21:46	15	05:48 (7)	21:05	23	06:36 (8)	19:58	24	07:29 (3)	18:45	19	08:16 (2)	16:39	16:02
7 05:00		05:34 (7)	05:43		06:14 (9)	06:36		07:08 (4)	07:28		07:57 (2)	07:26	08:16
21:45	14	05:48 (7)	21:03	21	06:35 (8)	19:55	22	07:30 (3)	18:43	19	08:16 (2)	16:37	16:02
8 05:01		05:34 (7)	05:45		06:15 (9)	06:38		07:10 (3)	07:30		07:56 (2)	07:28	08:18
21:45	14	05:48 (7)	21:01	18	06:33 (8)	19:53	20	07:30 (3)	18:41	19	08:15 (2)	16:35	16:01
9 05:02		05:35 (7)	05:47		06:16 (9)	06:40		07:09 (3)	07:32		07:58 (2)	07:30	08:19
21:44	12	05:47 (7)	20:59	14	06:30 (8)	19:50	20	07:29 (3)	18:38	16	08:14 (2)	16:33	16:01
10 05:03		05:36 (7)	05:48		06:18 (9)	06:42		07:09 (3)	07:34		08:00 (2)	07:31	08:20
21:43	11	05:47 (7)	20:57	5	06:23 (9)	19:48	20	07:29 (3)	18:36	13	08:13 (2)	16:32	16:01
11 05:04		05:37 (7)	05:50		06:43			07:10 (3)	07:36		08:02 (2)	07:33	08:21
21:42	9	05:46 (7)	20:55		19:46	18	07:28 (3)	18:34	9	08:11 (2)	16:30	16:01	
12 05:05		05:38 (7)	05:52		06:45			07:11 (3)	07:37		08:04 (2)	07:35	08:22
21:41	7	05:45 (7)	20:53		19:43	15	07:26 (3)	18:31	4	08:08 (2)	16:28	16:00	
13 05:06		05:40 (7)	05:54		06:47			07:13 (3)	07:39		07:37	08:23	
21:40	3	05:43 (7)	20:51		19:41	12	07:25 (3)	18:29			16:27	16:00	
14 05:07		05:55			06:48			07:15 (3)	07:41		07:39	08:24	
21:39		20:49			19:38	8	07:23 (3)	18:27			16:25	16:00	
15 05:09		05:57			06:50			07:47 (1)	07:43		07:41	08:25	
21:38		20:47			19:36	10	07:57 (1)	18:24			16:24	16:00	
16 05:10		05:59			06:52			07:44 (1)	07:45		07:43	08:26	
21:37		20:45			19:33	15	07:59 (1)	18:22			16:22	16:00	
17 05:11		06:00			06:54			07:43 (1)	07:46		07:44	08:27	
21:36		20:43			19:31	18	08:01 (1)	18:20			16:21	16:01	
18 05:13		06:23 (8)	06:02		06:55			07:40 (1)	07:48		07:46	08:28	
21:35	8	06:31 (8)	20:41		19:29	21	08:01 (1)	18:18			16:19	16:01	
19 05:14		06:21 (8)	06:04		06:57			07:40 (1)	07:50		07:48	08:28	
21:34	11	06:32 (8)	20:39		19:26	22	08:02 (1)	18:15			16:18	16:01	
20 05:15		06:20 (8)	06:05		06:59			07:39 (1)	07:52		07:50	08:29	
21:32	13	06:33 (8)	20:37		19:24	23	08:02 (1)	18:13			16:17	16:01	
21 05:17		06:19 (8)	06:07		07:12 (4)	07:00		07:38 (1)	07:54		07:51	08:30	
21:31	16	06:35 (8)	20:34	12	07:24 (4)	19:21	23	08:01 (1)	18:11		16:15	16:02	
22 05:18		06:18 (8)	06:09		07:10 (4)	07:02		07:37 (1)	07:56		07:53	08:30	
21:30	18	06:36 (8)	20:32	16	07:26 (4)	19:19	24	08:01 (1)	18:09		16:14	16:02	
23 05:20		06:17 (8)	06:11		07:08 (4)	07:04		07:37 (1)	07:58		07:55	08:31	
21:28	19	06:36 (8)	20:30	19	07:27 (4)	19:16	24	08:01 (1)	18:07		16:13	16:03	
24 05:21		06:17 (8)	06:12		07:07 (4)	07:06		07:37 (1)	07:59		07:57	08:31	
21:27	20	06:37 (8)	20:28	21	07:28 (4)	19:14	23	08:00 (1)	18:05		16:12	16:03	
25 05:23		06:17 (8)	06:14		07:06 (4)	07:07		07:37 (1)	07:01		07:58	08:32	
21:26	20	06:37 (8)	20:25	23	07:29 (4)	19:12	22	07:59 (1)	17:02		16:11	16:04	
26 05:24		06:17 (9)	06:16		07:04 (4)	07:09		07:38 (1)	07:03		08:00	08:32	
21:24	22	06:39 (8)	20:23	25	07:29 (4)	19:09	20	07:58 (1)	17:00		16:10	16:05	
27 05:26		06:15 (9)	06:18		07:04 (4)	07:11		07:39 (1)	07:05		08:02	08:32	
21:22	23	06:38 (8)	20:21	26	07:30 (4)	19:07	18	07:57 (1)	16:58		16:09	16:05	
28 05:27		06:15 (9)	06:19		07:03 (4)	07:13		07:39 (1)	07:07		08:03	08:32	
21:21	24	06:39 (8)	20:19	26	07:29 (4)	19:04	15	07:54 (1)	16:56		16:08	16:06	
29 05:29		06:14 (9)	06:21		07:02 (4)	07:14		07:42 (1)	07:09		08:05	08:32	
21:19	25	06:39 (8)	20:16	27	07:29 (4)	19:02	10	07:52 (1)	16:54		16:07	16:07	
30 05:30		06:13 (9)	06:23		07:02 (4)	07:16		08:05 (2)	07:11		08:06	08:32	
21:18	25	06:38 (8)	20:14	27	07:29 (4)	19:00	6	08:11 (2)	16:52		16:06	16:08	
31 05:32		06:13 (9)	06:24		07:02 (4)			07:13			08:32		
21:16	26	06:39 (8)	20:12	26	07:28 (4)			16:50			16:09		
Sonnenscheinstunden	509		458		382			330		262		237	
astr. max. mögl. Beschattung	438		454		581			182					
Red. Sonnenscheinwahrsch.	0.38		0.42		0.35			0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96			0.96					
Reduktion Windrichtung	0.72		0.72		0.70			0.66					
Gesamte Reduktion	0.26		0.29		0.23			0.18					
Met. wahrsch. Beschattung	115		133		136			33					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Minuten mit Schatten	Zeitpunkt (SS:MM)		Schattenanfang (WEA mit erstem Schatten)		Schattendecke (WEA mit letztem Schatten)	
	Sonnennuntergang (SS:MM)			Zeitpunkt (SS:MM)		Schattendecke		Schattendecke	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DP - IO120

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46	04:59	05:28 (7)
	16:10	17:00	17:55	19:51	16 07:33 (3)	20:45	21:34	12 05:40 (7)
2	08:32	08:02	07:05	06:52	07:15 (3)	05:44	04:58	05:29 (7)
	16:12	17:02	17:57	19:53	19 07:34 (3)	20:47	21:35	13 05:42 (7)
3	08:32	08:00	07:03	06:49	07:15 (3)	05:42	06:08 (9)	04:57 (7)
	16:13	17:04	17:58	6 07:33 (2)	19:55	19 07:34 (3)	20:49	13 06:21 (8)
4	08:32	07:58	07:01	06:47	07:14 (3)	05:41	06:06 (9)	04:56 (7)
	16:14	17:06	18:00	10 07:35 (2)	19:57	19 07:33 (3)	20:50	17 06:23 (8)
5	08:32	07:57	06:58	06:45	07:22 (2)	06:45	07:13 (4)	05:39 (7)
	16:15	17:08	18:02	14 07:36 (2)	19:59	20 07:33 (3)	20:52	20 06:25 (8)
6	08:31	07:55	06:56	06:42	07:20 (2)	06:42	07:08 (4)	05:37 (7)
	16:16	17:10	18:04	17 07:37 (2)	20:00	24 07:32 (3)	20:54	22 06:26 (8)
7	08:31	07:53	06:54	06:40	07:18 (2)	06:40	07:07 (4)	05:35 (7)
	16:18	17:12	18:06	18 07:36 (2)	20:02	24 07:31 (3)	20:56	23 06:27 (8)
8	08:30	07:51	06:51	06:37	07:18 (2)	06:37	07:05 (4)	05:33 (7)
	16:19	17:14	18:08	19 07:37 (2)	20:04	25 07:30 (3)	20:57	24 06:27 (8)
9	08:30	07:49	06:49	06:35	07:18 (2)	06:35	07:04 (4)	05:31 (7)
	16:20	17:16	18:10	19 07:37 (2)	20:06	25 07:29 (3)	20:59	24 06:27 (8)
10	08:29	07:48	06:47	06:33	07:17 (2)	06:33	07:02 (4)	05:29 (7)
	16:22	17:18	18:11	19 07:36 (2)	20:08	25 07:27 (4)	21:01	25 06:28 (8)
11	08:29	07:46	06:44	06:30	07:18 (2)	06:30	07:02 (4)	05:27 (7)
	16:23	17:20	18:13	17 07:35 (2)	20:09	25 07:27 (4)	21:03	25 06:28 (8)
12	08:28	07:44	06:42	06:28	07:19 (2)	06:28	07:02 (4)	05:26 (7)
	16:25	17:22	18:15	15 07:34 (2)	20:11	25 07:27 (4)	21:04	25 06:28 (8)
13	08:27	07:42	06:40	06:26	07:20 (2)	06:26	07:00 (4)	05:24 (7)
	16:26	17:24	18:17	12 07:32 (2)	20:13	27 07:27 (4)	21:06	24 06:28 (8)
14	08:26	07:40	06:37	06:24	07:22 (2)	06:24	07:00 (4)	05:22 (7)
	16:28	17:26	18:19	8 07:30 (2)	20:15	27 07:27 (4)	21:08	24 06:28 (8)
15	08:25	07:38	06:35	06:21	07:00 (1)	06:21	07:01 (4)	05:21 (7)
	16:30	17:28	18:21	7 07:07 (1)	20:17	25 07:26 (4)	21:09	23 06:28 (8)
16	08:24	07:36	06:32	06:19	07:14 (1)	06:19	07:01 (4)	05:19 (7)
	16:31	17:30	18:23	13 07:10 (1)	20:18	25 07:26 (4)	21:11	22 06:27 (8)
17	08:23	07:34	06:30	06:17	07:11 (1)	06:17	07:00 (4)	05:17 (7)
	16:33	17:32	18:24	17 07:11 (1)	20:20	24 07:24 (4)	21:12	20 06:27 (8)
18	08:22	07:32	06:28	06:14	07:01 (1)	06:14	07:01 (4)	05:16 (7)
	16:35	17:34	18:26	20 07:13 (1)	20:22	23 07:24 (4)	21:14	19 06:27 (8)
19	08:21	07:29	06:25	06:12	07:02 (1)	06:12	07:02 (4)	05:14 (7)
	16:36	17:35	18:28	22 07:14 (1)	20:24	20 07:22 (4)	21:16	18 06:26 (8)
20	08:20	07:27	06:23	06:10	07:03 (1)	06:10	07:03 (4)	05:13 (7)
	16:38	17:37	18:30	22 07:13 (1)	20:26	18 07:21 (4)	21:17	17 06:26 (8)
21	08:19	07:25	06:20	06:08	07:05 (1)	06:08	07:05 (4)	05:12 (7)
	16:40	17:39	18:32	23 07:14 (1)	20:27	14 07:19 (4)	21:19	15 06:25 (8)
22	08:18	07:23	06:18	06:06	07:07 (1)	06:06	07:07 (4)	05:10 (7)
	16:42	17:41	18:33	23 07:13 (1)	20:29	9 07:16 (4)	21:20	13 06:23 (8)
23	08:17	07:21	06:16	06:03	07:08 (1)	06:03	07:08 (4)	05:09 (7)
	16:43	17:43	18:35	23 07:13 (1)	20:31	10 06:22 (8)	21:49	18 05:48 (7)
24	08:15	07:19	06:13	06:01	07:09 (1)	06:01	07:09 (4)	05:07 (7)
	16:45	17:45	18:37	23 07:12 (1)	20:33	21:23	6 06:20 (8)	21:49
25	08:14	07:16	06:11	05:59	07:10 (1)	05:59	07:10 (4)	05:06 (7)
	16:47	17:47	18:39	21 07:11 (1)	20:35	21:24	6 06:20 (8)	21:49
26	08:13	07:14	06:08	05:57	07:11 (1)	05:57	07:11 (4)	05:05 (7)
	16:49	17:49	18:41	20 07:11 (1)	20:36	21:26	6 06:20 (8)	21:49
27	08:11	07:12	06:06	05:51	07:12 (1)	05:55	07:12 (4)	05:04 (7)
	16:51	17:51	18:42	17 07:08 (1)	20:38	21:27	6 06:20 (8)	21:49
28	08:10	07:10	06:04	05:53	07:13 (1)	05:53	07:13 (4)	05:03 (7)
	16:53	17:53	18:44	14 07:07 (1)	20:40	21:29	6 06:20 (8)	21:49
29	08:08	07:01	06:00	05:51	07:14 (1)	05:51	07:14 (4)	05:02 (7)
	16:55	17:55	18:46	12 08:03 (1)	20:42	21:30	5 05:37 (7)	21:49
30	08:07	06:59	06:00	05:49	07:15 (1)	05:49	07:15 (4)	05:01 (7)
	16:57	17:57	18:48	9 07:31 (3)	20:43	21:31	9 05:39 (7)	21:48
31	08:05	06:56	06:00	05:49	07:16 (1)	05:49	07:16 (4)	05:00 (7)
	16:58	17:58	18:49	13 07:33 (3)	20:45	21:32	11 05:40 (7)	21:48
Sonnenscheinstunden	253	275	367	419	491	506		
astr.max.mögl.Beschattung			473	478	454	509		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.68	0.72	0.73	0.72		
Gesamte Reduktion			0.18	0.26	0.30	0.27		
Met.wahrsch.Beschattung			85	122	136	135		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DP - IO120

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Oktober	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
302	339	467	706	617	554	815	1,348	1,328	721	398	8,381	

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November		Dezember				
1	04:55	05:32 (7)	05:34	06:13 (9)	06:26	07:01 (4)	07:18	07:58 (2)	07:14	08:08				
	21:48	17	05:49 (7)	21:14	25	06:38 (8)	20:09	25	07:26 (4)	18:57	15	08:13 (2)	16:48	16:05
2	04:56	05:32 (7)	05:35	06:13 (9)	06:28	07:01 (4)	07:20	07:57 (2)	07:16	08:09				
	21:48	18	05:50 (7)	21:12	26	06:39 (8)	20:07	25	07:26 (4)	18:55	17	08:14 (2)	16:46	16:05
3	04:56	05:33 (7)	05:37	06:13 (9)	06:30	07:01 (4)	07:21	07:55 (2)	07:18	08:11				
	21:47	17	05:50 (7)	21:11	25	06:38 (8)	20:05	25	07:26 (3)	18:52	18	08:13 (2)	16:44	16:04
4	04:57	05:33 (7)	05:38	06:13 (9)	06:31	07:02 (4)	07:23	07:55 (2)	07:20	08:12				
	21:47	16	05:49 (7)	21:09	25	06:38 (8)	20:02	25	07:27 (3)	18:50	19	08:14 (2)	16:42	16:03
5	04:58	05:33 (7)	05:40	06:14 (9)	06:33	07:04 (4)	07:25	07:55 (2)	07:22	08:14				
	21:46	17	05:50 (7)	21:07	24	06:38 (8)	20:00	24	07:28 (3)	18:48	19	08:14 (2)	16:41	16:03
6	04:59	05:34 (7)	05:42	06:13 (9)	06:35	07:04 (4)	07:27	07:55 (2)	07:24	08:15				
	21:46	16	05:50 (7)	21:05	23	06:36 (8)	19:58	24	07:28 (3)	18:45	18	08:13 (2)	16:39	16:02
7	05:00	05:34 (7)	05:43	06:14 (9)	06:36	07:08 (4)	07:28	07:55 (2)	07:26	08:16				
	21:45	16	05:50 (7)	21:03	22	06:36 (8)	19:55	20	07:28 (3)	18:43	18	08:13 (2)	16:37	16:02
8	05:01	05:35 (7)	05:45	06:14 (9)	06:38	07:09 (3)	07:30	07:56 (2)	07:28	08:18				
	21:45	15	05:50 (7)	21:01	20	06:34 (8)	19:53	20	07:29 (3)	18:41	15	08:11 (2)	16:35	16:01
9	05:02	05:35 (7)	05:47	06:16 (9)	06:40	07:08 (3)	07:32	07:58 (2)	07:30	08:19				
	21:44	15	05:50 (7)	20:59	16	06:32 (8)	19:50	19	07:27 (3)	18:38	12	08:10 (2)	16:33	16:01
10	05:03	05:36 (7)	05:48	06:17 (9)	06:42	07:08 (3)	07:34	08:00 (2)	07:31	08:20				
	21:43	13	05:49 (7)	20:57	9	06:27 (8)	19:48	19	07:27 (3)	18:36	8	08:08 (2)	16:32	16:01
11	05:04	05:37 (7)	05:50	06:43	07:10 (3)	07:36	08:02 (2)	07:33	08:21					
	21:42	12	05:49 (7)	20:55	19:46	16	07:26 (3)	18:34	3	08:05 (2)	16:30	16:01		
12	05:05	05:37 (7)	05:52	06:45	07:11 (3)	07:37	07:35	08:22						
	21:41	11	05:48 (7)	20:53	19:43	13	07:24 (3)	18:31	16:28	16:00				
13	05:06	05:38 (7)	05:54	06:47	07:13 (3)	07:39	07:37	08:23						
	21:40	10	05:48 (7)	20:51	19:41	10	07:23 (3)	18:29	16:27	16:00				
14	05:07	05:40 (7)	05:55	06:48	07:15 (3)	07:41	07:39	08:24						
	21:39	6	05:46 (7)	20:49	19:38	12	07:54 (1)	18:27	16:25	16:00				
15	05:09	05:57	06:50	07:43 (1)	07:43	07:41	08:25							
	21:38	20:47	19:36	13	07:56 (1)	18:24	16:24	16:00						
16	05:10	05:59	06:52	07:41 (1)	07:45	07:43	08:26							
	21:37	20:45	19:33	17	07:58 (1)	18:22	16:22	16:00						
17	05:11	06:00	06:54	07:40 (1)	07:46	07:44	08:27							
	21:36	20:43	19:31	19	07:59 (1)	18:20	16:21	16:01						
18	05:13	06:02	06:55	07:38 (1)	07:48	07:46	08:28							
	21:35	20:41	19:29	21	07:59 (1)	18:18	16:19	16:01						
19	05:14	06:26 (8)	06:04	06:57	07:37 (1)	07:50	07:48	08:28						
	21:34	2	06:28 (8)	20:39	19:26	22	07:59 (1)	18:15	16:18	16:01				
20	05:15	06:22 (8)	06:05	06:59	07:37 (1)	07:52	07:50	08:29						
	21:32	9	06:31 (8)	20:37	19:24	23	08:00 (1)	18:13	16:17	16:01				
21	05:17	06:22 (8)	06:07	07:11 (4)	07:00	07:35 (1)	07:54	07:51	08:30					
	21:31	11	06:33 (8)	20:34	11	07:22 (4)	19:21	24	07:59 (1)	18:11	16:15	16:02		
22	05:18	06:20 (8)	06:09	07:09 (4)	07:02	07:35 (1)	07:56	07:53	08:30					
	21:30	14	06:34 (8)	20:32	15	07:24 (4)	19:19	24	07:59 (1)	18:09	16:14	16:02		
23	05:20	06:19 (8)	06:11	07:06 (4)	07:04	07:35 (1)	07:58	07:55	08:31					
	21:28	16	06:35 (8)	20:30	19	07:25 (4)	19:16	23	07:58 (1)	18:07	16:13	16:03		
24	05:21	06:19 (8)	06:12	07:05 (4)	07:06	07:36 (1)	07:59	07:57	08:31					
	21:27	17	06:36 (8)	20:28	21	07:26 (4)	19:14	22	07:58 (1)	18:05	16:12	16:03		
25	05:23	06:18 (8)	06:14	07:05 (4)	07:07	07:36 (1)	07:01	07:58	08:32					
	21:26	19	06:37 (8)	20:25	22	07:27 (4)	19:12	20	07:56 (1)	17:02	16:11	16:04		
26	05:24	06:18 (8)	06:16	07:03 (4)	07:09	07:37 (1)	07:03	08:00	08:32					
	21:24	20	06:38 (8)	20:23	24	07:27 (4)	19:09	18	07:55 (1)	17:00	16:10	16:05		
27	05:26	06:17 (8)	06:18	07:03 (4)	07:11	07:38 (1)	07:05	08:02	08:32					
	21:22	21	06:38 (8)	20:21	25	07:28 (4)	19:07	15	07:53 (1)	16:58	16:09	16:06		
28	05:27	06:16 (9)	06:19	07:01 (4)	07:13	07:39 (1)	07:07	08:03	08:32					
	21:21	23	06:39 (8)	20:19	26	07:27 (4)	19:04	10	07:49 (1)	16:56	16:08	16:06		
29	05:29	06:15 (9)	06:21	07:01 (4)	07:14	08:04 (2)	07:09	08:05	08:32					
	21:19	24	06:39 (8)	20:16	26	07:27 (4)	19:02	3	08:07 (2)	16:54	16:07	16:07		
30	05:30	06:14 (9)	06:23	07:01 (4)	07:16	08:00 (2)	07:11	08:06	08:32					
	21:18	24	06:38 (8)	20:14	27	07:28 (4)	19:00	11	08:11 (2)	16:52	16:06	16:08		
31	05:32	06:14 (9)	06:24	07:01 (4)	07:13	07:13	08:32							
	21:16	25	06:39 (8)	20:12	25	07:26 (4)	16:50	16:09						
	Sonnenscheinstunden	509	458	382	330	262	237							
	astr. max. mögl. Beschattung	424	456	562	162									
	Red. Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29									
	Reduktion Betriebsdauer	0.96	0.96	0.96	0.96									
	Reduktion Windrichtung	0.72	0.72	0.70	0.66									
	Gesamte Reduktion	0.26	0.29	0.23	0.18									
	Met. wahrsch. Beschattung	111	134	132	30									

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt

Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBShadowrezeptor: DQ - IO121

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S [Mittlere tägliche Sonnenstunden] [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Table with columns for months (Januar to Juni) and rows for hourly intervals (e.g., 08:32 to 16:58) showing shadow cast status and angles.

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Table with columns: Tag im Monat, Sonnenaufgang (SS:MM), Sonnenuntergang (SS:MM), Minuten mit Schatten, Zeitpunkt (SS:MM) Schattenanfang, Zeitpunkt (SS:MM) Schattende, (WEA mit erstem Schatten), (WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBShadowrezeptor: DR - IO122

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
302	339	467	706	786	617	554	815	1,348	1,328	721	398	8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni						
1	08:32	08:03	07:08	06:54	07:34 (1) 05:46	06:47 (4) 04:59	05:51 (8)					
	16:10	17:00	17:55	19:51	22 07:56 (1) 20:45	14 07:01 (4) 21:34	20 06:11 (8)					
2	08:32	08:02	07:05	06:52	07:35 (1) 05:44	06:49 (4) 04:58	05:52 (8)					
	16:12	17:02	17:57	19:53	20 07:55 (1) 20:47	10 06:59 (4) 21:35	20 06:12 (8)					
3	08:32	08:00	07:03	06:49	07:36 (1) 05:42	06:49 (4) 04:57	05:52 (8)					
	16:13	17:04	17:58	19:55	18 07:54 (1) 20:49	18 07:01 (4) 21:34	20 06:12 (8)					
4	08:32	07:58	07:01	06:47	07:10 (3) 05:41	06:49 (4) 04:56	05:52 (8)					
	16:14	17:06	18:00	19:57	21 07:52 (1) 20:50	19 07:00 (3) 20:52	19 06:11 (8)					
5	08:32	07:57	06:58	06:45	07:08 (3) 05:39	06:49 (4) 04:55	05:53 (8)					
	16:15	17:08	18:02	19:59	22 07:50 (1) 20:52	21 07:00 (3) 20:52	18 06:11 (8)					
6	08:31	07:55	06:56	06:42	07:05 (3) 05:37	06:49 (4) 04:55	05:53 (8)					
	16:16	17:10	18:04	20:00	13 07:18 (3) 20:54	13 07:00 (3) 20:54	18 06:11 (8)					
7	08:31	07:53	06:54	06:40	07:03 (3) 05:35	06:49 (4) 04:54	05:54 (8)					
	16:18	17:12	18:06	20:02	17 07:20 (3) 20:56	17 07:00 (3) 20:56	17 06:11 (8)					
8	08:30	07:51	06:51	06:37	07:02 (3) 05:33	06:49 (4) 04:53	05:54 (8)					
	16:19	17:14	18:08	6 07:21 (2) 20:04	18 07:20 (3) 20:57	18 07:00 (3) 20:57	16 06:10 (8)					
9	08:30	07:49	06:49	07:13 (2) 06:35	07:01 (3) 05:31	06:49 (4) 04:53	05:55 (8)					
	16:20	17:16	18:10	11 07:24 (2) 20:06	20 07:21 (3) 20:59	20 07:00 (3) 20:59	16 06:11 (8)					
10	08:29	07:48	06:47	07:10 (2) 06:33	07:00 (3) 05:29	06:49 (4) 04:52	05:55 (8)					
	16:22	17:18	18:11	14 07:24 (2) 20:08	20 07:20 (3) 21:01	20 07:00 (3) 21:01	15 06:10 (8)					
11	08:29	07:46	06:44	07:08 (2) 06:30	07:00 (3) 05:27	05:54 (9) 04:52	05:56 (8)					
	16:23	17:20	18:13	17 07:25 (2) 20:09	20 07:20 (3) 21:03	8 06:02 (9) 21:44	14 06:10 (8)					
12	08:28	07:44	06:42	07:07 (2) 06:28	07:00 (3) 05:26	05:52 (9) 04:52	05:57 (8)					
	16:25	17:22	18:15	19 07:26 (2) 20:11	19 07:19 (3) 21:04	11 06:03 (9) 21:44	13 06:10 (8)					
13	08:27	07:42	06:40	07:06 (2) 06:26	07:00 (3) 05:24	05:52 (9) 04:51	05:58 (8)					
	16:26	17:24	18:17	19 07:25 (2) 20:13	18 07:18 (3) 21:06	13 06:05 (9) 21:45	12 06:10 (8)					
14	08:26	07:40	06:37	07:06 (2) 06:24	06:51 (4) 05:22	05:50 (9) 04:51	05:57 (8)					
	16:28	17:26	18:19	20 07:26 (2) 20:15	26 07:17 (3) 21:08	15 06:05 (9) 21:46	12 06:09 (8)					
15	08:25	07:38	06:35	07:05 (2) 06:21	06:49 (4) 05:21	05:50 (9) 04:51	05:58 (8)					
	16:30	17:28	18:21	20 07:25 (2) 20:17	27 07:16 (3) 21:09	17 06:07 (8) 21:46	11 06:09 (8)					
16	08:24	07:36	06:32	07:06 (2) 06:19	06:47 (4) 05:19	05:49 (9) 04:51	05:59 (8)					
	16:31	17:30	18:23	18 07:24 (2) 20:18	27 07:14 (3) 21:11	18 06:07 (8) 21:47	10 06:09 (8)					
17	08:23	07:34	06:30	07:06 (2) 06:17	06:45 (4) 05:17	05:49 (9) 04:50	05:59 (8)					
	16:33	17:32	18:24	16 07:22 (2) 20:20	24 07:09 (3) 21:12	20 06:09 (8) 21:47	10 06:09 (8)					
18	08:22	07:32	06:28	07:07 (2) 06:14	06:44 (4) 05:16	05:50 (9) 04:50	06:00 (8)					
	16:35	17:34	18:26	14 07:21 (2) 20:22	24 07:08 (4) 21:14	20 06:10 (8) 21:48	9 06:09 (8)					
19	08:21	07:29	06:25	07:09 (2) 06:12	06:44 (4) 05:14	05:49 (9) 04:50	06:00 (8)					
	16:36	17:35	18:28	11 07:20 (2) 20:24	25 07:09 (4) 21:16	21 06:10 (8) 21:48	9 06:09 (8)					
20	08:20	07:27	06:23	06:10	06:43 (4) 05:13	05:49 (9) 04:51	06:01 (8)					
	16:38	17:37	18:30	20:26	26 07:09 (4) 21:17	22 06:11 (8) 21:48	9 06:10 (8)					
21	08:19	07:25	06:20	06:08	06:43 (4) 05:12	05:50 (9) 04:51	06:01 (8)					
	16:40	17:39	18:32	20:27	26 07:09 (4) 21:19	21 06:11 (8) 21:49	9 06:10 (8)					
22	08:18	07:23	06:18	06:06	06:42 (4) 05:10	05:49 (9) 04:51	06:01 (8)					
	16:42	17:41	18:33	9 06:53 (1) 20:29	27 07:09 (4) 21:20	22 06:11 (8) 21:49	9 06:10 (8)					
23	08:17	07:21	06:16	06:41 (1) 06:03	06:42 (4) 05:09	05:49 (9) 04:51	06:01 (8)					
	16:43	17:43	18:35	14 06:55 (1) 20:31	27 07:09 (4) 21:22	22 06:11 (8) 21:49	9 06:10 (8)					
24	08:15	07:19	06:13	06:38 (1) 06:01	06:42 (4) 05:07	05:49 (9) 04:51	06:02 (8)					
	16:45	17:45	18:37	18 06:56 (1) 20:33	27 07:09 (4) 21:23	23 06:12 (8) 21:49	9 06:11 (8)					
25	08:14	07:16	06:11	06:37 (1) 05:59	06:42 (4) 05:06	05:49 (9) 04:52	06:01 (8)					
	16:47	17:47	18:39	21 06:58 (1) 20:35	26 07:08 (4) 21:24	23 06:12 (8) 21:49	10 06:11 (8)					
26	08:13	07:14	06:08	06:36 (1) 05:57	06:42 (4) 05:05	05:50 (8) 04:52	06:01 (8)					
	16:49	17:49	18:41	23 06:59 (1) 20:36	25 07:07 (4) 21:26	22 06:12 (8) 21:49	10 06:11 (8)					
27	08:11	07:12	06:06	06:35 (1) 05:55	06:42 (4) 05:04	05:50 (8) 04:53	06:01 (8)					
	16:50	17:51	18:42	23 06:58 (1) 20:38	24 07:06 (4) 21:27	22 06:12 (8) 21:49	11 06:12 (8)					
28	08:10	07:10	06:04	06:35 (1) 05:53	06:43 (4) 05:03	05:50 (8) 04:53	06:01 (8)					
	16:53	17:53	18:44	24 06:59 (1) 20:40	22 07:05 (4) 21:29	22 06:12 (8) 21:49	11 06:12 (8)					
29	08:08	07:01	07:34 (1) 05:51	06:44 (4) 05:02	05:50 (8) 04:54	06:01 (8)						
	16:55	19:46	24 07:58 (1) 20:42	21 07:05 (4) 21:30	22 06:12 (8) 21:49	12 06:13 (8)						
30	08:07	06:59	07:34 (1) 05:49	06:45 (4) 05:01	05:50 (8) 04:54	06:00 (8)						
	16:57	19:48	24 07:58 (1) 20:43	18 07:03 (4) 21:31	22 06:12 (8) 21:48	13 06:13 (8)						
31	08:05	06:56	07:34 (1) 05:50	05:00	05:50 (8) 04:54	06:00 (8)						
	16:58	19:50	24 07:58 (1) 20:44	21:32	22 06:12 (8) 21:48	13 06:13 (8)						
Sonnenscheinstunden	253	275	367	418	491	506						
astr. max.mögl. Beschattung			389	670	432	391						
Red. Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39						
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96						
Reduktion Windrichtung			0.69	0.72	0.73	0.73						
Gesamte Reduktion			0.18	0.26	0.30	0.27						
Met. wahrsch. Beschattung			71	171	129	105						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DS - IO123

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32 16:10	08:03 17:00	07:08 17:55	06:54 19:51	07:26 (1) 25 07:51 (1)	05:46 24 06:59 (4)			04:59 22 06:05 (8)
2	08:32 16:12	08:02 17:02	07:05 17:57	06:52 19:53	07:26 (1) 25 07:51 (1)	05:44 23 06:58 (4)			04:58 22 06:06 (8)
3	08:32 16:13	08:00 17:04	07:03 17:58	06:49 19:55	07:27 (1) 23 07:50 (1)	05:42 21 06:57 (4)			04:57 22 06:06 (8)
4	08:32 16:14	07:58 17:06	07:01 18:00	06:47 19:57	07:26 (1) 23 07:49 (1)	05:41 18 06:55 (4)			04:56 22 06:06 (8)
5	08:32 16:15	07:57 17:08	06:58 18:02	06:45 19:59	07:27 (1) 21 07:48 (1)	05:39 15 06:53 (4)			04:55 21 06:06 (8)
6	08:31 16:16	07:55 17:10	06:56 18:04	06:42 20:00	07:27 (1) 19 07:46 (1)	05:37 11 06:51 (4)			04:55 22 06:06 (8)
7	08:31 16:18	07:53 17:12	06:54 18:06	06:40 20:02	07:03 (3) 24 07:45 (1)	05:35 2 06:47 (4)			04:54 22 06:07 (8)
8	08:30 16:19	07:51 17:14	06:51 18:08	06:37 20:04	07:01 (3) 24 07:43 (1)	05:33 04:53			21:41 21 06:06 (8)
9	08:30 16:20	07:49 17:16	06:49 18:10	06:35 20:06	07:43 (1) 20 07:39 (1)	05:31 21 06:59 (9)			04:53 21 06:07 (8)
10	08:29 16:22	07:48 17:18	06:47 18:11	06:33 07:10 (2)	06:33 18 07:14 (3)	05:29 21:01			04:52 21 06:06 (8)
11	08:29 16:23	07:46 17:20	06:44 18:13	06:30 07:08 (2)	06:30 19 07:14 (3)	05:27 21:03			04:52 20 06:06 (8)
12	08:28 16:25	07:44 17:22	06:42 18:15	06:28 07:06 (2)	06:28 19 07:14 (3)	05:26 21:04			04:52 20 06:07 (8)
13	08:27 16:26	07:42 17:24	06:40 18:17	06:26 07:03 (2)	06:26 19 07:13 (3)	05:24 21:06			04:51 20 06:07 (8)
14	08:26 16:28	07:40 17:26	06:37 18:19	06:24 07:01 (2)	06:24 19 07:13 (3)	05:22 21:08			04:51 19 06:06 (8)
15	08:25 16:30	07:38 17:28	06:35 18:21	06:21 07:00 (2)	06:21 19 07:13 (3)	05:21 21:09			04:51 19 06:06 (8)
16	08:24 16:31	07:36 17:30	06:32 18:23	06:19 07:20 (2)	06:19 17 07:12 (3)	05:19 21:11			04:51 19 06:07 (8)
17	08:23 16:33	07:34 17:32	06:30 18:24	06:17 07:19 (2)	06:17 24 07:10 (3)	05:17 21:12			04:50 19 06:07 (8)
18	08:22 16:35	07:32 17:34	06:28 18:26	06:14 07:00 (2)	06:14 27 07:09 (3)	05:16 21:14			04:50 19 06:07 (8)
19	08:21 16:36	07:29 17:35	06:25 18:28	06:12 07:18 (2)	06:12 18 07:07 (3)	05:14 21:16			04:50 19 06:07 (8)
20	08:20 16:38	07:27 17:37	06:23 18:30	06:10 07:16 (2)	06:10 21 06:59 (4)	05:13 21:17			04:51 19 06:08 (8)
21	08:19 16:40	07:25 17:39	06:20 18:32	06:08 07:02 (2)	06:08 23 07:15 (2)	05:12 21:19			04:51 19 06:08 (8)
22	08:18 16:42	07:23 17:41	06:18 18:33	06:06 07:04 (2)	06:06 25 07:01 (4)	05:10 21:20			04:51 19 06:08 (8)
23	08:17 16:43	07:21 17:43	06:16 18:35	06:03 20:31	06:03 25 07:01 (4)	05:09 21:22			04:51 19 06:08 (8)
24	08:15 16:45	07:19 17:45	06:13 18:37	06:01 20:33	06:01 26 07:01 (4)	05:07 21:23			04:51 19 06:09 (8)
25	08:14 16:47	07:16 17:47	06:11 18:39	06:37 (1) 06:45 (1)	05:59 26 07:01 (4)	05:06 20 06:04 (8)			04:52 19 06:09 (8)
26	08:13 16:49	07:14 17:49	06:08 18:41	06:34 (1) 06:48 (1)	05:57 26 07:00 (4)	05:05 21 06:04 (8)			04:52 19 06:09 (8)
27	08:11 16:51	07:12 17:51	06:06 18:42	06:31 (1) 06:49 (1)	05:55 27 07:00 (4)	05:04 22 06:05 (8)			04:53 19 06:09 (8)
28	08:10 16:53	07:10 17:53	06:04 18:44	06:30 (1) 06:50 (1)	05:53 27 07:00 (4)	05:03 21:29			04:53 21:49 06:09 (8)
29	08:08 16:55	07:01 19:46	07:28 (1) 07:50 (1)	05:51 22 07:50 (1)	05:02 26 07:00 (4)	05:02 22 06:05 (8)			04:54 20 06:10 (8)
30	08:07 16:57	06:59 19:48	07:28 (1) 07:51 (1)	05:49 23 07:51 (1)	05:49 25 07:00 (4)	05:01 22 06:05 (8)			04:54 20 06:10 (8)
31	08:05 16:58	06:56 19:50	07:27 (1) 07:51 (1)	05:47 24 07:51 (1)	05:00 21:32	05:00 22 06:05 (8)			04:54 20 06:10 (8)
Sonnenscheinstunden 253 275 367 418 491 506 601									
astr.max.mögl.Beschattung									
Red.Sonnenscheinwahrsch.									
Reduktion Betriebsdauer									
Reduktion Windrichtung									
Gesamte Reduktion									
Met.wahrsch.Beschattung									

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (SS:MM)	Schattenende (SS:MM)	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)

windPRO 3.2.744 | EMD International A/S, Tel. +45 96 35 44 44, www.emd.dk, windpro@emd.dk

05.08.2019 10:28 / 252



Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: **GBSchattenrezeptor: DS - IO123**

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor

N	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe	
302	339	467	706	786	617	554	815	1,348	1,328	721	398	8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember			
1 04:55		05:50 (8) 05:34		06:26	06:54 (3) 07:18	07:44 (2) 07:14	08:08		
21:48	20	06:10 (8) 21:14		20:09	19	07:13 (3) 18:57	14	07:58 (2) 16:48	16:05
2 04:56		05:51 (8) 05:35		06:28	06:55 (3) 07:20	07:46 (2) 07:16	08:09		
21:48	20	06:11 (8) 21:12		20:07	18	07:13 (3) 18:55	11	07:57 (2) 16:46	16:05
3 04:56		05:51 (8) 05:37		06:30	06:56 (3) 07:21	07:47 (2) 07:18	08:11		
21:47	21	06:12 (8) 21:11		20:05	19	07:36 (1) 18:52	6	07:53 (2) 16:44	16:04
4 04:57		05:50 (8) 05:38		06:31	06:58 (3) 07:23	07:20	08:12		
21:47	21	06:11 (8) 21:09		20:02	23	07:40 (1) 18:50		16:42	16:03
5 04:58		05:51 (8) 05:40		06:33	07:00 (3) 07:25	07:22	08:14		
21:46	21	06:12 (8) 21:07		20:00	23	07:42 (1) 18:48		16:41	16:03
6 04:59		05:51 (8) 05:42	06:52 (4) 06:35	07:23 (1) 07:27	07:24	08:15			
21:46	21	06:12 (8) 21:05	7	06:59 (4) 19:58	19	07:42 (1) 18:45		16:39	16:02
7 05:00		05:51 (8) 05:43	06:50 (4) 06:36	07:22 (1) 07:28	07:26	08:16			
21:45	22	06:13 (8) 21:03	12	07:02 (4) 19:55	21	07:43 (1) 18:43		16:37	16:02
8 05:01		05:51 (8) 05:45	06:47 (4) 06:38	07:21 (1) 07:30	07:28	08:18			
21:45	22	06:13 (8) 21:01	16	07:03 (4) 19:53	23	07:44 (1) 18:41		16:35	16:01
9 05:02		05:51 (8) 05:47	06:46 (4) 06:40	07:20 (1) 07:32	07:30	08:19			
21:44	22	06:13 (8) 20:59	19	07:05 (4) 19:50	23	07:43 (1) 18:38		16:33	16:01
10 05:03		05:51 (8) 05:48	06:44 (4) 06:42	07:20 (1) 07:34	07:31	08:20			
21:43	23	06:14 (8) 20:57	21	07:05 (4) 19:48	24	07:44 (1) 18:36		16:32	16:01
11 05:04		05:51 (8) 05:50	06:44 (4) 06:43	07:20 (1) 07:36	07:33	08:21			
21:42	23	06:14 (8) 20:55	23	07:07 (4) 19:46	24	07:44 (1) 18:34		16:30	16:01
12 05:05		05:51 (8) 05:52	06:43 (4) 06:45	07:19 (1) 07:37	07:35	08:22			
21:41	23	06:14 (8) 20:53	25	07:08 (4) 19:43	24	07:43 (1) 18:31		16:28	16:00
13 05:06		05:52 (8) 05:54	06:42 (4) 06:47	07:19 (1) 07:39	07:37	08:23			
21:40	22	06:14 (8) 20:51	25	07:07 (4) 19:41	23	07:42 (1) 18:29		16:27	16:00
14 05:07		05:52 (8) 05:55	06:42 (4) 06:48	07:19 (1) 07:41	07:39	08:24			
21:39	22	06:14 (8) 20:49	26	07:08 (4) 19:38	23	07:42 (1) 18:27		16:25	16:00
15 05:09		05:52 (8) 05:57	06:41 (4) 06:50	07:19 (1) 07:43	07:41	08:25			
21:38	22	06:14 (8) 20:47	26	07:07 (4) 19:36	21	07:40 (1) 18:24		16:24	16:00
16 05:10		05:52 (8) 05:59	06:41 (4) 06:52	07:20 (1) 07:45	07:43	08:26			
21:37	21	06:13 (8) 20:45	27	07:08 (4) 19:33	19	07:39 (1) 18:22		16:22	16:00
17 05:11		05:53 (8) 06:00	06:41 (4) 06:54	07:22 (1) 07:46	07:44	08:27			
21:36	21	06:14 (8) 20:43	27	07:08 (4) 19:31	15	07:37 (1) 18:20		16:21	16:01
18 05:13		05:53 (8) 06:02	06:41 (4) 06:55	07:23 (1) 07:48	07:46	08:28			
21:35	21	06:14 (8) 20:41	26	07:07 (4) 19:29	11	07:34 (1) 18:18		16:19	16:01
19 05:14		05:53 (8) 06:04	06:41 (4) 06:57	07:20	07:48	08:28			
21:34	20	06:13 (8) 20:39	26	07:07 (4) 19:26		16:18	16:01		
20 05:15		05:53 (8) 06:05	06:41 (4) 06:59	07:20	07:50	08:29			
21:32	20	06:13 (8) 20:37	25	07:06 (4) 19:24		16:17	16:01		
21 05:17		05:54 (9) 06:07	06:41 (4) 07:00	07:51 (2) 07:54	07:51	08:30			
21:31	19	06:13 (8) 20:34	24	07:05 (4) 19:21	4	07:55 (2) 18:11		16:15	16:02
22 05:18		05:54 (9) 06:09	06:42 (4) 07:02	07:47 (2) 07:56	07:53	08:30			
21:30	18	06:12 (9) 20:32	23	07:05 (4) 19:19	12	07:59 (2) 18:09		16:14	16:02
23 05:20		05:54 (9) 06:11	06:42 (4) 07:04	07:45 (2) 07:58	07:55	08:31			
21:28	17	06:11 (9) 20:30	21	07:03 (4) 19:16	15	08:00 (2) 18:07		16:13	16:03
24 05:21		05:55 (9) 06:12	06:44 (4) 07:06	07:43 (2) 07:59	07:57	08:31			
21:27	17	06:12 (9) 20:28	27	07:11 (3) 19:14	17	08:00 (2) 18:05		16:12	16:03
25 05:23		05:55 (9) 06:14	06:46 (4) 07:07	07:42 (2) 07:01	07:58	08:32			
21:25	16	06:11 (9) 20:25	27	07:13 (3) 19:12	19	08:01 (2) 17:02		16:11	16:04
26 05:24		05:56 (9) 06:16	06:48 (4) 07:09	07:42 (2) 07:03	08:00	08:32			
21:24	15	06:11 (9) 20:23	23	07:13 (3) 19:09	19	08:01 (2) 17:00		16:10	16:05
27 05:26		05:56 (9) 06:18	06:56 (3) 07:11	07:42 (2) 07:05	08:02	08:32			
21:22	14	06:10 (9) 20:21	18	07:14 (3) 19:07	19	08:01 (2) 16:58		16:09	16:06
28 05:27		05:58 (9) 06:19	06:55 (3) 07:13	07:41 (2) 07:07	08:03	08:32			
21:21	12	06:10 (9) 20:19	19	07:14 (3) 19:04	19	08:00 (2) 16:56		16:08	16:06
29 05:29		05:59 (9) 06:21	06:55 (3) 07:14	07:41 (2) 07:09	08:05	08:32			
21:19	9	06:08 (9) 20:16	19	07:14 (3) 19:02	19	08:00 (2) 16:54		16:07	16:07
30 05:30		06:00 (9) 06:23	06:54 (3) 07:16	07:42 (2) 07:11	08:06	08:32			
21:18	5	06:05 (9) 20:14	20	07:14 (3) 19:00	17	07:59 (2) 16:52		16:06	16:08
31 05:32		06:24	06:54 (3) 07:13	07:13	08:32				
21:16		20:12	19	07:13 (3) 16:50		16:09			
Sonnenscheinstunden	508	458	382	330	262	237			
astr. max. mögl. Beschattung	570	571	532	31					
Red. Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29					
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96					
Reduktion Windrichtung	0.73	0.72	0.70	0.68					
Gesamte Reduktion	0.26	0.29	0.23	0.19					
Met. wahrsch. Beschattung	150	166	125	6					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattende	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	---------------------------	------------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DT - IO124

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	06:54	07:29 (1)	05:46	06:39 (4)	04:59	05:46 (8)
	16:10	17:00	17:55	19:51	24 07:53 (1)	20:45	21 07:00 (4)	21:34	22 06:08 (8)
2	08:32	08:02	07:05	06:52	07:29 (1)	05:44	06:40 (4)	04:58	05:47 (8)
	16:12	17:02	17:57	19:53	24 07:53 (1)	20:47	19 06:59 (4)	21:35	21 06:08 (8)
3	08:32	08:00	07:03	06:49	07:30 (1)	05:42	06:41 (4)	04:57	05:47 (8)
	16:13	17:04	17:58	19:55	22 07:52 (1)	20:49	16 06:57 (4)	21:36	21 06:08 (8)
4	08:32	07:58	07:01	06:47	07:30 (1)	05:41	06:42 (4)	04:56	05:47 (8)
	16:14	17:06	18:00	19:57	20 07:50 (1)	20:50	13 06:55 (4)	21:37	21 06:08 (8)
5	08:32	07:57	06:58	06:45	07:31 (1)	05:39	06:45 (4)	04:55	05:47 (8)
	16:15	17:08	18:02	19:59	18 07:49 (1)	20:52	7 06:52 (4)	21:38	21 06:08 (8)
6	08:31	07:55	06:56	06:42	07:05 (3)	05:37	04:55	05:47 (8)	05:47 (8)
	16:16	17:10	18:04	20:00	23 07:47 (1)	20:54	21:39	21 06:08 (8)	21:39
7	08:31	07:53	06:54	06:40	07:03 (3)	05:35	04:54	05:48 (8)	05:48 (8)
	16:18	17:12	18:06	20:02	23 07:45 (1)	20:56	21:40	21 06:09 (8)	21:40
8	08:30	07:51	06:51	06:37	07:01 (3)	05:33	04:53	05:48 (8)	05:48 (8)
	16:19	17:14	18:08	20:04	15 07:16 (3)	20:57	21:41	20 06:08 (8)	21:41
9	08:30	07:49	06:49	06:35	07:13 (2)	05:31	04:53	05:49 (8)	05:49 (8)
	16:20	17:16	18:10	2 07:15 (2)	20:06	18 07:17 (3)	20:59	21:42	19 06:08 (8)
10	08:29	07:48	06:47	07:10 (2)	06:33	06:57 (3)	05:29	04:52	05:49 (8)
	16:22	17:18	18:11	8 07:18 (2)	20:08	19 07:16 (3)	21:01	21:43	19 06:08 (8)
11	08:29	07:46	06:44	07:08 (2)	06:30	06:57 (3)	05:27	04:52	05:49 (8)
	16:23	17:20	18:13	12 07:20 (2)	20:09	19 07:16 (3)	21:03	21:44	19 06:08 (8)
12	08:28	07:44	06:42	07:06 (2)	06:28	06:57 (3)	05:26	04:52	05:50 (8)
	16:25	17:22	18:15	16 07:22 (2)	20:11	19 07:16 (3)	21:04	21:44	18 06:08 (8)
13	08:27	07:42	06:40	07:03 (2)	06:26	06:56 (3)	05:24	04:51	05:51 (8)
	16:26	17:24	18:17	19 07:22 (2)	20:13	19 07:15 (3)	21:06	8 05:59 (9)	17 06:08 (8)
14	08:26	07:40	06:37	07:03 (2)	06:24	06:56 (3)	05:22	04:49	05:50 (8)
	16:28	17:26	18:19	19 07:22 (2)	20:15	19 07:15 (3)	21:08	11 06:00 (9)	18 06:08 (8)
15	08:25	07:38	06:35	07:02 (2)	06:21	06:57 (3)	05:21	04:48	05:51 (8)
	16:30	17:28	18:21	20 07:22 (2)	20:17	17 07:14 (3)	21:09	13 06:01 (9)	17 06:08 (8)
16	08:24	07:36	06:32	07:02 (2)	06:19	06:48 (4)	05:19	04:51	05:51 (8)
	16:31	17:30	18:23	20 07:22 (2)	20:18	25 07:13 (3)	21:11	15 06:02 (9)	17 06:08 (8)
17	08:23	07:34	06:30	07:01 (2)	06:17	06:44 (4)	05:17	04:47	05:51 (8)
	16:33	17:32	18:24	19 07:20 (2)	20:20	27 07:11 (3)	21:12	16 06:03 (9)	17 06:08 (8)
18	08:22	07:32	06:28	07:02 (2)	06:14	06:42 (4)	05:16	04:47	05:52 (8)
	16:35	17:34	18:26	18 07:20 (2)	20:22	27 07:09 (3)	21:14	17 06:04 (9)	16 06:08 (8)
19	08:21	07:29	06:25	07:03 (2)	06:12	06:41 (4)	05:14	04:46	05:52 (8)
	16:36	17:35	18:28	16 07:19 (2)	20:24	21 07:02 (4)	21:16	17 06:03 (9)	16 06:08 (8)
20	08:20	07:27	06:23	07:04 (2)	06:10	06:40 (4)	05:13	04:45	05:53 (8)
	16:38	17:37	18:30	13 07:17 (2)	20:26	23 07:03 (4)	21:17	19 06:05 (8)	16 06:09 (8)
21	08:19	07:25	06:20	07:06 (2)	06:08	06:39 (4)	05:12	04:46	05:53 (8)
	16:40	17:39	18:32	8 07:14 (2)	20:27	25 07:04 (4)	21:19	20 06:06 (8)	16 06:08 (8)
22	08:18	07:23	06:18	07:05	06:06	06:38 (4)	05:10	04:45	05:53 (8)
	16:42	17:41	18:33	20:29	26 07:04 (4)	21:20	19 06:05 (8)	21:49	16 06:09 (8)
23	08:17	07:21	06:16	06:03	06:03	06:38 (4)	05:09	04:46	05:53 (8)
	16:43	17:43	18:35	20:31	26 07:04 (4)	21:22	20 06:06 (8)	21:49	16 06:09 (8)
24	08:15	07:19	06:13	06:38 (1)	06:01	06:38 (4)	05:07	04:46	05:54 (8)
	16:45	17:45	18:37	10 06:48 (1)	20:33	26 07:04 (4)	21:23	21 06:07 (8)	16 06:10 (8)
25	08:14	07:16	06:11	06:36 (1)	05:59	06:37 (4)	05:06	04:45	05:54 (8)
	16:47	17:47	18:39	15 06:51 (1)	20:35	27 07:04 (4)	21:24	21 06:07 (8)	16 06:10 (8)
26	08:13	07:14	06:08	06:34 (1)	05:57	06:36 (4)	05:05	04:45	05:53 (8)
	16:49	17:49	18:41	19 06:53 (1)	20:36	27 07:03 (4)	21:26	22 06:07 (8)	17 06:10 (8)
27	08:11	07:12	06:06	06:32 (1)	05:55	06:36 (4)	05:04	04:45	05:54 (8)
	16:51	17:51	18:42	21 06:53 (1)	20:38	27 07:03 (4)	21:27	23 06:08 (8)	17 06:11 (8)
28	08:10	07:10	06:04	06:32 (1)	05:53	06:37 (4)	05:03	04:45	05:53 (8)
	16:53	17:53	18:44	22 06:54 (1)	20:40	25 07:02 (4)	21:29	22 06:08 (8)	16 06:11 (8)
29	08:08		07:01	07:30 (1)	05:51	06:38 (4)	05:02	04:46	05:54 (8)
	16:55		19:46	23 07:53 (1)	20:42	24 07:02 (4)	21:30	22 06:08 (8)	16 06:12 (8)
30	08:07		06:59	07:30 (1)	05:49	06:38 (4)	05:01	04:46	05:53 (8)
	16:57		19:48	24 07:54 (1)	20:43	23 07:01 (4)	21:31	22 06:08 (8)	16 06:11 (8)
31	08:05		06:56	07:30 (1)			05:00	04:46	
	16:58		19:50	24 07:54 (1)			21:32	22 06:08 (8)	
Sonnenscheinstunden	253	275	367	418		491		506	
astr. max. mögl. Beschattung			348		678		426		545
Red. Sonnenscheinwahrsch.			0.28		0.37		0.43		0.39
Reduktion Betriebsdauer			0.96		0.96		0.96		0.96
Reduktion Windrichtung			0.69		0.72		0.72		0.73
Gesamte Reduktion			0.18		0.26		0.30		0.27
Met. wahrsch. Beschattung			64		173		127		147

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)	Schattenende	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DT - IO124

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
302	339	467	706	786	617	554	815	1,348	1,328	721	398	8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:54 (8)	05:34		06:26	06:56 (3)	07:18		07:44 (2)	07:14	08:08	
	21:48	06:12 (8)	21:14		20:09	07:15 (3)	18:57	17	08:01 (2)	16:48	16:05	
2	04:56	05:54 (8)	05:35		06:28	06:56 (3)	07:20		07:46 (2)	07:16	08:09	
	21:48	06:13 (8)	21:12		20:07	07:15 (3)	18:55	14	08:00 (2)	16:46	16:05	
3	04:56	05:54 (8)	05:37		06:30	06:56 (3)	07:21		07:47 (2)	07:18	08:11	
	21:47	06:14 (8)	21:11		20:05	07:14 (3)	18:52	10	07:57 (2)	16:44	16:04	
4	04:57	05:53 (8)	05:38		06:31	06:58 (3)	07:23		07:49 (2)	07:20	08:12	
	21:47	06:13 (8)	21:09		20:02	07:13 (3)	18:50	6	07:55 (2)	16:42	16:03	
5	04:58	05:54 (8)	05:40		06:33	07:00 (3)	07:25			07:22	08:14	
	21:46	06:14 (8)	21:07		20:00	07:42 (1)	18:48			16:41	16:03	
6	04:59	05:54 (8)	05:42		06:35	07:01 (3)	07:27			07:24	08:15	
	21:46	06:14 (8)	21:05		19:58	07:43 (1)	18:45			16:39	16:02	
7	05:00	05:54 (8)	05:43		06:36	07:26 (1)	07:28			07:26	08:16	
	21:45	06:15 (8)	21:03		19:55	07:44 (1)	18:43			16:37	16:02	
8	05:01	05:54 (8)	05:45		06:38	07:25 (1)	07:30			07:28	08:18	
	21:45	06:15 (8)	21:01	10	07:03 (4)	19:53	20	07:45 (1)	18:41	16:35	16:01	
9	05:02	05:54 (8)	05:47		06:51 (4)	06:40		07:23 (1)	07:32	07:30	08:19	
	21:44	06:16 (8)	20:59	14	07:05 (4)	19:50	22	07:45 (1)	18:38	16:33	16:01	
10	05:03	05:54 (8)	05:48		06:49 (4)	06:42		07:22 (1)	07:34	07:31	08:20	
	21:43	06:16 (8)	20:57	17	07:06 (4)	19:48	24	07:46 (1)	18:36	16:32	16:01	
11	05:04	05:54 (8)	05:50		06:48 (4)	06:43		07:22 (1)	07:36	07:33	08:21	
	21:42	06:16 (8)	20:55	20	07:08 (4)	19:46	24	07:46 (1)	18:34	16:30	16:01	
12	05:05	05:54 (8)	05:52		06:47 (4)	06:45		07:21 (1)	07:37	07:35	08:22	
	21:41	06:16 (8)	20:53	22	07:09 (4)	19:43	24	07:45 (1)	18:31	16:28	16:00	
13	05:06	05:54 (8)	05:54		06:46 (4)	06:47		07:21 (1)	07:39	07:37	08:23	
	21:40	06:16 (8)	20:51	23	07:09 (4)	19:41	24	07:45 (1)	18:29	16:27	16:00	
14	05:07	05:54 (8)	05:55		06:45 (4)	06:48		07:21 (1)	07:41	07:39	08:24	
	21:39	06:16 (8)	20:49	25	07:10 (4)	19:38	24	07:45 (1)	18:27	16:25	16:00	
15	05:09	05:54 (8)	05:57		06:44 (4)	06:50		07:21 (1)	07:43	07:41	08:25	
	21:38	06:16 (8)	20:47	26	07:10 (4)	19:36	22	07:43 (1)	18:24	16:24	16:00	
16	05:10	05:54 (8)	05:59		06:44 (4)	06:52		07:21 (1)	07:45	07:43	08:26	
	21:37	06:16 (8)	20:45	26	07:10 (4)	19:33	21	07:42 (1)	18:22	16:22	16:00	
17	05:11	05:55 (8)	06:00		06:44 (4)	06:54		07:22 (1)	07:46	07:44	08:27	
	21:36	06:17 (8)	20:43	27	07:11 (4)	19:31	19	07:41 (1)	18:20	16:21	16:01	
18	05:13	05:55 (8)	06:02		06:43 (4)	06:55		07:23 (1)	07:48	07:46	08:28	
	21:35	06:17 (8)	20:41	27	07:10 (4)	19:29	16	07:39 (1)	18:18	16:19	16:01	
19	05:14	05:55 (8)	06:04		06:43 (4)	06:57		07:25 (1)	07:50	07:48	08:28	
	21:34	06:16 (8)	20:39	27	07:10 (4)	19:26	11	07:36 (1)	18:15	16:18	16:01	
20	05:15	05:55 (8)	06:05		06:43 (4)	06:59			07:52	07:50	08:29	
	21:32	06:16 (8)	20:37	26	07:09 (4)	19:24			18:13	16:17	16:01	
21	05:17	05:56 (9)	06:07		06:43 (4)	07:00			07:54	07:51	08:30	
	21:31	06:16 (8)	20:34	26	07:09 (4)	19:21			18:11	16:15	16:02	
22	05:18	05:56 (9)	06:09		06:44 (4)	07:02		07:52 (2)	07:56	07:53	08:30	
	21:30	06:16 (8)	20:32	24	07:08 (4)	19:19	6	07:58 (2)	18:09	16:14	16:02	
23	05:20	05:56 (9)	06:11		06:44 (4)	07:04		07:49 (2)	07:58	07:55	08:31	
	21:28	06:15 (8)	20:30	23	07:07 (4)	19:16	12	08:01 (2)	18:07	16:13	16:03	
24	05:21	05:57 (9)	06:12		06:45 (4)	07:06		07:46 (2)	07:59	07:57	08:31	
	21:27	06:15 (8)	20:28	21	07:06 (4)	19:14	15	08:01 (2)	18:05	16:12	16:03	
25	05:23	05:56 (9)	06:14		06:46 (4)	07:07		07:45 (2)	07:01	07:58	08:32	
	21:25	06:13 (9)	20:25	27	07:13 (3)	19:12	17	08:02 (2)	17:02	16:11	16:04	
26	05:24	05:57 (9)	06:16		06:47 (4)	07:09		07:44 (2)	07:03	08:00	08:32	
	21:24	06:14 (9)	20:23	27	07:14 (3)	19:09	19	08:03 (2)	17:00	16:10	16:05	
27	05:26	05:57 (9)	06:18		06:50 (4)	07:11		07:44 (2)	07:05	08:02	08:32	
	21:22	06:13 (9)	20:21	25	07:15 (3)	19:07	19	08:03 (2)	16:58	16:09	16:06	
28	05:27	05:59 (9)	06:19		06:57 (3)	07:13		07:42 (2)	07:07	08:03	08:32	
	21:21	06:13 (9)	20:19	18	07:15 (3)	19:04	20	08:02 (2)	16:56	16:08	16:06	
29	05:29	05:59 (9)	06:21		06:57 (3)	07:14		07:42 (2)	07:09	08:05	08:32	
	21:19	06:11 (9)	20:16	19	07:16 (3)	19:02	20	08:02 (2)	16:54	16:07	16:07	
30	05:30	06:00 (9)	06:23		06:57 (3)	07:16		07:43 (2)	07:11	08:06	08:32	
	21:18	06:10 (9)	20:14	19	07:16 (3)	19:00	19	08:02 (2)	16:52	16:06	16:08	
31	05:32	06:02 (9)	06:24		06:55 (3)				07:13		08:32	
	21:16	06:08 (9)	20:12	20	07:15 (3)				16:50		16:09	
		Sonnenscheinstunden	508	458	382	532	330	262	237			
		astr.max.mögl.Beschattung	590	539	532	47						
		Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29						
		Reduktion Betriebsdauer	0.96	0.96	0.96	0.96						
		Reduktion Windrichtung	0.73	0.72	0.70	0.68						
		Gesamte Reduktion	0.26	0.29	0.23	0.19						
		Met.wahrsch.Beschattung	155	157	125	9						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattende	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DU - IO125

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:35 (1)	05:46	06:44 (4)	04:59
	16:10	17:00	17:55	19:51	23 07:58 (1)	20:45	20 07:04 (4)	21:34
2	08:32	08:02	07:05	06:52	07:35 (1)	05:44	06:45 (4)	04:58
	16:12	17:02	17:57	19:53	22 07:57 (1)	20:47	17 07:02 (4)	21:35
3	08:32	08:00	07:03	06:49	07:36 (1)	05:42	06:46 (4)	04:57
	16:13	17:04	17:58	19:55	20 07:56 (1)	20:49	14 07:00 (4)	21:36
4	08:32	07:58	07:01	06:47	07:10 (3)	05:41	06:49 (4)	04:56
	16:14	17:06	18:00	19:57	21 07:54 (1)	20:50	8 06:57 (4)	21:37
5	08:32	07:57	06:58	06:45	07:08 (3)	05:39		04:55
	16:15	17:08	18:02	19:59	23 07:52 (1)	20:52		21:38
6	08:31	07:55	06:56	06:42	07:05 (3)	05:37		04:55
	16:16	17:10	18:04	20:00	19 07:47 (1)	20:54		21:39
7	08:31	07:53	06:54	07:17 (2)	06:40	07:03 (3)	05:35	04:54
	16:18	17:12	18:06	4 07:21 (2)	20:02	17 07:20 (3)	20:56	21:40
8	08:30	07:51	06:51	07:15 (2)	06:37	07:02 (3)	05:33	04:53
	16:19	17:14	18:08	9 07:24 (2)	20:04	18 07:20 (3)	20:57	21:41
9	08:30	07:49	06:49	07:13 (2)	06:35	07:00 (3)	05:31	04:53
	16:20	17:16	18:10	13 07:26 (2)	20:06	20 07:20 (3)	20:59	21:42
10	08:29	07:48	06:47	07:10 (2)	06:33	07:00 (3)	05:29	04:52
	16:22	17:18	18:11	17 07:27 (2)	20:08	20 07:20 (3)	21:01	21:43
11	08:29	07:46	06:44	07:09 (2)	06:30	07:00 (3)	05:27	04:52
	16:23	17:20	18:13	19 07:28 (2)	20:09	20 07:20 (3)	21:03	21:44
12	08:28	07:44	06:42	07:08 (2)	06:28	07:00 (3)	05:26	04:52
	16:25	17:22	18:15	20 07:28 (2)	20:11	20 07:20 (3)	21:04	21:44
13	08:27	07:42	06:40	07:07 (2)	06:26	06:59 (3)	05:24	04:51
	16:26	17:24	18:17	20 07:27 (2)	20:13	20 07:19 (3)	21:06	21:45
14	08:26	07:40	06:37	07:07 (2)	06:23	06:54 (4)	05:22	04:51
	16:28	17:26	18:19	21 07:28 (2)	20:15	24 07:18 (3)	21:08	21:46
15	08:25	07:38	06:35	07:07 (2)	06:21	06:50 (4)	05:21	04:50
	16:30	17:28	18:21	19 07:26 (2)	20:17	27 07:17 (3)	21:09	21:46
16	08:24	07:36	06:32	07:07 (2)	06:19	06:48 (4)	05:19	04:51
	16:31	17:30	18:23	19 07:26 (2)	20:18	27 07:15 (3)	21:11	21:47
17	08:23	07:34	06:30	07:08 (2)	06:17	06:45 (4)	05:17	04:50
	16:33	17:32	18:24	16 07:24 (2)	20:20	27 07:12 (3)	21:12	21:47
18	08:22	07:32	06:28	07:09 (2)	06:14	06:44 (4)	05:16	04:50
	16:35	17:34	18:26	14 07:23 (2)	20:22	23 07:07 (4)	21:14	21:48
19	08:21	07:29	06:25	07:11 (2)	06:12	06:43 (4)	05:14	04:50
	16:36	17:35	18:28	10 07:21 (2)	20:24	25 07:08 (4)	21:16	21:48
20	08:20	07:27	06:23	06:10	06:43 (4)	05:13	05:47 (9)	04:51
	16:38	17:37	18:30	20:26	26 07:09 (4)	21:17	20 06:07 (8)	21:48
21	08:19	07:25	06:20	06:08	06:42 (4)	05:12	05:47 (9)	04:51
	16:40	17:39	18:32	20:27	27 07:09 (4)	21:19	21 06:08 (8)	21:49
22	08:18	07:23	06:18	06:44 (1)	06:06	06:42 (4)	05:10	04:51
	16:42	17:41	18:33	11 06:55 (1)	20:29	27 07:09 (4)	21:20	21:49
23	08:17	07:21	06:16	06:42 (1)	06:03	06:41 (4)	05:09	04:51
	16:43	17:43	18:35	15 06:57 (1)	20:31	28 07:09 (4)	21:22	21:49
24	08:15	07:19	06:13	06:39 (1)	06:01	06:41 (4)	05:07	04:51
	16:45	17:45	18:37	19 06:58 (1)	20:33	28 07:09 (4)	21:23	22 06:09 (8)
25	08:14	07:16	06:11	06:38 (1)	05:59	06:40 (4)	05:06	04:52
	16:47	17:47	18:39	21 06:59 (1)	20:35	28 07:08 (4)	21:24	22 06:09 (8)
26	08:13	07:14	06:08	06:37 (1)	05:57	06:40 (4)	05:05	04:52
	16:49	17:49	18:41	23 07:00 (1)	20:36	27 07:07 (4)	21:26	23 06:10 (8)
27	08:11	07:12	06:06	06:36 (1)	05:55	06:40 (4)	05:04	04:53
	16:50	17:51	18:42	24 07:00 (1)	20:38	27 07:07 (4)	21:27	23 06:10 (8)
28	08:10	07:10	06:04	06:36 (1)	05:53	06:41 (4)	05:03	04:53
	16:53	17:53	18:44	24 07:00 (1)	20:40	25 07:06 (4)	21:29	23 06:10 (8)
29	08:08		07:01	07:35 (1)	05:51	06:42 (4)	05:02	04:54
	16:55		19:46	24 07:59 (1)	20:42	24 07:06 (4)	21:30	23 06:10 (8)
30	08:07		06:59	07:35 (1)	05:49	06:43 (4)	05:00	04:54
	16:57		19:48	24 07:59 (1)	20:43	22 07:05 (4)	21:31	23 06:10 (8)
31	08:05		06:56	07:35 (1)			05:00	04:54
	16:58		19:50	24 07:59 (1)			21:32	23 06:10 (8)
Sonnenscheinstunden	253	275	367	418	705	491	435	506
astr.max.mögl.Beschattung			410		705		435	506
Red.Sonnenscheinwahrsch.			0.28		0.37		0.43	0.39
Reduktion Betriebsdauer			0.96		0.96		0.96	0.96
Reduktion Windrichtung			0.69		0.72		0.73	0.73
Gesamte Reduktion			0.18		0.26		0.30	0.27
Met.wahrsch.Beschattung			75		180		130	159

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DU - IO125

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S [Mittlere tägliche Sonnenstunden] [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember
1	04:55	05:55 (8)	05:34		06:26	06:59 (3)	07:18		07:47 (2)	07:14	08:08
	21:48	06:15 (8)	21:14		20:09	07:19 (3)	18:57	20	08:07 (2)	16:48	16:05
2	04:56	05:55 (8)	05:35		06:28	06:59 (3)	07:20		07:47 (2)	07:16	08:09
	21:48	06:15 (8)	21:12		20:07	07:19 (3)	18:55	20	08:07 (2)	16:46	16:05
3	04:56	05:56 (8)	05:37		06:30	06:58 (3)	07:21		07:47 (2)	07:18	08:11
	21:47	06:16 (8)	21:11		20:05	07:18 (3)	18:52	18	08:05 (2)	16:44	16:04
4	04:57	05:55 (8)	05:38		06:31	06:59 (3)	07:23		07:49 (2)	07:20	08:12
	21:47	06:16 (8)	21:09		20:02	07:17 (3)	18:50	15	08:04 (2)	16:42	16:03
5	04:58	05:55 (8)	05:40		06:33	07:00 (3)	07:25		07:51 (2)	07:22	08:14
	21:46	06:16 (8)	21:07		20:00	07:17 (3)	18:48	11	08:02 (2)	16:41	16:03
6	04:59	05:55 (8)	05:42		06:35	07:01 (3)	07:27		07:53 (2)	07:24	08:15
	21:46	06:17 (8)	21:05		19:58	07:43 (1)	18:45	7	08:00 (2)	16:39	16:02
7	05:00	05:55 (8)	05:43		06:36	07:03 (3)	07:28			07:26	08:16
	21:45	06:17 (8)	21:03		19:55	07:47 (1)	18:43			16:37	16:02
8	05:01	05:55 (8)	05:45		06:38	07:05 (3)	07:30			07:28	08:18
	21:45	06:18 (8)	21:01		19:53	07:49 (1)	18:41			16:35	16:01
9	05:02	05:55 (8)	05:47		06:40	07:30 (1)	07:32			07:30	08:19
	21:44	06:18 (8)	20:59	10	07:07 (4)	19:50	19	07:49 (1)	18:38	16:33	16:01
10	05:03	05:55 (8)	05:48		06:54 (4)	06:42		07:29 (1)	07:34	07:31	08:20
	21:43	06:18 (8)	20:57	15	07:09 (4)	19:48	21	07:50 (1)	18:36	16:32	16:01
11	05:04	05:55 (8)	05:50		06:53 (4)	06:43		07:28 (1)	07:36	07:33	08:21
	21:42	06:19 (8)	20:55	18	07:11 (4)	19:46	23	07:51 (1)	18:34	16:30	16:01
12	05:05	05:55 (8)	05:52		06:52 (4)	06:45		07:26 (1)	07:37	07:35	08:22
	21:41	06:19 (8)	20:53	21	07:13 (4)	19:43	24	07:50 (1)	18:31	16:28	16:00
13	05:06	05:55 (8)	05:54		06:50 (4)	06:47		07:26 (1)	07:39	07:37	08:23
	21:40	06:19 (8)	20:51	23	07:13 (4)	19:41	25	07:51 (1)	18:29	16:27	16:00
14	05:07	05:55 (8)	05:55		06:50 (4)	06:48		07:26 (1)	07:41	07:39	08:24
	21:39	06:19 (8)	20:49	24	07:14 (4)	19:38	25	07:51 (1)	18:27	16:25	16:00
15	05:09	05:55 (8)	05:57		06:48 (4)	06:50		07:25 (1)	07:43	07:41	08:25
	21:38	06:19 (8)	20:47	26	07:14 (4)	19:36	25	07:50 (1)	18:24	16:24	16:00
16	05:10	05:55 (8)	05:59		06:48 (4)	06:52		07:25 (1)	07:45	07:43	08:26
	21:37	06:19 (8)	20:45	27	07:15 (4)	19:33	24	07:49 (1)	18:22	16:22	16:00
17	05:11	05:56 (8)	06:00		06:48 (4)	06:54		07:26 (1)	07:46	07:44	08:27
	21:36	06:19 (8)	20:43	27	07:15 (4)	19:31	23	07:49 (1)	18:20	16:21	16:01
18	05:13	05:56 (8)	06:02		06:47 (4)	06:55		07:25 (1)	07:48	07:46	08:28
	21:35	06:19 (8)	20:41	27	07:14 (4)	19:29	22	07:47 (1)	18:18	16:19	16:01
19	05:14	05:56 (8)	06:04		06:47 (4)	06:57		07:26 (1)	07:50	07:48	08:28
	21:34	06:19 (8)	20:39	28	07:15 (4)	19:26	20	07:46 (1)	18:15	16:18	16:01
20	05:15	05:57 (9)	06:05		06:46 (4)	06:59		07:28 (1)	07:52	07:50	08:29
	21:32	06:18 (8)	20:37	28	07:14 (4)	19:24	16	07:44 (1)	18:13	16:17	16:01
21	05:17	05:58 (9)	06:07		06:46 (4)	07:00		07:29 (1)	07:54	07:51	08:30
	21:31	06:19 (8)	20:34	28	07:14 (4)	19:21	12	07:41 (1)	18:11	16:15	16:02
22	05:18	05:57 (9)	06:09		06:47 (4)	07:02		07:33 (1)	07:56	07:53	08:30
	21:30	06:18 (8)	20:32	27	07:14 (4)	19:19	3	07:36 (1)	18:09	16:14	16:02
23	05:20	05:57 (9)	06:11		06:46 (4)	07:04			07:58	07:55	08:31
	21:28	06:17 (8)	20:30	26	07:12 (4)	19:16			18:07	16:13	16:03
24	05:21	05:58 (9)	06:12		06:47 (4)	07:06		07:55 (2)	07:59	07:57	08:31
	21:27	06:17 (8)	20:28	25	07:12 (4)	19:14	7	08:02 (2)	18:05	16:12	16:03
25	05:23	05:57 (9)	06:14		06:48 (4)	07:07		07:52 (2)	07:01	07:58	08:32
	21:25	06:16 (8)	20:25	23	07:11 (4)	19:12	13	08:05 (2)	17:02	16:11	16:04
26	05:24	05:58 (9)	06:16		06:48 (4)	07:09		07:51 (2)	07:03	08:00	08:32
	21:24	06:16 (9)	20:23	27	07:15 (3)	19:09	15	08:06 (2)	17:00	16:10	16:05
27	05:26	05:58 (9)	06:18		06:50 (4)	07:11		07:50 (2)	07:05	08:02	08:32
	21:22	06:15 (9)	20:21	27	07:17 (3)	19:07	17	08:07 (2)	16:58	16:09	16:06
28	05:27	06:00 (9)	06:19		06:51 (4)	07:13		07:48 (2)	07:07	08:03	08:32
	21:21	06:15 (9)	20:19	27	07:18 (3)	19:04	19	08:07 (2)	16:56	16:08	16:06
29	05:29	06:00 (9)	06:21		06:55 (4)	07:14		07:47 (2)	07:09	08:05	08:32
	21:19	06:14 (9)	20:16	24	07:19 (3)	19:02	20	08:07 (2)	16:54	16:07	16:07
30	05:30	06:00 (9)	06:23		07:00 (3)	07:16		07:47 (2)	07:11	08:06	08:32
	21:18	06:12 (9)	20:14	19	07:19 (3)	19:00	20	08:07 (2)	16:52	16:06	16:08
31	05:32	06:03 (9)	06:24		06:59 (3)				07:13		08:32
	21:16	06:11 (9)	20:12	20	07:19 (3)				16:50		16:09
Sonnenscheinstunden		508	458		382			330		262	237
astr.max.mögl.Beschattung		633		547		552			91		
Red.Sonnenscheinwahrsch.		0.38		0.42		0.35			0.29		
Reduktion Betriebsdauer		0.96		0.96		0.96			0.96		
Reduktion Windrichtung		0.73		0.72		0.70			0.68		
Gesamte Reduktion		0.26		0.29		0.23			0.19		
Met.wahrsch.Beschattung		167		159		129			17		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DV - IO126

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32 16:10	08:03 17:00	07:08 17:55	06:54 19:51	07:43 (1) 08:01 (1)	05:46 20:45	5	06:57 (4) 07:02 (4)	04:59 21:34	05:53 (8) 22 06:15 (8)
2	08:32 16:12	08:02 17:02	07:05 17:57	06:52 19:53	07:15 (3) 07:59 (1)	05:44 20:47			04:58 21:35	05:54 (8) 21 06:15 (8)
3	08:32 16:13	08:00 17:04	07:03 17:58	06:49 19:55	07:13 (3) 07:56 (1)	05:42 20:49			04:57 21:36	05:54 (8) 21 06:15 (8)
4	08:32 16:14	07:58 17:06	07:01 18:00	06:47 19:57	07:10 (3) 07:24 (3)	05:41 20:50	14		04:56 21:37	05:54 (8) 20 06:14 (8)
5	08:32 16:15	07:57 17:08	06:58 18:02	06:45 19:59	07:08 (3) 07:25 (3)	05:39 20:52	17		04:55 21:38	05:55 (8) 20 06:15 (8)
6	08:31 16:16	07:55 17:10	06:56 18:04	06:42 19:59	07:06 (3) 07:25 (3)	05:37 20:54	19		04:55 21:39	05:56 (8) 18 06:14 (8)
7	08:31 16:18	07:53 17:12	06:54 18:06	06:40 19:59	07:05 (3) 07:26 (3)	05:35 20:56	21		04:54 21:40	05:57 (8) 18 06:15 (8)
8	08:30 16:19	07:51 17:14	06:51 18:08	06:37 19:59	07:05 (3) 07:26 (3)	05:33 20:57	21		04:53 21:41	05:57 (8) 17 06:14 (8)
9	08:30 16:20	07:49 17:16	06:49 18:10	06:35 19:59	07:04 (3) 07:25 (3)	05:31 20:59	21		04:53 21:42	05:58 (8) 16 06:14 (8)
10	08:29 16:22	07:48 17:18	06:47 18:11	06:33 19:59	07:04 (3) 07:25 (3)	05:29 21:01	7	05:57 (9) 06:04 (9)	04:52 21:43	05:57 (8) 16 06:13 (8)
11	08:29 16:23	07:46 17:20	06:44 18:13	06:30 19:59	07:01 (4) 07:24 (3)	05:27 21:03	11	05:55 (9) 06:06 (9)	04:52 21:44	05:58 (8) 15 06:13 (8)
12	08:28 16:25	07:44 17:22	06:42 18:15	06:28 19:59	07:13 (2) 07:33 (2)	05:26 21:04	14	05:53 (9) 06:07 (9)	04:52 21:44	05:59 (8) 14 06:13 (8)
13	08:27 16:26	07:42 17:24	06:40 18:17	06:26 19:59	07:12 (2) 07:32 (2)	05:24 21:06	15	05:53 (9) 06:08 (9)	04:51 21:45	06:00 (8) 14 06:14 (8)
14	08:26 16:28	07:40 17:26	06:37 18:19	06:23 19:59	07:13 (2) 07:31 (2)	05:22 21:08	17	05:52 (9) 06:09 (9)	04:51 21:46	06:00 (8) 13 06:13 (8)
15	08:25 16:30	07:38 17:28	06:35 18:21	06:21 19:59	07:13 (2) 07:29 (2)	05:21 21:09	19	05:52 (9) 06:11 (8)	04:51 21:46	06:00 (8) 13 06:13 (8)
16	08:24 16:31	07:36 17:30	06:32 18:23	06:19 19:59	07:15 (2) 07:28 (2)	05:19 21:11	20	05:51 (9) 06:11 (8)	04:51 21:47	06:01 (8) 12 06:13 (8)
17	08:23 16:33	07:34 17:32	06:30 18:24	06:17 19:59	07:17 (2) 07:24 (2)	05:17 21:12	22	05:51 (9) 06:13 (8)	04:50 21:47	06:01 (8) 12 06:13 (8)
18	08:22 16:35	07:32 17:34	06:28 18:26	06:14 19:59	07:16 (4) 07:16 (4)	05:16 21:14	23	05:51 (9) 06:14 (8)	04:50 21:48	06:02 (8) 10 06:12 (8)
19	08:21 16:36	07:29 17:35	06:25 18:28	06:12 19:59	07:01 (1) 07:16 (4)	05:14 21:16	23	05:51 (9) 06:14 (8)	04:50 21:48	06:02 (8) 10 06:12 (8)
20	08:20 16:38	07:27 17:37	06:23 18:30	06:10 19:59	07:03 (1) 07:03 (1)	05:13 21:17	23	05:51 (9) 06:14 (8)	04:51 21:48	06:03 (8) 10 06:13 (8)
21	08:19 16:40	07:25 17:39	06:20 18:32	06:08 19:59	07:04 (1) 07:15 (2)	05:12 21:19	23	05:52 (9) 06:15 (8)	04:51 21:49	06:03 (8) 10 06:13 (8)
22	08:18 16:42	07:23 17:41	06:18 18:33	06:06 19:59	07:05 (1) 07:06 (1)	05:10 21:20	23	05:51 (9) 06:14 (8)	04:51 21:49	06:03 (8) 10 06:13 (8)
23	08:17 16:43	07:21 17:43	06:16 18:35	06:03 19:59	07:06 (1) 07:07 (1)	05:09 21:22	24	05:51 (9) 06:15 (8)	04:51 21:49	06:03 (8) 10 06:13 (8)
24	08:15 16:45	07:19 17:45	06:13 18:37	06:01 19:59	06:42 (1) 07:06 (1)	05:07 21:23	24	05:51 (8) 06:15 (8)	04:51 21:49	06:04 (8) 10 06:14 (8)
25	08:14 16:47	07:16 17:47	06:11 18:39	05:59 19:59	06:42 (1) 07:07 (1)	05:06 21:24	23	05:52 (8) 06:15 (8)	04:52 21:49	06:03 (8) 11 06:14 (8)
26	08:13 16:49	07:14 17:49	06:08 18:41	05:57 19:59	06:42 (1) 07:07 (1)	05:05 21:26	24	05:52 (8) 06:16 (8)	04:52 21:49	06:03 (8) 12 06:15 (8)
27	08:11 16:50	07:12 17:51	06:06 18:42	05:55 19:59	06:41 (1) 07:06 (1)	05:04 21:27	24	05:52 (8) 06:16 (8)	04:53 21:49	06:04 (8) 12 06:16 (8)
28	08:10 16:51	07:10 17:53	06:04 18:44	05:53 19:59	06:41 (1) 07:06 (1)	05:03 21:29	24	05:52 (8) 06:16 (8)	04:53 21:49	06:03 (8) 13 06:16 (8)
29	08:08 16:55	07:08 17:55	06:01 18:46	05:51 19:59	07:09 (4) 08:05 (1)	05:02 21:30	23	05:52 (8) 06:15 (8)	04:54 21:49	06:03 (8) 14 06:17 (8)
30	08:07 16:57	07:07 17:57	05:59 18:48	05:49 19:59	07:09 (4) 08:04 (1)	05:00 21:31	22	05:53 (8) 06:15 (8)	04:54 21:48	06:02 (8) 15 06:17 (8)
31	08:05 16:58	07:05 17:58	05:56 18:50	05:47 19:59	07:06 (4) 08:03 (1)	05:00 21:32	22	05:53 (8) 06:15 (8)		
Sonnenscheinstunden	253	275	367	418	491	506				
astr.max.mögl.Beschattung				474	684	455	429			
Red.Sonnenscheinwahrsch.				0.28	0.37	0.43	0.39			
Reduktion Betriebsdauer				0.96	0.96	0.96	0.96			
Reduktion Windrichtung				0.69	0.72	0.73	0.73			
Gesamte Reduktion				0.18	0.26	0.30	0.27			
Met.wahrsch.Beschattung				86	175	136	116			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DV - IO126
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55	06:03 (8) 05:34	06:04 (9) 06:26	07:00 (4) 07:18	07:52 (2) 07:14	08:08
	21:48	14 06:17 (8) 21:14	13 06:17 (9) 20:09	23 07:23 (3) 18:57	20 08:12 (2) 16:48	16:05
2	04:56	06:03 (8) 05:35	06:06 (9) 06:28	07:03 (3) 07:20	07:52 (2) 07:16	08:09
	21:48	15 06:18 (8) 21:12	10 06:16 (9) 20:07	21 07:24 (3) 18:55	20 08:12 (2) 16:46	16:05
3	04:56	06:03 (8) 05:37	06:08 (9) 06:30	07:02 (3) 07:21	07:50 (2) 07:18	08:11
	21:47	16 06:19 (8) 21:11	5 06:13 (9) 20:05	21 07:23 (3) 18:52	21 08:11 (2) 16:44	16:04
4	04:57	06:02 (8) 05:38	06:31	07:02 (3) 07:23	07:51 (2) 07:20	08:12
	21:47	17 06:19 (8) 21:09	20:02	21 07:23 (3) 18:50	19 08:10 (2) 16:42	16:03
5	04:58	06:02 (8) 05:40	06:33	07:02 (3) 07:25	07:51 (2) 07:22	08:14
	21:46	18 06:20 (8) 21:07	20:00	21 07:23 (3) 18:48	19 08:10 (2) 16:41	16:03
6	04:59	06:02 (8) 05:42	06:35	07:02 (3) 07:27	07:53 (2) 07:24	08:15
	21:46	18 06:20 (8) 21:05	19:58	19 07:21 (3) 18:45	16 08:09 (2) 16:39	16:02
7	05:00	06:02 (8) 05:43	06:36	07:03 (3) 07:28	07:55 (2) 07:26	08:16
	21:45	19 06:21 (8) 21:03	19:55	18 07:21 (3) 18:43	12 08:07 (2) 16:37	16:02
8	05:01	06:02 (8) 05:45	06:38	07:05 (3) 07:30	07:56 (2) 07:28	08:18
	21:45	20 06:22 (8) 21:01	19:53	14 07:19 (3) 18:41	8 08:04 (2) 16:35	16:01
9	05:02	06:02 (8) 05:47	06:40	07:06 (3) 07:32	07:30	08:19
	21:44	20 06:22 (8) 20:59	19:50	19 07:49 (1) 18:38	16:33	16:01
10	05:03	06:02 (8) 05:48	06:42	07:08 (3) 07:34	07:31	08:20
	21:43	21 06:23 (8) 20:57	19:48	20 07:52 (1) 18:36	16:32	16:01
11	05:04	06:01 (8) 05:50	06:43	07:36 (1) 07:36	07:33	08:21
	21:42	22 06:23 (8) 20:55	19:46	18 07:54 (1) 18:34	16:30	16:01
12	05:05	06:01 (8) 05:52	07:04 (4) 06:45	07:34 (1) 07:37	07:35	08:22
	21:41	22 06:23 (8) 20:53	8 07:12 (4) 19:43	20 07:54 (1) 18:31	16:28	16:00
13	05:06	06:01 (8) 05:54	07:01 (4) 06:47	07:33 (1) 07:39	07:37	08:23
	21:40	23 06:24 (8) 20:51	13 07:14 (4) 19:41	22 07:55 (1) 18:29	16:27	16:00
14	05:07	06:01 (8) 05:55	06:59 (4) 06:48	07:32 (1) 07:41	07:39	08:24
	21:39	23 06:24 (8) 20:49	18 07:17 (4) 19:38	24 07:56 (1) 18:27	16:25	16:00
15	05:09	06:01 (8) 05:57	06:57 (4) 06:50	07:31 (1) 07:43	07:41	08:25
	21:38	23 06:24 (8) 20:47	20 07:17 (4) 19:36	24 07:55 (1) 18:24	16:24	16:00
16	05:10	06:01 (8) 05:59	06:56 (4) 06:52	07:31 (1) 07:45	07:43	08:26
	21:37	23 06:24 (8) 20:45	23 07:19 (4) 19:33	24 07:55 (1) 18:22	16:22	16:00
17	05:11	06:01 (8) 06:00	06:55 (4) 06:54	07:30 (1) 07:46	07:44	08:27
	21:36	24 06:25 (8) 20:43	25 07:20 (4) 19:31	25 07:55 (1) 18:20	16:21	16:01
18	05:13	06:01 (8) 06:02	06:54 (4) 06:55	07:30 (1) 07:48	07:46	08:28
	21:35	24 06:25 (8) 20:41	26 07:20 (4) 19:29	24 07:54 (1) 18:18	16:19	16:01
19	05:14	06:01 (8) 06:04	06:54 (4) 06:57	07:30 (1) 07:50	07:48	08:28
	21:34	24 06:25 (8) 20:39	26 07:20 (4) 19:26	24 07:54 (1) 18:15	16:18	16:01
20	05:15	06:01 (8) 06:05	06:52 (4) 06:59	07:30 (1) 07:52	07:50	08:29
	21:32	24 06:25 (8) 20:37	28 07:20 (4) 19:24	23 07:53 (1) 18:13	16:17	16:01
21	05:17	06:02 (9) 06:07	06:52 (4) 07:00	07:30 (1) 07:54	07:51	08:30
	21:31	23 06:25 (8) 20:34	28 07:20 (4) 19:21	21 07:51 (1) 18:11	16:15	16:02
22	05:18	06:02 (9) 06:09	06:52 (4) 07:02	07:31 (1) 07:56	07:53	08:30
	21:30	23 06:25 (8) 20:32	28 07:20 (4) 19:19	19 07:50 (1) 18:09	16:14	16:02
23	05:20	06:01 (9) 06:11	06:51 (4) 07:04	07:33 (1) 07:58	07:55	08:31
	21:28	23 06:24 (8) 20:30	29 07:20 (4) 19:16	15 07:48 (1) 18:07	16:13	16:03
24	05:21	06:02 (9) 06:12	06:52 (4) 07:06	07:34 (1) 07:59	07:57	08:31
	21:27	23 06:25 (8) 20:28	27 07:19 (4) 19:14	11 07:45 (1) 18:05	16:12	16:03
25	05:23	06:01 (9) 06:14	06:52 (4) 07:07	07:01	07:58	08:32
	21:25	23 06:24 (8) 20:25	27 07:19 (4) 19:12	17:02	16:11	16:04
26	05:24	06:02 (9) 06:16	06:52 (4) 07:09	08:01 (2) 07:03	08:00	08:32
	21:24	22 06:24 (8) 20:23	26 07:18 (4) 19:09	5 08:06 (2) 17:00	16:10	16:05
27	05:26	06:02 (9) 06:18	06:52 (4) 07:11	07:57 (2) 07:05	08:02	08:32
	21:22	21 06:23 (8) 20:21	25 07:17 (4) 19:07	12 08:09 (2) 16:58	16:09	16:05
28	05:27	06:01 (9) 06:19	06:52 (4) 07:13	07:55 (2) 07:07	08:03	08:32
	21:21	20 06:21 (8) 20:19	26 07:18 (3) 19:04	15 08:10 (2) 16:56	16:08	16:06
29	05:29	06:02 (9) 06:21	06:54 (4) 07:14	07:53 (2) 07:09	08:05	08:32
	21:19	19 06:21 (8) 20:16	27 07:21 (3) 19:02	18 08:11 (2) 16:54	16:07	16:07
30	05:30	06:02 (9) 06:23	06:55 (4) 07:16	07:52 (2) 07:11	08:06	08:32
	21:18	17 06:19 (8) 20:14	27 07:22 (3) 19:00	19 08:11 (2) 16:52	16:06	16:08
31	05:32	06:03 (9) 06:24	06:56 (4)	07:13	08:32	
	21:16	15 06:18 (9) 20:12	26 07:22 (3)	16:50	16:09	
Sonnenscheinstunden 508 458 382 330 262 237						
astr.max.mögl.Beschattung 639 511 560 135						
Red.Sonnenscheinwahrsch. 0.38 0.42 0.35 0.29						
Reduktion Betriebsdauer 0.96 0.96 0.96 0.96						
Reduktion Windrichtung 0.73 0.72 0.70 0.67						
Gesamte Reduktion 0.26 0.29 0.23 0.19						
Met.wahrsch.Beschattung 168 149 131 25						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DW - IO127

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46	04:59	06:03 (8)		
	16:10	17:00	17:55	19:51	10 07:27 (3)	20:45	21:34	14 06:17 (8)		
2	08:32	08:02	07:05	06:52	07:15 (3)	05:44	04:58	06:05 (8)		
	16:12	17:02	17:57	19:53	14 07:29 (3)	20:47	21:35	12 06:17 (8)		
3	08:32	08:00	07:03	06:49	07:13 (3)	05:42	04:57	06:06 (8)		
	16:13	17:04	17:58	19:55	17 07:30 (3)	20:49	21:36	10 06:16 (8)		
4	08:32	07:58	07:01	06:47	07:11 (3)	05:41	04:56	06:07 (8)		
	16:14	17:06	18:00	8 07:33 (2)	19:57	07:30 (3)	20:50	21:37	8 06:15 (8)	
5	08:32	07:57	06:58	06:45	07:10 (3)	05:39	04:55	06:09 (8)		
	16:15	17:08	18:02	12 07:34 (2)	19:59	20 07:30 (3)	20:52	21:38	5 06:14 (8)	
6	08:31	07:55	06:56	06:42	07:09 (3)	05:37	04:55			
	16:16	17:10	18:04	15 07:35 (2)	20:00	20 07:29 (3)	20:54	21:39		
7	08:31	07:53	06:54	06:40	07:09 (3)	05:35	06:02 (9)	04:54		
	16:18	17:12	18:06	18 07:35 (2)	20:02	20 07:29 (3)	20:56	8 06:10 (9)	21:40	
8	08:30	07:51	06:51	06:37	07:08 (4)	05:33	06:00 (9)	04:53	05:25 (7)	
	16:19	17:14	18:08	20 07:36 (2)	20:04	21 07:29 (3)	20:57	11 06:11 (9)	21:41	5 05:30 (7)
9	08:30	07:49	06:49	06:35	07:03 (4)	05:31	05:58 (9)	04:53	05:25 (7)	
	16:20	17:16	18:10	20 07:36 (2)	20:06	25 07:28 (3)	20:59	16 06:14 (8)	21:42	7 05:32 (7)
10	08:29	07:48	06:47	06:33	07:01 (4)	05:29	05:58 (9)	04:52	05:24 (7)	
	16:22	17:18	18:11	19 07:35 (2)	20:08	26 07:27 (3)	21:01	19 06:17 (8)	21:43	8 05:32 (7)
11	08:29	07:46	06:44	06:30	06:59 (4)	05:27	05:57 (9)	04:52	05:24 (7)	
	16:23	17:20	18:13	19 07:35 (2)	20:09	27 07:26 (3)	21:03	20 06:17 (8)	21:44	10 05:34 (7)
12	08:28	07:44	06:42	06:28	07:17 (2)	05:26	05:56 (9)	04:52	05:24 (7)	
	16:25	17:22	18:15	18 07:35 (2)	20:11	26 07:24 (3)	21:04	22 06:18 (8)	21:44	10 05:34 (7)
13	08:27	07:42	06:40	06:26	07:17 (2)	05:24	05:56 (9)	04:51	05:24 (7)	
	16:26	17:24	18:17	16 07:33 (2)	20:13	25 07:21 (4)	21:06	23 06:19 (8)	21:45	11 05:35 (7)
14	08:26	07:40	06:37	06:23	07:18 (2)	05:22	05:56 (9)	04:51	05:23 (7)	
	16:28	17:26	18:19	14 07:32 (2)	20:15	27 07:22 (4)	21:08	23 06:19 (8)	21:46	12 05:35 (7)
15	08:25	07:38	06:35	06:21	06:55 (4)	05:21	05:56 (9)	04:51	05:23 (7)	
	16:30	17:28	18:21	10 07:29 (2)	20:17	27 07:22 (4)	21:09	24 06:20 (8)	21:46	12 05:35 (7)
16	08:24	07:36	06:32	06:19	06:55 (4)	05:19	05:56 (9)	04:51	05:23 (7)	
	16:31	17:30	18:23	20:18	27 07:22 (4)	21:11	24 06:20 (8)	21:47	13 05:36 (7)	
17	08:23	07:34	06:30	06:17	06:53 (4)	05:17	05:56 (9)	04:50	05:23 (7)	
	16:33	17:32	18:24	9 07:05 (1)	20:20	28 07:21 (4)	21:12	25 06:21 (8)	21:47	13 05:36 (7)
18	08:22	07:32	06:28	06:14	06:53 (4)	05:16	05:57 (9)	04:50	05:23 (7)	
	16:35	17:34	18:26	15 07:08 (1)	20:22	28 07:21 (4)	21:14	24 06:21 (8)	21:48	14 05:37 (7)
19	08:21	07:29	06:25	06:12	06:54 (4)	05:14	05:57 (9)	04:50	05:23 (7)	
	16:36	17:35	18:28	19 07:10 (1)	20:24	27 07:21 (4)	21:16	24 06:21 (8)	21:48	14 05:37 (7)
20	08:20	07:27	06:23	06:10	06:54 (4)	05:13	05:58 (9)	04:51	05:24 (7)	
	16:38	17:37	18:30	21 07:10 (1)	20:26	26 07:20 (4)	21:17	23 06:21 (8)	21:48	14 05:38 (7)
21	08:19	07:25	06:20	06:08	06:54 (4)	05:12	05:58 (9)	04:51	05:24 (7)	
	16:40	17:39	18:32	22 07:11 (1)	20:27	26 07:20 (4)	21:19	23 06:21 (8)	21:49	14 05:38 (7)
22	08:18	07:23	06:18	06:06	06:55 (4)	05:10	05:57 (8)	04:51	05:24 (7)	
	16:42	17:41	18:33	24 07:11 (1)	20:29	24 07:19 (4)	21:20	24 06:21 (8)	21:49	14 05:38 (7)
23	08:17	07:21	06:16	06:03	06:55 (4)	05:09	05:58 (9)	04:51	05:24 (7)	
	16:43	17:43	18:35	24 07:11 (1)	20:31	23 07:18 (4)	21:22	23 06:21 (8)	21:49	14 05:38 (7)
24	08:15	07:19	06:13	06:01	06:56 (4)	05:07	05:58 (9)	04:51	05:25 (7)	
	16:45	17:45	18:37	25 07:11 (1)	20:33	21 07:17 (4)	21:23	23 06:21 (8)	21:49	14 05:39 (7)
25	08:14	07:16	06:11	05:59	06:57 (4)	05:06	05:59 (9)	04:52	05:25 (7)	
	16:47	17:47	18:39	25 07:11 (1)	20:35	17 07:14 (4)	21:24	21 06:20 (8)	21:49	13 05:38 (7)
26	08:13	07:14	06:08	05:57	06:59 (4)	05:05	05:59 (9)	04:52	05:25 (7)	
	16:49	17:49	18:41	23 07:10 (1)	20:36	13 07:12 (4)	21:26	21 06:20 (8)	21:49	13 05:38 (7)
27	08:11	07:12	06:06	05:46	06:56 (4)	05:04	06:00 (8)	04:53	05:26 (7)	
	16:51	17:51	18:42	23 07:09 (1)	20:38	6 07:08 (4)	21:27	20 06:20 (8)	21:49	13 05:39 (7)
28	08:10	07:10	06:04	05:53	06:47 (1)	05:03	06:01 (8)	04:53	05:26 (7)	
	16:53	17:53	18:44	21 07:08 (1)	20:40	21:29	19 06:20 (8)	21:49	12 05:38 (7)	
29	08:08	07:01	06:47	05:51	05:02	05:02	06:01 (8)	04:54	05:27 (7)	
	16:55	19:46	19 08:06 (1)	20:42	21:30	18 06:19 (8)	21:49	11 05:38 (7)		
30	08:07	06:59	07:49 (1)	05:49	05:00	06:02 (8)	04:54	05:27 (7)		
	16:57	19:48	16 08:05 (1)	20:43	21:31	17 06:19 (8)	21:48	11 05:38 (7)		
31	08:05	06:56	07:20 (3)	04:59	04:59	06:02 (8)				
	16:58	19:50	17 08:03 (1)	21:32	16 06:18 (8)					
Sonnenscheinstunden	253	275	367	418	491	511	506	321		
astr.max.mögl.Beschattung			492	590		0.43		0.39		
Red.Sonnenscheinwahrsch.			0.28	0.37		0.96		0.96		
Reduktion Betriebsdauer			0.68	0.72		0.73		0.72		
Gesamte Reduktion			0.18	0.26		0.30		0.26		
Met.wahrsch.Beschattung			89	151		153		85		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
i17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DW - IO127

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:55	05:28 (7)	05:34		06:07 (9)	06:26	06:58 (4)	07:18	07:56 (2)	07:14	08:08			
	21:48	10	05:38 (7)	21:14	21	06:28 (8)	20:09	27	07:25 (3)	18:57	17	08:13 (2)	16:48	16:05
2	04:56	05:29 (7)	05:35		06:07 (9)	06:28	07:00 (4)	07:20	07:55 (2)	07:16	08:09			
	21:48	9	05:38 (7)	21:12	20	06:27 (8)	20:07	26	07:26 (3)	18:55	19	08:14 (2)	16:46	16:05
3	04:56	05:30 (7)	05:37		06:08 (9)	06:30	07:01 (4)	07:21	07:54 (2)	07:18	08:11			
	21:47	8	05:38 (7)	21:11	17	06:25 (8)	20:05	25	07:26 (3)	18:52	19	08:13 (2)	16:44	16:04
4	04:57	05:30 (7)	05:38		06:09 (9)	06:31	07:05 (4)	07:23	07:53 (2)	07:20	08:12			
	21:47	6	05:36 (7)	21:09	15	06:24 (8)	20:02	21	07:26 (3)	18:50	20	08:13 (2)	16:42	16:03
5	04:58	05:32 (7)	05:40		06:11 (9)	06:33	07:06 (3)	07:25	07:53 (2)	07:22	08:14			
	21:46	3	05:35 (7)	21:07	10	06:21 (9)	20:00	20	07:26 (3)	18:48	20	08:13 (2)	16:41	16:03
6	04:59		05:42		06:12 (9)	06:35	07:05 (3)	07:27	07:54 (2)	07:24	08:15			
	21:46		21:05	6	06:18 (9)	19:58	21	07:26 (3)	18:45	19	08:13 (2)	16:39	16:02	
7	05:00		05:43			06:36	07:05 (3)	07:28	07:55 (2)	07:26	08:16			
	21:45		21:03			19:55	20	07:25 (3)	18:43	17	08:12 (2)	16:37	16:02	
8	05:01		06:15 (8)	05:45		06:38	07:06 (3)	07:30	07:56 (2)	07:28	08:18			
	21:45	6	06:21 (8)	21:01		19:53	19	07:25 (3)	18:41	14	08:10 (2)	16:35	16:01	
9	05:02		06:13 (8)	05:47		06:40	07:06 (3)	07:32	07:58 (2)	07:30	08:19			
	21:44	10	06:23 (8)	20:59		19:50	17	07:23 (3)	18:38	10	08:08 (2)	16:33	16:01	
10	05:03		06:13 (8)	05:48		06:42	07:08 (3)	07:34	08:00 (2)	07:31	08:20			
	21:43	11	06:24 (8)	20:57		19:48	14	07:22 (3)	18:36	5	08:05 (2)	16:32	16:01	
11	05:04		06:12 (8)	05:50		06:43	07:10 (3)	07:36		07:33	08:21			
	21:42	13	06:25 (8)	20:55		19:46	11	07:21 (3)	18:34		16:30	16:01		
12	05:05		06:11 (8)	05:52		06:45	07:11 (3)	07:37		07:35	08:22			
	21:41	15	06:26 (8)	20:53		19:43	16	07:53 (1)	18:31		16:28	16:00		
13	05:06		06:10 (8)	05:54		06:47	07:40 (1)	07:39		07:37	08:23			
	21:40	17	06:27 (8)	20:51		19:41	16	07:56 (1)	18:29		16:27	16:00		
14	05:07		06:10 (8)	05:55		06:48	07:39 (1)	07:41		07:39	08:24			
	21:39	17	06:27 (8)	20:49		19:38	18	07:57 (1)	18:27		16:25	16:00		
15	05:09		06:09 (8)	05:57		06:50	07:36 (1)	07:43		07:41	08:25			
	21:38	19	06:28 (8)	20:47		19:36	21	07:57 (1)	18:24		16:24	16:00		
16	05:10		06:09 (8)	05:59		06:52	07:36 (1)	07:45		07:43	08:26			
	21:37	19	06:28 (8)	20:45	9	07:08 (4)	19:33	22	07:58 (1)	18:22		16:22	16:00	
17	05:11		06:09 (8)	06:00		07:06 (4)	06:54	07:35 (1)	07:46		07:44	08:27		
	21:36	21	06:30 (8)	20:43	14	07:20 (4)	19:31	24	07:59 (1)	18:20		16:21	16:01	
18	05:13		06:09 (8)	06:02		07:03 (4)	06:55	07:34 (1)	07:48		07:46	08:28		
	21:35	21	06:30 (8)	20:41	18	07:21 (4)	19:29	24	07:58 (1)	18:18		16:19	16:01	
19	05:14		06:08 (8)	06:04		07:02 (4)	06:57	07:34 (1)	07:50		07:48	08:28		
	21:34	22	06:30 (8)	20:39	21	07:23 (4)	19:26	24	07:58 (1)	18:15		16:18	16:01	
20	05:15		06:08 (8)	06:05		07:00 (4)	06:59	07:34 (1)	07:52		07:50	08:29		
	21:32	22	06:30 (8)	20:37	23	07:23 (4)	19:24	24	07:58 (1)	18:13		16:17	16:01	
21	05:17		06:08 (8)	06:07		06:59 (4)	07:00	07:33 (1)	07:54		07:51	08:30		
	21:31	23	06:31 (8)	20:34	25	07:24 (4)	19:21	24	07:57 (1)	18:11		16:15	16:02	
22	05:18		06:08 (8)	06:09		06:59 (4)	07:02	07:33 (1)	07:56		07:53	08:30		
	21:30	23	06:31 (8)	20:32	26	07:25 (4)	19:19	23	07:56 (1)	18:09		16:14	16:02	
23	05:20		06:07 (8)	06:11		06:57 (4)	07:04	07:34 (1)	07:58		07:55	08:31		
	21:28	24	06:31 (8)	20:30	27	07:24 (4)	19:16	21	07:55 (1)	18:07		16:13	16:03	
24	05:21		06:08 (8)	06:12		06:57 (4)	07:06	07:34 (1)	07:59		07:57	08:31		
	21:27	24	06:32 (8)	20:28	28	07:25 (4)	19:14	19	07:53 (1)	18:05		16:12	16:03	
25	05:23		06:07 (8)	06:14		06:57 (4)	07:07	07:35 (1)	07:01		07:58	08:32		
	21:25	24	06:31 (8)	20:25	28	07:25 (4)	19:12	17	07:52 (1)	17:02		16:11	16:04	
26	05:24		06:07 (8)	06:16		06:56 (4)	07:09	07:37 (1)	07:03		08:00	08:32		
	21:24	25	06:32 (8)	20:23	28	07:24 (4)	19:09	12	07:49 (1)	17:00		16:10	16:05	
27	05:26		06:07 (8)	06:18		06:56 (4)	07:11	07:43 (1)	07:05		08:02	08:32		
	21:22	24	06:31 (8)	20:21	28	07:24 (4)	19:07	1	07:44 (1)	16:58		16:09	16:05	
28	05:27		06:07 (8)	06:19		06:56 (4)	07:13	08:01 (2)	07:07		08:03	08:32		
	21:21	24	06:31 (8)	20:19	27	07:23 (4)	19:04	7	08:08 (2)	16:56		16:08	16:06	
29	05:29		06:07 (8)	06:21		06:56 (4)	07:14	07:59 (2)	07:09		08:05	08:32		
	21:19	24	06:31 (8)	20:16	26	07:22 (4)	19:02	12	08:11 (2)	16:54		16:07	16:07	
30	05:30		06:06 (8)	06:23		06:57 (4)	07:16	07:57 (2)	07:11		08:06	08:32		
	21:18	24	06:30 (8)	20:14	25	07:22 (4)	19:00	16	08:13 (2)	16:52		16:06	16:08	
31	05:32		06:07 (8)	06:24		06:57 (4)			07:13			08:32		
	21:16	22	06:29 (8)	20:12	26	07:23 (3)			16:50			16:09		
Sonnenscheinstunden	508		458			382			330		262	237		
astr.max.mögl.Beschattung	510		468			562			160					
Red.Sonnenscheinwahrsch.	0.38		0.42			0.35			0.29					
Reduktion Betriebsdauer	0.96		0.96			0.96			0.96					
Reduktion Windrichtung	0.73		0.72			0.70			0.66					
Gesamte Reduktion	0.26		0.29			0.23			0.18					
Met.wahrsch.Beschattung	134		137			131			30					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DX - IO128

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46	04:59	05:58 (8)		
	16:10	17:00	17:55	19:51	18 08:01 (1)	20:45	21:34	19 06:17 (8)		
2	08:32	08:02	07:05	06:52	07:15 (3)	05:44	04:58	05:59 (8)		
	16:12	17:02	17:57	19:53	13 07:28 (3)	20:47	21:35	19 06:18 (8)		
3	08:32	08:00	07:03	06:49	07:13 (3)	05:42	04:57	05:59 (8)		
	16:13	17:04	17:58	19:55	16 07:29 (3)	20:49	21:36	18 06:17 (8)		
4	08:32	07:58	07:01	06:47	07:10 (3)	05:41	04:56	05:59 (8)		
	16:14	17:06	18:00	8 07:33 (2)	19:57	07:29 (3)	20:50	21:37	18 06:17 (8)	
5	08:32	07:57	06:58	07:22 (2)	06:45	07:10 (3)	05:39	04:55	06:01 (8)	
	16:15	17:08	18:02	12 07:34 (2)	19:59	20 07:30 (3)	20:52	21:38	16 06:17 (8)	
6	08:31	07:55	06:56	07:20 (2)	06:42	07:08 (3)	05:37	04:55	06:01 (8)	
	16:16	17:10	18:04	16 07:36 (2)	20:00	21 07:29 (3)	20:54	21:39	15 06:16 (8)	
7	08:31	07:53	06:54	07:17 (2)	06:40	07:08 (3)	05:35	04:54	06:02 (8)	
	16:18	17:12	18:06	19 07:36 (2)	20:02	21 07:29 (3)	20:56	21:40	14 06:16 (8)	
8	08:30	07:51	06:51	07:17 (2)	06:37	07:08 (3)	05:33	04:53	06:03 (8)	
	16:19	17:14	18:08	19 07:36 (2)	20:04	21 07:29 (3)	20:57	5 06:01 (9)	12 06:15 (8)	
9	08:30	07:49	06:49	07:17 (2)	06:35	07:05 (4)	05:31	05:58 (9)	04:53	06:04 (8)
	16:20	17:16	18:10	20 07:37 (2)	20:06	23 07:28 (3)	20:59	10 06:08 (9)	21:42	11 06:15 (8)
10	08:29	07:48	06:47	07:16 (2)	06:33	07:01 (4)	05:29	05:57 (9)	04:52	06:04 (8)
	16:22	17:18	18:11	20 07:36 (2)	20:08	26 07:27 (3)	21:01	13 06:10 (9)	21:43	10 06:14 (8)
11	08:29	07:46	06:44	07:16 (2)	06:30	06:59 (4)	05:27	05:56 (9)	04:52	06:05 (8)
	16:23	17:20	18:13	20 07:36 (2)	20:09	27 07:26 (3)	21:03	16 06:12 (8)	21:44	9 06:14 (8)
12	08:28	07:44	06:42	07:17 (2)	06:28	06:58 (4)	05:26	05:55 (9)	04:52	06:07 (8)
	16:25	17:22	18:15	19 07:36 (2)	20:11	27 07:25 (3)	21:04	18 06:13 (8)	21:44	6 06:13 (8)
13	08:27	07:42	06:40	07:17 (2)	06:26	06:56 (4)	05:24	05:55 (9)	04:51	06:08 (8)
	16:26	17:24	18:17	17 07:34 (2)	20:13	26 07:22 (3)	21:06	20 06:15 (8)	21:45	4 06:12 (8)
14	08:26	07:40	06:37	07:18 (2)	06:23	06:55 (4)	05:22	05:54 (9)	04:51	05:24 (7)
	16:28	17:26	18:19	15 07:33 (2)	20:15	25 07:20 (4)	21:08	21 06:15 (8)	21:46	4 05:28 (7)
15	08:25	07:38	06:35	07:19 (2)	06:21	06:54 (4)	05:21	05:54 (9)	04:51	05:24 (7)
	16:30	17:28	18:21	11 07:30 (2)	20:17	27 07:21 (4)	21:09	23 06:17 (8)	21:46	5 05:29 (7)
16	08:24	07:36	06:32	07:24 (2)	06:19	06:53 (4)	05:19	05:53 (9)	04:51	05:23 (7)
	16:31	17:30	18:23	1 07:25 (2)	20:18	28 07:21 (4)	21:11	24 06:17 (8)	21:47	7 05:30 (7)
17	08:23	07:34	06:30	06:57 (1)	06:17	06:52 (4)	05:17	05:54 (9)	04:50	05:23 (7)
	16:33	17:32	18:24	7 07:04 (1)	20:20	28 07:20 (4)	21:12	24 06:18 (8)	21:47	7 05:30 (7)
18	08:22	07:32	06:28	06:54 (1)	06:14	06:52 (4)	05:16	05:54 (9)	04:50	05:23 (7)
	16:35	17:34	18:26	14 07:08 (1)	20:22	28 07:20 (4)	21:14	24 06:18 (8)	21:48	8 05:31 (7)
19	08:21	07:29	06:25	06:52 (1)	06:12	06:52 (4)	05:14	05:54 (9)	04:50	05:23 (7)
	16:36	17:35	18:28	18 07:10 (1)	20:24	28 07:20 (4)	21:16	24 06:18 (8)	21:48	8 05:31 (7)
20	08:20	07:27	06:23	06:50 (1)	06:10	06:52 (4)	05:13	05:54 (9)	04:51	05:24 (7)
	16:38	17:37	18:30	20 07:10 (1)	20:26	28 07:20 (4)	21:17	25 06:19 (8)	21:48	8 05:32 (7)
21	08:19	07:25	06:20	06:49 (1)	06:08	06:52 (4)	05:12	05:55 (9)	04:51	05:24 (7)
	16:40	17:39	18:32	22 07:11 (1)	20:27	28 07:20 (4)	21:19	24 06:19 (8)	21:49	8 05:32 (7)
22	08:18	07:23	06:18	06:47 (1)	06:06	06:52 (4)	05:10	05:54 (9)	04:51	05:24 (7)
	16:42	17:41	18:33	24 07:11 (1)	20:29	27 07:19 (4)	21:20	24 06:18 (8)	21:49	8 05:32 (7)
23	08:17	07:21	06:16	06:47 (1)	06:03	06:53 (4)	05:09	05:55 (8)	04:51	05:24 (7)
	16:43	17:43	18:35	25 07:12 (1)	20:31	25 07:18 (4)	21:22	24 06:19 (8)	21:49	8 05:32 (7)
24	08:15	07:19	06:13	06:46 (1)	06:01	06:53 (4)	05:07	05:55 (8)	04:51	05:25 (7)
	16:45	17:45	18:37	25 07:11 (1)	20:33	24 07:17 (4)	21:23	24 06:19 (8)	21:49	8 05:33 (7)
25	08:14	07:16	06:11	06:46 (1)	05:59	06:53 (4)	05:06	05:55 (8)	04:52	05:25 (7)
	16:47	17:47	18:39	25 07:11 (1)	20:35	22 07:15 (4)	21:24	24 06:19 (8)	21:49	8 05:33 (7)
26	08:13	07:14	06:08	06:46 (1)	05:57	06:54 (4)	05:05	05:56 (8)	04:52	05:25 (7)
	16:49	17:49	18:41	25 07:11 (1)	20:36	20 07:14 (4)	21:26	23 06:19 (8)	21:49	7 05:32 (7)
27	08:11	07:12	06:06	06:46 (1)	05:55	06:56 (4)	05:04	05:56 (8)	04:53	05:27 (7)
	16:50	17:51	18:42	24 07:10 (1)	20:38	16 07:12 (4)	21:27	23 06:19 (8)	21:49	5 05:32 (7)
28	08:10	07:10	06:04	06:46 (1)	05:53	06:58 (4)	05:03	05:56 (8)	04:53	05:27 (7)
	16:53	17:53	18:44	23 07:09 (1)	20:40	12 07:10 (4)	21:29	23 06:19 (8)	21:49	4 05:31 (7)
29	08:08		07:01	07:46 (1)	05:51		05:02	05:57 (8)	04:54	05:29 (7)
	16:55		19:46	21 08:07 (1)	20:42		21:30	21 06:18 (8)	21:49	5 06:15 (8)
30	08:07		06:59	07:47 (1)	05:49		05:00	05:57 (8)	04:54	06:10 (8)
	16:57		19:48	19 08:06 (1)	20:43		21:31	21 06:18 (8)	21:48	6 06:16 (8)
31	08:05		06:56	07:49 (1)			04:59	05:57 (8)		
	16:58		19:50	15 08:04 (1)			21:32	21 06:18 (8)		
Sonnenscheinstunden	253	275	367	418	491	506	285			
astr.max.mögl.Beschattung			504	644	499	285				
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39				
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96				
Reduktion Windrichtung			0.68	0.72	0.73	0.72				
Gesamte Reduktion			0.18	0.26	0.30	0.27				
Met.wahrsch.Beschattung			91	165	149	76				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DX - IO128

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:55	06:10 (8)	05:34	06:05 (9)	06:26	06:58 (4)	07:18	07:56 (2)	07:14	08:08				
	21:48	7	06:17 (8)	21:14	18	06:23 (8)	20:09	27	07:25 (3)	18:57	18	08:14 (2)	16:48	16:05
2	04:56	06:10 (8)	05:35	06:06 (9)	06:28	07:00 (4)	07:20	07:55 (2)	07:16	08:09				
	21:48	9	06:19 (8)	21:12	15	06:21 (9)	20:07	26	07:26 (3)	18:55	20	08:15 (2)	16:46	16:05
3	04:56	06:09 (8)	05:37	06:07 (9)	06:30	07:03 (4)	07:21	07:54 (2)	07:18	08:11				
	21:47	11	06:20 (8)	21:11	12	06:19 (9)	20:05	23	07:26 (3)	18:52	20	08:14 (2)	16:44	16:04
4	04:57	06:08 (8)	05:38	06:09 (9)	06:31	07:05 (3)	07:23	07:54 (2)	07:20	08:12				
	21:47	12	06:20 (8)	21:09	9	06:18 (9)	20:02	21	07:26 (3)	18:50	20	08:14 (2)	16:42	16:03
5	04:58	06:08 (8)	05:40	06:33	07:05 (3)	07:25	07:54 (2)	07:22	08:14					
	21:46	13	06:21 (8)	21:07	20:00	21	07:26 (3)	18:48	20	08:14 (2)	16:41	16:03		
6	04:59	06:08 (8)	05:42	06:35	07:04 (3)	07:27	07:54 (2)	07:24	08:15					
	21:46	14	06:22 (8)	21:05	19:58	21	07:25 (3)	18:45	19	08:13 (2)	16:39	16:02		
7	05:00	06:07 (8)	05:43	06:36	07:05 (3)	07:28	07:55 (2)	07:26	08:16					
	21:45	16	06:23 (8)	21:03	19:55	20	07:25 (3)	18:43	17	08:12 (2)	16:37	16:02		
8	05:01	06:07 (8)	05:45	06:38	07:05 (3)	07:30	07:56 (2)	07:28	08:18					
	21:45	17	06:24 (8)	21:01	19:53	19	07:24 (3)	18:41	14	08:10 (2)	16:35	16:01		
9	05:02	06:07 (8)	05:47	06:40	07:06 (3)	07:32	07:58 (2)	07:30	08:19					
	21:44	17	06:24 (8)	20:59	19:50	16	07:22 (3)	18:38	11	08:09 (2)	16:33	16:01		
10	05:03	06:06 (8)	05:48	06:42	07:08 (3)	07:34	08:00 (2)	07:31	08:20					
	21:43	19	06:25 (8)	20:57	19:48	13	07:21 (3)	18:36	6	08:06 (2)	16:32	16:01		
11	05:04	06:06 (8)	05:50	06:43	07:10 (3)	07:36			07:33	08:21				
	21:42	20	06:26 (8)	20:55	19:46	17	07:53 (1)	18:34		16:30	16:01			
12	05:05	06:06 (8)	05:52	06:45	07:41 (1)	07:37				07:35	08:22			
	21:41	20	06:26 (8)	20:53	19:43	14	07:55 (1)	18:31		16:28	16:00			
13	05:06	06:06 (8)	05:54	06:47	07:39 (1)	07:39				07:37	08:23			
	21:40	20	06:26 (8)	20:51	19:41	18	07:57 (1)	18:29		16:27	16:00			
14	05:07	06:05 (8)	05:55	06:48	07:38 (1)	07:41				07:39	08:24			
	21:39	22	06:27 (8)	20:49	6	07:15 (4)	19:38	20	07:58 (1)	18:27	16:25	16:00		
15	05:09	06:05 (8)	05:57	07:05 (4)	06:50	07:36 (1)	07:43			07:41	08:25			
	21:38	22	06:27 (8)	20:47	13	07:18 (4)	19:36	22	07:58 (1)	18:24	16:24	16:00		
16	05:10	06:05 (8)	05:59	07:03 (4)	06:52	07:35 (1)	07:45			07:43	08:26			
	21:37	22	06:27 (8)	20:45	17	07:20 (4)	19:33	24	07:59 (1)	18:22	16:22	16:00		
17	05:11	06:05 (8)	06:00	07:02 (4)	06:54	07:35 (1)	07:46			07:44	08:27			
	21:36	23	06:28 (8)	20:43	20	07:22 (4)	19:31	24	07:59 (1)	18:20	16:21	16:01		
18	05:13	06:05 (8)	06:02	07:00 (4)	06:55	07:33 (1)	07:48			07:46	08:28			
	21:35	23	06:28 (8)	20:41	22	07:22 (4)	19:29	25	07:58 (1)	18:18	16:19	16:01		
19	05:14	06:05 (8)	06:04	06:59 (4)	06:57	07:33 (1)	07:50			07:48	08:28			
	21:34	23	06:28 (8)	20:39	24	07:23 (4)	19:26	25	07:58 (1)	18:15	16:18	16:01		
20	05:15	06:04 (8)	06:05	06:57 (4)	06:59	07:33 (1)	07:52			07:50	08:29			
	21:32	24	06:28 (8)	20:37	26	07:23 (4)	19:24	25	07:58 (1)	18:13	16:17	16:01		
21	05:17	06:05 (8)	06:07	06:57 (4)	07:00	07:33 (1)	07:54			07:51	08:30			
	21:31	24	06:29 (8)	20:34	27	07:24 (4)	19:21	24	07:57 (1)	18:11	16:15	16:02		
22	05:18	06:05 (8)	06:09	06:57 (4)	07:02	07:33 (1)	07:56			07:53	08:30			
	21:30	24	06:29 (8)	20:32	27	07:24 (4)	19:19	23	07:56 (1)	18:09	16:14	16:02		
23	05:20	06:04 (9)	06:11	06:56 (4)	07:04	07:34 (1)	07:58			07:55	08:31			
	21:28	24	06:28 (8)	20:30	28	07:24 (4)	19:16	21	07:55 (1)	18:07	16:13	16:03		
24	05:21	06:05 (9)	06:12	06:56 (4)	07:06	07:34 (1)	07:59			07:57	08:31			
	21:27	24	06:29 (8)	20:28	28	07:24 (4)	19:14	19	07:53 (1)	18:05	16:12	16:03		
25	05:23	06:04 (9)	06:14	06:56 (4)	07:07	07:36 (1)	07:01			07:58	08:32			
	21:25	24	06:28 (8)	20:25	28	07:24 (4)	19:12	15	07:51 (1)	17:02	16:11	16:04		
26	05:24	06:05 (9)	06:16	06:55 (4)	07:09	07:38 (1)	07:03			08:00	08:32			
	21:24	24	06:29 (8)	20:23	28	07:23 (4)	19:09	10	07:48 (1)	17:00	16:10	16:05		
27	05:26	06:04 (9)	06:18	06:55 (4)	07:11		07:05			08:02	08:32			
	21:22	24	06:28 (8)	20:21	28	07:23 (4)	19:07			16:58	16:09	16:05		
28	05:27	06:04 (9)	06:19	06:55 (4)	07:13	08:01 (2)	07:07			08:03	08:32			
	21:21	23	06:27 (8)	20:19	26	07:21 (4)	19:04	9	08:10 (2)	16:56	16:08	16:06		
29	05:29	06:04 (9)	06:21	06:56 (4)	07:14	07:58 (2)	07:09			08:05	08:32			
	21:19	23	06:27 (8)	20:16	25	07:21 (4)	19:02	14	08:12 (2)	16:54	16:07	16:07		
30	05:30	06:04 (9)	06:23	06:56 (4)	07:16	07:57 (2)	07:11			08:06	08:32			
	21:18	21	06:25 (8)	20:14	27	07:23 (3)	19:00	16	08:13 (2)	16:52	16:06	16:08		
31	05:32	06:05 (9)	06:24	06:57 (4)			07:13				08:32			
	21:16	20	06:25 (8)	20:12	27	07:24 (3)				16:50	16:09	16:09		
Sonnenscheinstunden	509		458		382		330		262		237			
astr.max.mögl.Beschattung	609		481		572		165							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29							
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96							
Reduktion Windrichtung	0.73		0.72		0.70		0.66							
Gesamte Reduktion	0.26		0.29		0.23		0.18							
Met.wahrsch.Beschattung	160		140		134		31							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattenende	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DY - IO129

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46	04:59	
	16:10	17:00	17:55	19:51	17 07:34 (3)	20:45	21:34	
2	08:32	08:02	07:05	07:29 (2)	06:52	07:16 (3)	05:44	04:58
	16:12	17:02	17:57	19:53	19 07:35 (3)	20:47	21:35	
3	08:32	08:00	07:03	07:27 (2)	06:49	07:15 (3)	05:42	04:57
	16:13	17:04	17:58	19:55	20 07:35 (3)	20:49	21:36	
4	08:32	07:58	07:01	07:25 (2)	06:47	07:14 (3)	05:41	04:56
	16:14	17:06	18:00	19:57	20 07:34 (3)	20:50	21:37	05:43 (7)
5	08:32	07:57	06:58	07:22 (2)	06:45	07:14 (3)	05:39	04:55
	16:15	17:08	18:02	18 07:40 (2)	19:59	20 07:34 (3)	20:52	8 06:13 (9) 21:38 8 05:35 (7)
6	08:31	07:55	06:56	07:21 (2)	06:42	07:10 (4)	05:37	06:03 (9) 04:55 05:26 (7)
	16:16	17:10	18:04	19 07:40 (2)	20:00	23 07:33 (3)	20:54	15 06:18 (8) 21:39 10 05:36 (7)
7	08:31	07:53	06:54	07:20 (2)	06:40	07:08 (4)	05:35	06:02 (9) 04:54 05:26 (7)
	16:18	17:12	18:06	20 07:40 (2)	20:02	25 07:33 (3)	20:56	19 06:21 (8) 21:40 11 05:37 (7)
8	08:30	07:51	06:51	07:20 (2)	06:37	07:06 (4)	05:33	06:01 (9) 04:53 05:25 (7)
	16:19	17:14	18:08	20 07:40 (2)	20:04	26 07:32 (3)	20:57	21 06:22 (8) 21:41 12 05:37 (7)
9	08:30	07:49	06:49	07:20 (2)	06:35	07:04 (4)	05:31	06:00 (9) 04:53 05:25 (7)
	16:20	17:16	18:10	20 07:40 (2)	20:06	26 07:30 (3)	20:59	23 06:23 (8) 21:42 13 05:38 (7)
10	08:29	07:48	06:47	07:20 (2)	06:33	07:03 (4)	05:29	06:00 (9) 04:52 05:25 (7)
	16:22	17:18	18:11	19 07:39 (2)	20:08	25 07:28 (3)	21:01	24 06:24 (8) 21:43 13 05:38 (7)
11	08:29	07:46	06:44	07:21 (2)	06:30	07:02 (4)	05:27	06:00 (9) 04:52 05:25 (7)
	16:23	17:20	18:13	17 07:38 (2)	20:09	26 07:28 (4)	21:03	25 06:25 (8) 21:44 14 05:39 (7)
12	08:28	07:44	06:42	07:22 (2)	06:28	07:01 (4)	05:26	05:59 (9) 04:52 05:25 (7)
	16:25	17:22	18:15	15 07:37 (2)	20:11	27 07:28 (4)	21:04	26 06:25 (8) 21:44 15 05:40 (7)
13	08:27	07:42	06:40	07:24 (2)	06:26	07:00 (4)	05:24	06:00 (9) 04:51 05:25 (7)
	16:26	17:24	18:17	10 07:34 (2)	20:13	28 07:28 (4)	21:06	26 06:26 (8) 21:45 15 05:40 (7)
14	08:26	07:40	06:37	06:23	06:23	07:00 (4)	05:22	05:59 (9) 04:51 05:24 (7)
	16:28	17:26	18:19	20:15	28 07:28 (4)	21:08	26 06:25 (8) 21:46 16 05:40 (7)	
15	08:25	07:38	06:35	07:00 (1)	06:21	07:00 (4)	05:21	06:00 (9) 04:51 05:25 (7)
	16:30	17:28	18:21	12 07:12 (1)	20:17	28 07:28 (4)	21:09	26 06:26 (8) 21:46 15 05:40 (7)
16	08:24	07:36	06:32	06:58 (1)	06:19	07:00 (4)	05:19	06:00 (9) 04:51 05:25 (7)
	16:31	17:30	18:23	16 07:14 (1)	20:18	27 07:27 (4)	21:11	25 06:25 (8) 21:47 16 05:41 (7)
17	08:23	07:34	06:30	06:56 (1)	06:17	06:59 (4)	05:17	06:01 (9) 04:50 05:25 (7)
	16:33	17:32	18:24	19 07:15 (1)	20:20	27 07:26 (4)	21:12	25 06:26 (8) 21:47 16 05:41 (7)
18	08:22	07:32	06:28	06:55 (1)	06:14	06:59 (4)	05:16	06:02 (9) 04:50 05:25 (7)
	16:35	17:34	18:26	21 07:16 (1)	20:22	27 07:26 (4)	21:14	24 06:26 (8) 21:48 16 05:41 (7)
19	08:21	07:29	06:25	06:54 (1)	06:12	07:00 (4)	05:14	06:02 (9) 04:50 05:25 (7)
	16:36	17:35	18:28	23 07:17 (1)	20:24	25 07:25 (4)	21:16	23 06:25 (8) 21:48 16 05:41 (7)
20	08:20	07:27	06:23	06:53 (1)	06:10	07:01 (4)	05:13	06:03 (9) 04:51 05:26 (7)
	16:38	17:37	18:30	24 07:17 (1)	20:26	23 07:24 (4)	21:17	23 06:26 (8) 21:48 17 05:43 (7)
21	08:19	07:25	06:20	06:53 (1)	06:08	07:02 (4)	05:12	06:03 (8) 04:51 05:26 (7)
	16:40	17:39	18:32	24 07:17 (1)	20:27	21 07:23 (4)	21:19	23 06:26 (8) 21:49 17 05:43 (7)
22	08:18	07:23	06:18	06:52 (1)	06:06	07:03 (4)	05:10	06:03 (8) 04:51 05:26 (7)
	16:42	17:41	18:33	24 07:16 (1)	20:29	18 07:21 (4)	21:20	21 06:24 (8) 21:49 17 05:43 (7)
23	08:17	07:21	06:16	06:52 (1)	06:03	07:05 (4)	05:09	06:04 (8) 04:51 05:26 (7)
	16:43	17:43	18:35	24 07:16 (1)	20:31	14 07:19 (4)	21:22	20 06:24 (8) 21:49 17 05:43 (7)
24	08:15	07:19	06:13	06:51 (1)	06:01	07:07 (4)	05:07	06:04 (8) 04:51 05:27 (7)
	16:45	17:45	18:37	24 07:15 (1)	20:33	9 07:16 (4)	21:23	20 06:24 (8) 21:49 16 05:43 (7)
25	08:14	07:16	06:11	06:52 (1)	05:59	05:06	05:06	06:05 (8) 04:52 05:27 (7)
	16:47	17:47	18:39	22 07:14 (1)	20:35	21:24	19 06:24 (8) 21:49 16 05:43 (7)	
26	08:13	07:14	06:08	06:53 (1)	05:57	05:05	05:05	06:06 (8) 04:52 05:27 (7)
	16:49	17:49	18:41	21 07:14 (1)	20:36	21:26	17 06:23 (8) 21:49 16 05:43 (7)	
27	08:11	07:12	06:06	06:53 (1)	05:55	05:04	05:04	06:07 (8) 04:53 05:28 (7)
	16:51	17:51	18:42	19 07:12 (1)	20:38	21:27	15 06:22 (8) 21:49 16 05:44 (7)	
28	08:10	07:10	06:04	06:55 (1)	05:53	05:03	05:03	06:08 (8) 04:53 05:28 (7)
	16:53	17:53	18:44	15 07:10 (1)	20:40	21:29	14 06:22 (8) 21:49 15 05:43 (7)	
29	08:08	07:01	06:01	07:24 (3)	05:51	05:02	05:02	06:09 (8) 04:54 05:28 (7)
	16:55	19:46	14 08:06 (1)	20:42	21:30	11 06:20 (8) 21:49 16 05:44 (7)		
30	08:07	06:59	07:22 (3)	05:49	05:00	06:11 (8)	04:54 05:28 (7)	
	16:57	19:48	10 07:32 (3)	20:43	21:31	8 06:19 (8) 21:48 15 05:43 (7)		
31	08:05	06:56	07:20 (3)	05:49	04:59	06:13 (8)		
	16:58	19:50	14 07:34 (3)	21:32	4 06:17 (8)			
Sonnenscheinstunden	253	275	367	419	491	506		
astr.max.mögl.Beschattung			517	549	531	389		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.68	0.72	0.73	0.72		
Gesamte Reduktion			0.18	0.26	0.30	0.26		
Met.wahrsch.Beschattung			93	140	159	103		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DY - IO129

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:29 (7)	05:34		06:10 (9)	06:26	07:01 (4)	07:18	08:02 (2)	07:14	08:08		
	21:48	05:43 (7)	21:14	25	06:35 (8)	20:09	26	07:27 (4)	18:57	13	08:15 (2)	16:48	16:05
2	04:56	05:30 (7)	05:35		06:10 (9)	06:28		07:02 (4)	07:20		08:00 (2)	07:16	08:09
	21:48	05:44 (7)	21:12	25	06:35 (8)	20:07	25	07:27 (3)	18:55	16	08:16 (2)	16:46	16:05
3	04:56	05:30 (7)	05:37		06:10 (9)	06:30		07:02 (4)	07:21		07:58 (2)	07:18	08:11
	21:47	05:44 (7)	21:11	23	06:33 (8)	20:05	26	07:28 (3)	18:52	18	08:16 (2)	16:44	16:04
4	04:57	05:30 (7)	05:38		06:11 (9)	06:31		07:03 (4)	07:23		07:58 (2)	07:20	08:12
	21:47	05:43 (7)	21:09	22	06:33 (8)	20:02	26	07:29 (3)	18:50	19	08:17 (2)	16:42	16:03
5	04:58	05:31 (7)	05:40		06:12 (9)	06:33		07:05 (4)	07:25		07:57 (2)	07:22	08:14
	21:46	05:43 (7)	21:07	20	06:32 (8)	20:00	25	07:30 (3)	18:48	20	08:17 (2)	16:41	16:03
6	04:59	05:32 (7)	05:42		06:12 (9)	06:35		07:06 (4)	07:27		07:57 (2)	07:24	08:15
	21:46	05:42 (7)	21:05	18	06:30 (8)	19:58	23	07:29 (3)	18:45	20	08:17 (2)	16:39	16:02
7	05:00	05:33 (7)	05:43		06:14 (9)	06:36		07:09 (3)	07:28		07:57 (2)	07:26	08:16
	21:45	05:42 (7)	21:03	13	06:27 (8)	19:55	20	07:29 (3)	18:43	20	08:17 (2)	16:37	16:02
8	05:01	05:34 (7)	05:45		06:15 (9)	06:38		07:09 (3)	07:30		07:56 (2)	07:28	08:18
	21:45	05:41 (7)	21:01	7	06:22 (9)	19:53	20	07:29 (3)	18:41	19	08:15 (2)	16:35	16:01
9	05:02	05:36 (7)	05:47		06:40			07:08 (3)	07:32		07:58 (2)	07:30	08:19
	21:44	05:39 (7)	20:59		19:50	20	07:28 (3)	18:38	16	08:14 (2)	16:33	16:01	
10	05:03	05:16 (8)	05:48		06:42			07:09 (3)	07:34		08:00 (2)	07:31	08:20
	21:43		20:57		19:48	19	07:28 (3)	18:36	13	08:13 (2)	16:32	16:01	
11	05:04	05:16 (8)	05:50		06:43			07:10 (3)	07:36		08:02 (2)	07:33	08:21
	21:42		20:55		19:46	17	07:27 (3)	18:34	10	08:12 (2)	16:30	16:01	
12	05:05	05:17 (8)	05:52		06:45			07:11 (3)	07:37		08:04 (2)	07:35	08:22
	21:41		20:53		19:43	14	07:25 (3)	18:31	5	08:09 (2)	16:28	16:00	
13	05:06	06:20 (8)	05:54		06:47			07:13 (3)	07:39		07:37	07:37	08:23
	21:40	06:27 (8)	20:51		19:41	10	07:23 (3)	18:29			16:27	16:00	
14	05:07	06:18 (8)	05:55		06:48			07:15 (3)	07:41		07:39	08:24	
	21:39	06:28 (8)	20:49		19:38	14	07:57 (1)	18:27			16:25	16:00	
15	05:09	06:17 (8)	05:57		06:50			07:45 (1)	07:43		07:41	08:25	
	21:38	06:30 (8)	20:47		19:36	14	07:59 (1)	18:24			16:24	16:00	
16	05:10	06:16 (8)	05:59		06:52			07:43 (1)	07:45		07:43	08:26	
	21:37	06:30 (8)	20:45		19:33	18	08:01 (1)	18:22			16:22	16:00	
17	05:11	06:16 (8)	06:00		06:54			07:41 (1)	07:46		07:44	08:27	
	21:36	06:32 (8)	20:43		19:31	21	08:02 (1)	18:20			16:21	16:01	
18	05:13	06:15 (8)	06:02		06:55			07:40 (1)	07:48		07:46	08:28	
	21:35	06:33 (8)	20:41		19:29	22	08:02 (1)	18:18			16:19	16:01	
19	05:14	06:14 (8)	06:04		07:12 (4)	06:57		07:39 (1)	07:50		07:48	08:28	
	21:34	06:33 (8)	20:39	11	07:23 (4)	19:26	23	08:02 (1)	18:15		16:18	16:01	
20	05:15	06:14 (8)	06:05		07:09 (4)	06:59		07:38 (1)	07:52		07:50	08:29	
	21:32	06:34 (8)	20:37	15	07:24 (4)	19:24	25	08:03 (1)	18:13		16:17	16:01	
21	05:17	06:14 (8)	06:07		07:07 (4)	07:00		07:37 (1)	07:54		07:51	08:30	
	21:31	06:35 (8)	20:34	19	07:26 (4)	19:21	25	08:02 (1)	18:11		16:15	16:02	
22	05:18	06:13 (8)	06:09		07:06 (4)	07:02		07:37 (1)	07:56		07:53	08:30	
	21:30	06:35 (8)	20:32	22	07:28 (4)	19:19	25	08:02 (1)	18:09		16:14	16:02	
23	05:20	06:13 (8)	06:11		07:04 (4)	07:04		07:37 (1)	07:58		07:55	08:31	
	21:28	06:35 (8)	20:30	24	07:28 (4)	19:16	24	08:01 (1)	18:07		16:13	16:03	
24	05:21	06:13 (9)	06:12		07:04 (4)	07:06		07:37 (1)	07:59		07:57	08:31	
	21:27	06:36 (8)	20:28	25	07:29 (4)	19:14	23	08:00 (1)	18:05		16:12	16:03	
25	05:23	06:12 (9)	06:14		07:03 (4)	07:07		07:37 (1)	07:01		07:58	08:32	
	21:25	06:36 (8)	20:25	26	07:29 (4)	19:12	22	07:59 (1)	17:02		16:11	16:04	
26	05:24	06:12 (9)	06:16		07:02 (4)	07:09		07:38 (1)	07:03		08:00	08:32	
	21:24	06:37 (8)	20:23	27	07:29 (4)	19:09	20	07:58 (1)	17:00		16:10	16:05	
27	05:26	06:11 (9)	06:18		07:02 (4)	07:11		07:39 (1)	07:05		08:02	08:32	
	21:22	06:36 (8)	20:21	27	07:29 (4)	19:07	18	07:57 (1)	16:58		16:09	16:05	
28	05:27	06:10 (9)	06:19		07:01 (4)	07:13		07:40 (1)	07:07		08:03	08:32	
	21:21	06:36 (8)	20:19	27	07:28 (4)	19:04	14	07:54 (1)	16:56		16:08	16:06	
29	05:29	06:10 (9)	06:21		07:01 (4)	07:14		07:43 (1)	07:09		08:05	08:32	
	21:19	06:36 (8)	20:16	28	07:29 (4)	19:02	7	07:50 (1)	16:54		16:07	16:07	
30	05:30	06:10 (9)	06:23		07:01 (4)	07:16		08:05 (2)	07:11		08:06	08:32	
	21:18	06:36 (8)	20:14	27	07:28 (4)	19:00	8	08:13 (2)	16:52		16:06	16:08	
31	05:32	06:10 (9)	06:24		07:00 (4)				07:13			08:32	
	21:16	06:36 (8)	20:12	27	07:27 (4)				16:50			16:09	
	Sonnenscheinstunden	509	458		382			330		262		237	
	astr.max.mögl.Beschattung	479		458		594			189				
	Red.Sonnenscheinwahrsch.	0.38		0.42		0.35			0.29				
	Reduktion Betriebsdauer	0.96		0.96		0.96			0.96				
	Reduktion Windrichtung	0.73		0.72		0.70			0.66				
	Gesamte Reduktion	0.26		0.29		0.23			0.18				
	Met.wahrsch.Beschattung	126		134		139			35				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattenende	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DZ - IO130

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	07:32 (2)	06:54	07:17 (3)	05:46	04:59	06:08 (8)
	16:10	17:00	17:55	6 07:38 (2)	19:51	18 07:35 (3)	20:45	21:34	12 06:20 (8)
2	08:32	08:02	07:05	07:29 (2)	06:52	07:16 (3)	05:44	04:58	06:10 (8)
	16:12	17:02	17:57	11 07:40 (2)	19:53	20 07:36 (3)	20:47	21:35	9 06:19 (8)
3	08:32	08:00	07:03	07:27 (2)	06:49	07:16 (3)	05:42	04:57	06:12 (8)
	16:13	17:04	17:58	14 07:41 (2)	19:55	20 07:36 (3)	20:49	21:36	5 06:17 (8)
4	08:32	07:58	07:01	07:25 (2)	06:47	07:14 (3)	05:41	04:56	
	16:14	17:06	18:00	18 07:43 (2)	19:57	21 07:35 (3)	20:50		21:37
5	08:32	07:57	06:58	07:23 (2)	06:45	07:15 (3)	05:39	06:07 (9)	04:55
	16:15	17:08	18:02	19 07:42 (2)	19:59	20 07:35 (3)	20:52	3 06:10 (9)	21:38
6	08:31	07:55	06:56	07:23 (2)	06:42	07:11 (4)	05:37	06:03 (9)	04:55
	16:16	17:10	18:04	20 07:43 (2)	20:00	23 07:34 (3)	20:54	10 06:13 (9)	21:39
7	08:31	07:53	06:54	07:22 (2)	06:40	07:08 (4)	05:35	06:02 (9)	04:54
	16:18	17:12	18:06	20 07:42 (2)	20:02	26 07:34 (3)	20:56	16 06:18 (8)	21:40
8	08:30	07:51	06:51	07:22 (2)	06:37	07:07 (4)	05:33	06:01 (9)	04:53
	16:19	17:14	18:08	20 07:42 (2)	20:04	26 07:33 (3)	20:57	19 06:20 (8)	21:41
9	08:30	07:49	06:49	07:23 (2)	06:35	07:04 (4)	05:31	06:00 (9)	04:53
	16:20	17:16	18:10	19 07:42 (2)	20:06	27 07:31 (3)	20:59	21 06:21 (8)	21:42
10	08:29	07:48	06:47	07:22 (2)	06:33	07:03 (4)	05:29	06:00 (9)	04:52
	16:22	17:18	18:11	18 07:40 (2)	20:08	26 07:29 (3)	21:01	23 06:23 (8)	21:43
11	08:29	07:46	06:44	07:23 (2)	06:30	07:02 (4)	05:27	05:59 (9)	04:52
	16:23	17:20	18:13	16 07:39 (2)	20:09	27 07:29 (4)	21:03	24 06:23 (8)	21:44
12	08:28	07:44	06:42	07:25 (2)	06:28	07:02 (4)	05:26	05:58 (9)	04:52
	16:25	17:22	18:15	13 07:38 (2)	20:11	27 07:29 (4)	21:04	25 06:23 (8)	21:44
13	08:27	07:42	06:40	07:27 (2)	06:26	07:01 (4)	05:24	05:59 (9)	04:51
	16:26	17:24	18:17	7 07:34 (2)	20:13	28 07:29 (4)	21:06	26 06:25 (8)	21:45
14	08:26	07:40	06:37	07:04 (1)	06:23	07:00 (4)	05:22	05:58 (9)	04:51
	16:28	17:26	18:19	9 07:13 (1)	20:15	29 07:29 (4)	21:08	26 06:24 (8)	21:46
15	08:25	07:38	06:35	07:00 (1)	06:21	07:00 (4)	05:21	05:59 (9)	04:51
	16:30	17:28	18:21	15 07:15 (1)	20:17	29 07:29 (4)	21:09	26 06:25 (8)	21:46
16	08:24	07:36	06:32	06:59 (1)	06:19	07:00 (4)	05:19	05:59 (9)	04:51
	16:31	17:30	18:23	18 07:17 (1)	20:18	29 07:29 (4)	21:11	26 06:25 (8)	21:47
17	08:23	07:34	06:30	06:57 (1)	06:17	06:59 (4)	05:17	05:59 (9)	04:50
	16:33	17:32	18:24	21 07:18 (1)	20:20	28 07:27 (4)	21:12	26 06:25 (8)	21:47
18	08:22	07:32	06:28	06:56 (1)	06:14	07:00 (4)	05:16	06:00 (9)	04:50
	16:35	17:34	18:26	23 07:19 (1)	20:22	27 07:27 (4)	21:14	26 06:26 (8)	21:48
19	08:21	07:29	06:25	06:55 (1)	06:12	07:00 (4)	05:14	06:00 (9)	04:50
	16:36	17:35	18:28	25 07:20 (1)	20:24	26 07:26 (4)	21:16	25 06:25 (8)	21:48
20	08:20	07:27	06:23	06:54 (1)	06:10	07:01 (4)	05:13	06:01 (9)	04:51
	16:38	17:37	18:30	25 07:19 (1)	20:26	24 07:25 (4)	21:17	24 06:25 (8)	21:48
21	08:19	07:25	06:20	06:54 (1)	06:08	07:02 (4)	05:12	06:02 (9)	04:51
	16:40	17:39	18:32	25 07:19 (1)	20:27	22 07:24 (4)	21:19	24 06:26 (8)	21:49
22	08:18	07:23	06:18	06:53 (1)	06:05	07:03 (4)	05:10	06:01 (8)	04:51
	16:42	17:41	18:33	25 07:18 (1)	20:29	20 07:23 (4)	21:20	24 06:25 (8)	21:49
23	08:17	07:21	06:16	06:54 (1)	06:03	07:04 (4)	05:09	06:02 (8)	04:51
	16:43	17:43	18:35	24 07:18 (1)	20:31	17 07:21 (4)	21:22	23 06:25 (8)	21:49
24	08:15	07:19	06:13	06:53 (1)	06:01	07:06 (4)	05:07	06:02 (8)	04:51
	16:45	17:45	18:37	24 07:17 (1)	20:33	13 07:19 (4)	21:23	22 06:24 (8)	21:49
25	08:14	07:16	06:11	06:54 (1)	05:59	07:09 (4)	05:06	06:03 (8)	04:52
	16:47	17:47	18:39	22 07:16 (1)	20:35	5 07:14 (4)	21:24	21 06:24 (8)	21:49
26	08:13	07:14	06:08	06:55 (1)	05:57		05:05	06:04 (8)	04:52
	16:49	17:49	18:41	20 07:15 (1)	20:36		21:26	20 06:24 (8)	21:49
27	08:11	07:12	06:06	06:55 (1)	05:55		05:04	06:04 (8)	04:53
	16:51	17:51	18:42	18 07:13 (1)	20:38		21:27	20 06:24 (8)	21:49
28	08:10	07:10	06:04	06:57 (1)	05:53		05:03	06:05 (8)	04:53
	16:53	17:53	18:44	14 07:11 (1)	20:40		21:29	18 06:23 (8)	21:49
29	08:08		07:01	07:24 (3)	05:51		05:02	06:06 (8)	04:54
	16:55		19:46	14 08:07 (1)	20:42		21:30	16 06:22 (8)	21:49
30	08:07		06:59	07:22 (3)	05:49		05:00	06:06 (8)	04:54
	16:57		19:48	11 07:33 (3)	20:43		21:31	16 06:22 (8)	21:48
31	08:05		06:56	07:20 (3)			04:59	06:07 (8)	
	16:58		19:50	15 07:35 (3)			21:32	14 06:21 (8)	
Sonnenscheinstunden	253	275	367	419	491		564	506	337
astr.max.mögl.Beschattung			0.28	0.37	0.43		0.39		0.39
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96		0.96		0.96
Reduktion Betriebsdauer			0.68	0.72	0.73		0.72		0.72
Gesamte Reduktion			0.18	0.26	0.30		0.26		0.26
Met.wahrsch.Beschattung			98	148	169		89		89

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: DZ - IO130

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:29 (7)	05:34		06:09 (9)	06:26	07:01 (4)	07:18	08:05 (2)	07:14	08:08	
	21:48	11 05:40 (7)	21:14	25	06:34 (8)	20:09	27 07:28 (4)	18:57	11 08:16 (2)	16:48	16:05	
2	04:56	05:29 (7)	05:35		06:10 (9)	06:28	07:02 (4)	07:20	08:03 (2)	07:16	08:09	
	21:48	11 05:40 (7)	21:12	23	06:33 (8)	20:07	26 07:28 (3)	18:55	15 08:18 (2)	16:46	16:05	
3	04:56	05:30 (7)	05:37		06:09 (9)	06:30	07:02 (4)	07:21	08:01 (2)	07:18	08:11	
	21:47	10 05:40 (7)	21:11	23	06:32 (8)	20:05	27 07:29 (3)	18:52	17 08:18 (2)	16:44	16:04	
4	04:57	05:31 (7)	05:38		06:10 (9)	06:31	07:04 (4)	07:23	08:00 (2)	07:20	08:12	
	21:47	8 05:39 (7)	21:09	21	06:31 (8)	20:02	26 07:30 (3)	18:50	19 08:19 (2)	16:42	16:03	
5	04:58	05:32 (7)	05:40		06:12 (9)	06:33	07:05 (4)	07:25	07:59 (2)	07:22	08:14	
	21:46	6 05:38 (7)	21:07	18	06:30 (8)	20:00	26 07:31 (3)	18:48	20 08:19 (2)	16:41	16:03	
6	04:59	05:34 (7)	05:42		06:12 (9)	06:35	07:07 (4)	07:27	07:59 (2)	07:24	08:15	
	21:46	3 05:37 (7)	21:05	14	06:26 (8)	19:58	23 07:30 (3)	18:45	20 08:19 (2)	16:39	16:02	
7	05:00		05:43		06:14 (9)	06:36	07:10 (3)	07:28	07:59 (2)	07:26	08:16	
	21:45		21:03	9	06:23 (9)	19:55	20 07:30 (3)	18:43	20 08:19 (2)	16:37	16:02	
8	05:01		05:45			06:38	07:10 (3)	07:30	07:58 (2)	07:28	08:18	
	21:45		21:01			19:53	20 07:30 (3)	18:41	20 08:18 (2)	16:35	16:01	
9	05:02		06:21 (8)	05:47		06:40	07:09 (3)	07:32	07:58 (2)	07:30	08:19	
	21:44	2 06:23 (8)	20:59			19:50	20 07:29 (3)	18:38	19 08:17 (2)	16:33	16:01	
10	05:03	06:18 (8)	05:48			06:42	07:09 (3)	07:34	08:00 (2)	07:31	08:20	
	21:43	8 06:26 (8)	20:57			19:48	20 07:29 (3)	18:36	16 08:16 (2)	16:32	16:01	
11	05:04	06:17 (8)	05:50			06:43	07:10 (3)	07:36	08:02 (2)	07:33	08:21	
	21:42	11 06:28 (8)	20:55			19:46	18 07:28 (3)	18:34	13 08:15 (2)	16:30	16:01	
12	05:05	06:16 (8)	05:52			06:45	07:11 (3)	07:37	08:04 (2)	07:35	08:22	
	21:41	13 06:29 (8)	20:53			19:43	15 07:26 (3)	18:31	9 08:13 (2)	16:28	16:00	
13	05:06	06:15 (8)	05:54			06:47	07:13 (3)	07:39	08:06 (2)	07:37	08:23	
	21:40	15 06:30 (8)	20:51			19:41	12 07:25 (3)	18:29	3 08:09 (2)	16:27	16:00	
14	05:07	06:14 (8)	05:55			06:48	07:15 (3)	07:41		07:39	08:24	
	21:39	17 06:31 (8)	20:49			19:38	14 07:58 (1)	18:27		16:25	16:00	
15	05:09	06:14 (8)	05:57			06:50	07:47 (1)	07:43		07:41	08:25	
	21:38	17 06:31 (8)	20:47			19:36	13 08:00 (1)	18:24		16:24	16:00	
16	05:10	06:13 (8)	05:59			06:52	07:45 (1)	07:45		07:43	08:26	
	21:37	19 06:32 (8)	20:45			19:33	17 08:02 (1)	18:22		16:22	16:00	
17	05:11	06:13 (8)	06:00			06:54	07:43 (1)	07:46		07:44	08:27	
	21:36	20 06:33 (8)	20:43			19:31	21 08:04 (1)	18:20		16:21	16:01	
18	05:13	06:13 (8)	06:02		07:14 (4)	06:55	07:41 (1)	07:48		07:46	08:28	
	21:35	21 06:34 (8)	20:41	8	07:22 (4)	19:29	23 08:04 (1)	18:18		16:19	16:01	
19	05:14	06:12 (8)	06:04		07:11 (4)	06:57	07:41 (1)	07:50		07:48	08:28	
	21:34	22 06:34 (8)	20:39	14	07:25 (4)	19:26	23 08:04 (1)	18:15		16:18	16:01	
20	05:15	06:12 (8)	06:05		07:08 (4)	06:59	07:40 (1)	07:52		07:50	08:29	
	21:32	22 06:34 (8)	20:37	18	07:26 (4)	19:24	25 08:05 (1)	18:13		16:17	16:01	
21	05:17	06:12 (8)	06:07		07:07 (4)	07:00	07:39 (1)	07:54		07:51	08:30	
	21:31	23 06:35 (8)	20:34	21	07:28 (4)	19:21	25 08:04 (1)	18:11		16:15	16:02	
22	05:18	06:12 (8)	06:09		07:06 (4)	07:02	07:39 (1)	07:56		07:53	08:30	
	21:30	23 06:35 (8)	20:32	23	07:29 (4)	19:19	25 08:04 (1)	18:09		16:14	16:02	
23	05:20	06:11 (9)	06:11		07:04 (4)	07:04	07:39 (1)	07:58		07:55	08:31	
	21:28	24 06:35 (8)	20:30	25	07:29 (4)	19:16	25 08:04 (1)	18:07		16:13	16:03	
24	05:21	06:11 (9)	06:12		07:04 (4)	07:06	07:38 (1)	07:59		07:57	08:31	
	21:27	25 06:36 (8)	20:28	26	07:30 (4)	19:14	24 08:02 (1)	18:05		16:12	16:03	
25	05:23	06:10 (9)	06:14		07:03 (4)	07:07	07:38 (1)	07:01		07:58	08:32	
	21:25	26 06:36 (8)	20:25	28	07:31 (4)	19:12	24 08:02 (1)	17:02		16:11	16:04	
26	05:24	06:10 (9)	06:16		07:02 (4)	07:09	07:39 (1)	07:03		08:00	08:32	
	21:24	26 06:36 (8)	20:23	28	07:30 (4)	19:09	22 08:01 (1)	17:00		16:10	16:05	
27	05:26	06:10 (9)	06:18		07:02 (4)	07:11	07:40 (1)	07:05		08:02	08:32	
	21:22	26 06:36 (8)	20:21	29	07:31 (4)	19:07	20 08:00 (1)	16:58		16:09	16:05	
28	05:27	06:09 (9)	06:19		07:01 (4)	07:13	07:41 (1)	07:07		08:03	08:32	
	21:21	26 06:35 (8)	20:19	29	07:30 (4)	19:04	16 07:57 (1)	16:56		16:08	16:06	
29	05:29	06:09 (9)	06:21		07:01 (4)	07:14	07:43 (1)	07:09		08:05	08:32	
	21:19	27 06:36 (8)	20:16	29	07:30 (4)	19:02	12 07:55 (1)	16:54		16:07	16:07	
30	05:30	06:09 (9)	06:23		07:01 (4)	07:16	08:09 (2)	07:11		08:06	08:32	
	21:18	26 06:35 (8)	20:14	29	07:30 (4)	19:00	3 08:12 (2)	16:52		16:06	16:08	
31	05:32	06:09 (9)	06:24		07:01 (4)			07:13			08:32	
	21:16	26 06:35 (8)	20:12	27	07:28 (4)			16:50			16:09	
Sonnenscheinstunden	509		458		382		330		262		237	
astr.max.mögl.Beschattung	514		467		612		202					
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96					
Reduktion Windrichtung	0.73		0.72		0.70		0.66					
Gesamte Reduktion	0.26		0.29		0.23		0.18					
Met.wahrsch.Beschattung	135		136		143		37					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EA - IO131

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	07:32 (2)	06:54	07:18 (3)	05:46	04:59
	16:10	17:00	17:55	10 07:42 (2)	19:51	20 07:38 (3)	20:45	21:34
2	08:32	08:02	07:05	07:29 (2)	06:52	07:18 (3)	05:44	04:58
	16:12	17:02	17:57	13 07:42 (2)	19:53	21 07:39 (3)	20:47	21:35
3	08:32	08:00	07:03	07:27 (2)	06:49	07:18 (3)	05:42	04:57
	16:13	17:04	17:58	16 07:43 (2)	19:55	21 07:39 (3)	20:49	7 06:09 (9)
4	08:32	07:58	07:01	07:25 (2)	06:47	07:15 (4)	05:41	06:07 (9)
	16:14	17:06	18:00	19 07:44 (2)	19:57	23 07:38 (3)	20:50	16 06:23 (8)
5	08:32	07:57	06:58	07:24 (2)	06:45	07:13 (4)	05:39	06:05 (9)
	16:15	17:08	18:02	20 07:44 (2)	19:59	24 07:37 (3)	20:52	20 06:25 (8)
6	08:31	07:55	06:56	07:24 (2)	06:42	07:10 (4)	05:37	06:04 (9)
	16:16	17:10	18:04	20 07:44 (2)	20:00	26 07:36 (3)	20:54	22 06:26 (8)
7	08:31	07:53	06:54	07:23 (2)	06:40	07:09 (4)	05:35	06:04 (9)
	16:18	17:12	18:06	20 07:43 (2)	20:02	26 07:35 (3)	20:56	24 06:28 (8)
8	08:30	07:51	06:51	07:24 (2)	06:37	07:08 (4)	05:33	06:03 (9)
	16:19	17:14	18:08	19 07:43 (2)	20:04	25 07:33 (3)	20:57	26 06:29 (8)
9	08:30	07:49	06:49	07:25 (2)	06:35	07:06 (4)	05:31	06:03 (9)
	16:20	17:16	18:10	17 07:42 (2)	20:06	26 07:32 (4)	20:59	26 06:29 (8)
10	08:29	07:48	06:47	07:25 (2)	06:33	07:06 (4)	05:29	06:03 (9)
	16:22	17:18	18:11	16 07:41 (2)	20:08	27 07:33 (4)	21:01	27 06:30 (8)
11	08:29	07:46	06:44	07:27 (2)	06:30	07:05 (4)	05:27	06:03 (9)
	16:23	17:20	18:13	12 07:39 (2)	20:09	28 07:33 (4)	21:03	27 06:30 (8)
12	08:28	07:44	06:42	07:29 (2)	06:28	07:05 (4)	05:26	06:02 (9)
	16:25	17:22	18:15	7 07:36 (2)	20:11	28 07:33 (4)	21:04	28 06:30 (8)
13	08:27	07:42	06:40	07:05 (1)	06:26	07:04 (4)	05:24	06:03 (9)
	16:26	17:24	18:17	12 07:17 (1)	20:13	28 07:32 (4)	21:06	27 06:30 (8)
14	08:26	07:40	06:37	07:03 (1)	06:23	07:04 (4)	05:22	06:03 (9)
	16:28	17:26	18:19	16 07:19 (1)	20:15	28 07:32 (4)	21:08	27 06:30 (8)
15	08:25	07:38	06:35	07:01 (1)	06:21	07:05 (4)	05:21	06:04 (9)
	16:30	17:28	18:21	19 07:20 (1)	20:17	27 07:32 (4)	21:09	26 06:30 (8)
16	08:24	07:36	06:32	07:00 (1)	06:19	07:05 (4)	05:19	06:04 (9)
	16:31	17:30	18:23	21 07:21 (1)	20:18	26 07:31 (4)	21:11	26 06:30 (8)
17	08:23	07:34	06:30	06:58 (1)	06:17	07:05 (4)	05:17	06:05 (9)
	16:33	17:32	18:24	23 07:21 (1)	20:20	24 07:29 (4)	21:12	25 06:30 (8)
18	08:22	07:32	06:28	06:58 (1)	06:14	07:05 (4)	05:16	06:07 (9)
	16:35	17:34	18:26	24 07:22 (1)	20:22	23 07:28 (4)	21:14	23 06:30 (8)
19	08:21	07:29	06:25	06:57 (1)	06:12	07:07 (4)	05:14	06:07 (9)
	16:36	17:35	18:28	25 07:22 (1)	20:24	20 07:27 (4)	21:16	22 06:29 (8)
20	08:20	07:27	06:23	06:56 (1)	06:10	07:08 (4)	05:13	06:08 (9)
	16:38	17:37	18:30	25 07:21 (1)	20:26	18 07:26 (4)	21:17	21 06:29 (8)
21	08:19	07:25	06:20	06:57 (1)	06:08	07:10 (4)	05:12	06:09 (9)
	16:40	17:39	18:32	24 07:21 (1)	20:27	13 07:23 (4)	21:19	19 06:28 (8)
22	08:18	07:23	06:18	06:56 (1)	06:05	07:13 (4)	05:10	06:09 (9)
	16:42	17:41	18:33	24 07:20 (1)	20:29	7 07:20 (4)	21:20	18 06:27 (8)
23	08:17	07:21	06:16	06:57 (1)	06:03	05:09	05:09	06:10 (8)
	16:43	17:43	18:35	22 07:19 (1)	20:31	21:22	17 06:27 (8)	18 05:46 (7)
24	08:15	07:19	06:13	06:57 (1)	06:01	05:07	06:11 (8)	04:51
	16:45	17:45	18:37	21 07:18 (1)	20:33	21:23	15 06:26 (8)	18 05:47 (7)
25	08:14	07:16	06:11	06:58 (1)	05:59	05:06	06:12 (8)	04:52
	16:47	17:47	18:39	19 07:17 (1)	20:35	21:24	13 06:25 (8)	18 05:47 (7)
26	08:13	07:14	06:08	07:00 (1)	05:57	05:05	06:14 (8)	04:52
	16:49	17:49	18:41	15 07:15 (1)	20:36	21:26	10 06:24 (8)	18 05:47 (7)
27	08:11	07:12	06:06	07:01 (1)	05:55	05:04	06:16 (8)	04:53
	16:51	17:51	18:42	11 07:12 (1)	20:38	21:27	6 06:22 (8)	17 05:47 (7)
28	08:10	07:10	06:04	06:27 (3)	05:53	05:03		04:53
	16:53	17:53	5 07:34 (2)	18:44	8 06:35 (3)	20:40	21:29	21:49
29	08:08		07:01	07:24 (3)	05:51	05:02		04:54
	16:55		19:46	12 07:36 (3)	20:42	21:30		21:49
30	08:07		06:59	07:22 (3)	05:49	05:00		04:54
	16:57		19:48	16 07:38 (3)	20:43	21:31		21:48
31	08:05		06:56	07:20 (3)		04:59		
	16:58		19:50	19 07:39 (3)		21:32		
Sonnenscheinstunden	253	275	367	419	491	518	506	478
astr. max.mögl. Beschattung		5	545	509	518	478		478
Red. Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39		0.39
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96		0.96
Reduktion Windrichtung		0.65	0.68	0.72	0.73	0.72		0.72
Gesamte Reduktion		0.15	0.18	0.26	0.30	0.27		0.27
Met. wahrsch. Beschattung		1	98	130	155	127		127

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	--	---------------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EA - IO131
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:31 (7)	05:34		06:13 (9)	06:26	07:04 (4)	07:18	07:47 (1)	07:14	08:08		
	21:48	16 05:47 (7)	21:14	27	06:40 (8)	20:09	28	07:32 (4)	18:57	7 07:54 (1)	16:48	16:05	
2	04:56	05:31 (7)	05:35		06:13 (9)	06:28		07:05 (4)	07:20		08:06 (2)	07:16	08:09
	21:48	17 05:48 (7)	21:12	27	06:40 (8)	20:07	27	07:32 (4)	18:55	11	08:17 (2)	16:46	16:05
3	04:56	05:32 (7)	05:37		06:13 (9)	06:30		07:04 (4)	07:21		08:03 (2)	07:18	08:11
	21:47	16 05:48 (7)	21:11	26	06:39 (8)	20:05	26	07:30 (4)	18:52	15	08:18 (2)	16:44	16:04
4	04:57	05:32 (7)	05:38		06:13 (9)	06:31		07:05 (4)	07:23		08:02 (2)	07:20	08:12
	21:47	15 05:47 (7)	21:09	26	06:39 (8)	20:02	25	07:30 (3)	18:50	17	08:19 (2)	16:42	16:03
5	04:58	05:32 (7)	05:40		06:14 (9)	06:33		07:06 (4)	07:25		08:01 (2)	07:22	08:14
	21:46	15 05:47 (7)	21:07	25	06:39 (8)	20:00	26	07:32 (3)	18:48	19	08:20 (2)	16:41	16:03
6	04:59	05:33 (7)	05:42		06:14 (9)	06:35		07:06 (4)	07:27		08:01 (2)	07:24	08:15
	21:46	14 05:47 (7)	21:05	23	06:37 (8)	19:58	26	07:32 (3)	18:45	19	08:20 (2)	16:39	16:02
7	05:00	05:34 (7)	05:43		06:15 (9)	06:36		07:08 (4)	07:28		08:00 (2)	07:26	08:16
	21:45	13 05:47 (7)	21:03	21	06:36 (8)	19:55	24	07:32 (3)	18:43	20	08:20 (2)	16:37	16:02
8	05:01	05:34 (7)	05:45		06:15 (9)	06:38		07:10 (4)	07:30		07:59 (2)	07:28	08:18
	21:45	13 05:47 (7)	21:01	19	06:34 (8)	19:53	23	07:33 (3)	18:41	20	08:19 (2)	16:35	16:01
9	05:02	05:35 (7)	05:47		06:17 (9)	06:40		07:11 (3)	07:32		07:59 (2)	07:30	08:19
	21:44	11 05:46 (7)	20:59	15	06:32 (8)	19:50	21	07:32 (3)	18:38	20	08:19 (2)	16:33	16:01
10	05:03	05:36 (7)	05:48		06:19 (9)	06:42		07:11 (3)	07:34		08:00 (2)	07:31	08:20
	21:43	10 05:46 (7)	20:57	5	06:24 (9)	19:48	21	07:32 (3)	18:36	18	08:18 (2)	16:32	16:01
11	05:04	05:38 (7)	05:50		06:43			07:12 (3)	07:36		08:02 (2)	07:33	08:21
	21:42	7 05:45 (7)	20:55		19:46	19	07:31 (3)	18:34	15	08:17 (2)	16:30	16:01	
12	05:05	05:40 (7)	05:52		06:45			07:11 (3)	07:37		08:04 (2)	07:35	08:22
	21:41	2 05:42 (7)	20:53		19:43	19	07:30 (3)	18:31	12	08:16 (2)	16:28	16:00	
13	05:06		05:54		06:47			07:13 (3)	07:39		08:06 (2)	07:37	08:23
	21:40		20:51		19:41	16	07:29 (3)	18:29	8	08:14 (2)	16:27	16:00	
14	05:07		05:55		06:48			07:15 (3)	07:41		08:08 (2)	07:39	08:24
	21:39		20:49		19:38	13	07:28 (3)	18:27	1	08:09 (2)	16:25	16:00	
15	05:09		05:57		06:50			07:16 (3)	07:43		07:41	08:25	
	21:38		20:47		19:36	9	07:25 (3)	18:24		16:24	16:00		
16	05:10	06:26 (8)	05:59		06:52			07:51 (1)	07:45		07:43	08:26	
	21:37	2 06:28 (8)	20:45		19:33	9	08:00 (1)	18:22		16:22	16:00		
17	05:11	06:24 (8)	06:00		06:54			07:48 (1)	07:46		07:44	08:27	
	21:36	8 06:32 (8)	20:43		19:31	15	08:03 (1)	18:20		16:21	16:01		
18	05:13	06:22 (8)	06:02		06:55			07:46 (1)	07:48		07:46	08:28	
	21:35	12 06:34 (8)	20:41		19:29	18	08:04 (1)	18:18		16:19	16:01		
19	05:14	06:21 (8)	06:04		06:57			07:44 (1)	07:50		07:48	08:28	
	21:34	14 06:35 (8)	20:39		19:26	21	08:05 (1)	18:15		16:18	16:01		
20	05:15	06:20 (8)	06:05		06:59			07:43 (1)	07:52		07:50	08:29	
	21:32	16 06:36 (8)	20:37		19:24	23	08:06 (1)	18:13		16:17	16:01		
21	05:17	06:20 (8)	06:07		07:17 (4)	07:00		07:42 (1)	07:54		07:51	08:30	
	21:31	17 06:37 (8)	20:34	8	07:25 (4)	19:21	23	08:05 (1)	18:11		16:15	16:02	
22	05:18	06:19 (8)	06:09		07:14 (4)	07:02		07:41 (1)	07:56		07:53	08:30	
	21:30	19 06:38 (8)	20:32	14	07:28 (4)	19:19	25	08:06 (1)	18:09		16:14	16:02	
23	05:20	06:18 (8)	06:11		07:11 (4)	07:04		07:41 (1)	07:58		07:55	08:31	
	21:28	20 06:38 (8)	20:30	19	07:30 (4)	19:16	25	08:06 (1)	18:07		16:13	16:03	
24	05:21	06:18 (8)	06:12		07:10 (4)	07:06		07:40 (1)	07:59		07:57	08:31	
	21:27	21 06:39 (8)	20:28	21	07:31 (4)	19:14	25	08:05 (1)	18:05		16:12	16:03	
25	05:23	06:17 (8)	06:14		07:09 (4)	07:07		07:40 (1)	07:01		07:58	08:32	
	21:25	22 06:39 (8)	20:25	23	07:32 (4)	19:12	24	08:04 (1)	17:02		16:11	16:04	
26	05:24	06:17 (9)	06:16		07:07 (4)	07:09		07:41 (1)	07:03		08:00	08:32	
	21:24	23 06:40 (8)	20:23	25	07:32 (4)	19:09	23	08:04 (1)	17:00		16:10	16:05	
27	05:26	06:15 (9)	06:18		07:07 (4)	07:11		07:41 (1)	07:05		08:02	08:32	
	21:22	25 06:40 (8)	20:21	26	07:33 (4)	19:07	22	08:03 (1)	16:58		16:09	16:05	
28	05:27	06:14 (9)	06:19		07:05 (4)	07:13		07:41 (1)	07:07		08:03	08:32	
	21:21	26 06:40 (8)	20:19	28	07:33 (4)	19:04	20	08:01 (1)	16:56		16:08	16:06	
29	05:29	06:14 (9)	06:21		07:05 (4)	07:14		07:42 (1)	07:09		08:05	08:32	
	21:19	27 06:41 (8)	20:16	28	07:33 (4)	19:02	18	08:00 (1)	16:54		16:07	16:07	
30	05:30	06:13 (9)	06:23		07:05 (4)	07:16		07:44 (1)	07:11		08:06	08:32	
	21:18	27 06:40 (8)	20:14	28	07:33 (4)	19:00	13	07:57 (1)	16:52		16:06	16:08	
31	05:32	06:14 (9)	06:24		07:04 (4)				07:13			08:32	
	21:16	27 06:41 (8)	20:12	28	07:32 (4)				16:50			16:09	
Sonnenscheinstunden		509	458		382			330		262	237		
astr.max.mögl.Beschattung		455		462		627			202				
Red.Sonnenscheinwahrsch.		0.38		0.42		0.35			0.29				
Reduktion Betriebsdauer		0.96		0.96		0.96			0.96				
Reduktion Windrichtung		0.72		0.72		0.70			0.66				
Gesamte Reduktion		0.26		0.29		0.23			0.18				
Met.wahrsch.Beschattung		119		135		146			37				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)		Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattende	(WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EB - IO132

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	07:32 (2)	06:54	07:18 (3)	05:46	04:59
	16:10	17:00	17:55	11 07:43 (2)	19:51	20 07:38 (3)	20:45	21:34
2	08:32	08:02	07:05	07:29 (2)	06:52	07:18 (3)	05:44	04:58
	16:12	17:02	17:57	15 07:44 (2)	19:53	20 07:38 (3)	20:47	21:35
3	08:32	08:00	07:03	07:27 (2)	06:49	07:18 (3)	05:42	04:57
	16:13	17:04	17:58	18 07:45 (2)	19:55	21 07:39 (3)	20:49	21:36
4	08:32	07:58	07:01	07:26 (2)	06:47	07:17 (3)	05:41	04:56
	16:14	17:06	18:00	20 07:46 (2)	19:57	21 07:38 (3)	20:50	5 06:13 (9) 21:37
5	08:32	07:57	06:58	06:25 (2)	06:45	07:14 (4)	05:39	06:05 (9) 04:55
	16:15	17:08	18:02	20 07:45 (2)	19:59	23 07:37 (3)	20:52	12 06:17 (8) 21:38
6	08:31	07:55	06:56	06:25 (2)	06:42	07:10 (4)	05:37	06:03 (9) 04:55
	16:16	17:10	18:04	20 07:45 (2)	20:00	26 07:36 (3)	20:54	18 06:21 (8) 21:39
7	08:31	07:53	06:54	06:24 (2)	06:40	07:09 (4)	05:35	06:03 (9) 04:54
	16:18	17:12	18:06	20 07:44 (2)	20:02	26 07:35 (3)	20:56	21 06:24 (8) 21:40
8	08:30	07:51	06:51	06:25 (2)	06:37	07:08 (4)	05:33	06:02 (9) 04:53
	16:19	17:14	18:08	19 07:44 (2)	20:04	26 07:34 (3)	20:57	23 06:25 (8) 21:41
9	08:30	07:49	06:49	06:26 (2)	06:35	07:06 (4)	05:31	06:01 (9) 04:53
	16:20	17:16	18:10	18 07:44 (2)	20:06	26 07:32 (4)	20:59	24 06:25 (8) 21:42
10	08:29	07:48	06:47	06:26 (2)	06:33	07:05 (4)	05:29	06:01 (9) 04:52
	16:22	17:18	18:11	16 07:42 (2)	20:08	27 07:32 (4)	21:01	26 06:27 (8) 21:43
11	08:29	07:46	06:44	06:28 (2)	06:30	07:05 (4)	05:27	06:01 (9) 04:52
	16:23	17:20	18:13	12 07:40 (2)	20:09	28 07:33 (4)	21:03	26 06:27 (8) 21:44
12	08:28	07:44	06:42	06:28 (2)	06:28	07:05 (4)	05:26	06:00 (9) 04:52
	16:25	17:22	18:15	6 07:37 (2)	20:11	28 07:33 (4)	21:04	27 06:27 (8) 21:44
13	08:27	07:42	06:40	06:26 (1)	06:26	07:03 (4)	05:24	06:01 (9) 04:51
	16:26	17:24	18:17	12 07:18 (1)	20:13	29 07:32 (4)	21:06	27 06:28 (8) 21:45
14	08:26	07:40	06:37	07:04 (1)	06:23	07:03 (4)	05:22	06:00 (9) 04:51
	16:28	17:26	18:19	16 07:20 (1)	20:15	29 07:32 (4)	21:08	28 06:28 (8) 21:46
15	08:25	07:38	06:35	07:01 (1)	06:21	07:03 (4)	05:21	06:01 (9) 04:51
	16:30	17:28	18:21	20 07:21 (1)	20:17	29 07:32 (4)	21:09	27 06:28 (8) 21:46
16	08:24	07:36	06:32	07:00 (1)	06:19	07:04 (4)	05:19	06:01 (9) 04:51
	16:31	17:30	18:23	22 07:22 (1)	20:18	28 07:32 (4)	21:11	27 06:28 (8) 21:47
17	08:23	07:34	06:30	06:59 (1)	06:17	07:03 (4)	05:17	06:02 (9) 04:50
	16:33	17:32	18:24	23 07:22 (1)	20:20	27 07:30 (4)	21:12	26 06:28 (8) 21:47
18	08:22	07:32	06:28	06:58 (1)	06:14	07:04 (4)	05:16	06:03 (9) 04:50
	16:35	17:34	18:26	25 07:23 (1)	20:22	25 07:29 (4)	21:14	26 06:29 (8) 21:48
19	08:21	07:29	06:25	06:58 (1)	06:12	07:04 (4)	05:14	06:03 (9) 04:50
	16:36	17:35	18:28	25 07:23 (1)	20:24	24 07:28 (4)	21:16	25 06:28 (8) 21:48
20	08:20	07:27	06:23	06:57 (1)	06:10	07:05 (4)	05:13	06:04 (9) 04:51
	16:38	17:37	18:30	25 07:22 (1)	20:26	22 07:27 (4)	21:17	24 06:28 (8) 21:48
21	08:19	07:25	06:20	06:57 (1)	06:08	07:07 (4)	05:12	06:05 (8) 04:51
	16:40	17:39	18:32	25 07:22 (1)	20:27	19 07:26 (4)	21:19	23 06:28 (8) 21:49
22	08:18	07:23	06:18	06:57 (1)	06:05	07:08 (4)	05:10	06:04 (9) 04:51
	16:42	17:41	18:33	24 07:21 (1)	20:29	16 07:24 (4)	21:20	23 06:27 (8) 21:49
23	08:17	07:21	06:16	06:57 (1)	06:03	07:11 (4)	05:09	06:05 (8) 04:51
	16:43	17:43	18:35	24 07:21 (1)	20:31	10 07:21 (4)	21:22	22 06:27 (8) 21:49
24	08:15	07:19	06:13	06:57 (1)	06:01		05:07	06:06 (8) 04:51
	16:45	17:45	18:37	22 07:19 (1)	20:33		21:23	20 06:26 (8) 21:49
25	08:14	07:16	06:11	06:58 (1)	05:59		05:06	06:07 (8) 04:52
	16:47	17:47	18:39	20 07:18 (1)	20:35		21:24	19 06:26 (8) 21:49
26	08:13	07:14	06:08	07:00 (1)	05:57		05:05	06:07 (8) 04:52
	16:49	17:49	18:41	17 07:17 (1)	20:36		21:26	19 06:26 (8) 21:49
27	08:11	07:12	06:06	07:01 (1)	05:55		05:04	06:08 (8) 04:53
	16:50	17:51	18:42	12 07:13 (1)	20:38		21:27	17 06:25 (8) 21:49
28	08:10	07:10	06:04	06:27 (3)	05:53		05:03	06:09 (8) 04:53
	16:53	17:53	7 07:34 (2)	18:44	10 07:09 (1)	20:40	21:29	15 06:24 (8) 21:49
29	08:08		07:01	07:24 (3)	05:51		05:02	06:10 (8) 04:54
	16:55		19:46	12 07:36 (3)	20:42		21:30	13 06:23 (8) 21:49
30	08:07		06:59	07:22 (3)	05:49		05:00	06:11 (8) 04:54
	16:57		19:48	15 07:37 (3)	20:43		21:31	11 06:22 (8) 21:48
31	08:05		06:56	07:20 (3)			04:59	06:13 (8)
	16:58		19:50	18 07:38 (3)			21:32	8 06:21 (8)
Sonnenscheinstunden	253	275	367	419	550	491	582	506
astr.max.mögl.Beschattung		7	562	562	550	491	582	369
Red.Sonnenscheinwahrsch.		0.24	0.28	0.28	0.37	0.43	0.43	0.39
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96	0.96	0.96
Reduktion Windrichtung		0.65	0.68	0.72	0.73	0.73	0.73	0.72
Gesamte Reduktion		0.15	0.18	0.26	0.26	0.30	0.30	0.26
Met.wahrsch.Beschattung		1	101	140	174	174	174	98

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattenende	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EC - IO133

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember					
1	04:55 21:48	05:33 (7) 05:51 (7)	05:33 21:14	06:16 (9) 06:44 (8)	06:26 20:09	07:09 (4) 07:37 (4)	07:18 18:57	17	07:46 (1) 08:03 (1)	07:14 16:48	08:08 16:05
2	04:56 21:48	05:33 (7) 05:51 (7)	05:35 21:12	06:16 (9) 06:45 (8)	06:28 20:07	07:09 (4) 07:37 (4)	07:20 18:55	13	07:48 (1) 08:01 (1)	07:16 16:46	08:09 16:05
3	04:56 21:47	05:34 (7) 05:51 (7)	05:37 21:11	06:16 (9) 06:44 (8)	06:30 20:05	07:08 (4) 07:36 (4)	07:21 18:52	13	07:51 (1) 08:18 (2)	07:18 16:44	08:11 16:04
4	04:57 21:47	05:33 (7) 05:51 (7)	05:38 21:09	06:16 (9) 06:44 (8)	06:31 20:02	07:08 (4) 07:35 (4)	07:23 18:50	12	08:08 (2) 08:20 (2)	07:20 16:42	08:12 16:03
5	04:58 21:46	05:34 (7) 05:51 (7)	05:40 21:07	06:16 (9) 06:44 (8)	06:33 20:00	07:09 (4) 07:35 (4)	07:25 18:48	16	08:06 (2) 08:22 (2)	07:22 16:41	08:14 16:03
6	04:59 21:46	05:34 (7) 05:51 (7)	05:42 21:05	06:16 (9) 06:43 (8)	06:35 19:58	07:08 (4) 07:33 (3)	07:27 18:45	17	08:05 (2) 08:22 (2)	07:24 16:39	08:15 16:02
7	05:00 21:45	05:35 (7) 05:51 (7)	05:43 21:03	06:17 (9) 06:43 (8)	06:36 19:55	07:09 (4) 07:34 (3)	07:28 18:43	19	08:04 (2) 08:23 (2)	07:26 16:37	08:16 16:02
8	05:01 21:45	05:36 (7) 05:51 (7)	05:45 21:01	06:17 (9) 06:41 (8)	06:38 19:53	07:10 (4) 07:35 (3)	07:30 18:41	19	08:03 (2) 08:22 (2)	07:28 16:35	08:18 16:01
9	05:02 21:44	05:36 (7) 05:51 (7)	05:47 20:59	06:18 (9) 06:40 (8)	06:40 19:50	07:11 (4) 07:35 (3)	07:32 18:38	20	08:02 (2) 08:22 (2)	07:30 16:33	08:19 16:01
10	05:03 21:43	05:37 (7) 05:50 (7)	05:48 20:57	06:18 (9) 06:38 (8)	06:42 19:48	07:13 (4) 07:35 (3)	07:34 18:36	20	08:02 (2) 08:22 (2)	07:31 16:32	08:20 16:01
11	05:04 21:42	05:38 (7) 05:50 (7)	05:50 20:55	06:20 (9) 06:36 (8)	06:43 19:46	07:14 (3) 07:35 (3)	07:36 18:34	20	08:02 (2) 08:22 (2)	07:33 16:30	08:21 16:01
12	05:05 21:41	05:39 (7) 05:49 (7)	05:52 20:53	06:45 19:43	06:45 19:43	07:14 (3) 07:34 (3)	07:37 18:31	17	08:04 (2) 08:21 (2)	07:35 16:28	08:22 16:00
13	05:06 21:40	05:40 (7) 05:48 (7)	05:53 20:51	06:47 19:41	06:47 19:41	07:14 (3) 07:33 (3)	07:39 18:29	14	08:06 (2) 08:20 (2)	07:37 16:27	08:23 16:00
14	05:07 21:39	05:42 (7) 05:46 (7)	05:55 20:49	06:48 19:38	06:48 19:38	07:15 (3) 07:33 (3)	07:41 18:27	10	08:08 (2) 08:18 (2)	07:39 16:25	08:24 16:00
15	05:09 21:38	05:57 20:47	05:57 20:47	06:50 19:36	06:50 19:36	07:16 (3) 07:31 (3)	07:43 18:24	6	08:10 (2) 08:16 (2)	07:41 16:24	08:25 16:00
16	05:10 21:37	05:59 20:45	05:59 20:45	06:52 19:33	06:52 19:33	07:18 (3) 07:29 (3)	07:45 18:22	11	07:43 18:22	07:43 16:22	08:26 16:00
17	05:11 21:36	06:00 20:43	06:00 20:43	06:54 19:31	06:54 19:31	07:20 (3) 07:26 (3)	07:46 18:20	6	07:44 18:20	07:44 16:21	08:27 16:01
18	05:13 21:35	06:02 20:41	06:02 20:41	06:55 19:29	06:55 19:29	07:54 (1) 08:04 (1)	07:48 18:18	10	07:46 18:18	07:46 16:19	08:28 16:01
19	05:14 21:34	06:04 20:39	06:04 20:39	06:57 19:26	06:57 19:26	07:51 (1) 08:06 (1)	07:50 18:15	15	07:48 18:15	07:48 16:18	08:28 16:01
20	05:15 21:32	06:05 20:37	06:05 20:37	06:59 19:24	06:59 19:24	07:49 (1) 08:08 (1)	07:52 18:13	19	07:50 18:13	07:50 16:17	08:29 16:01
21	05:17 21:31	06:07 20:34	06:07 20:34	07:00 19:21	07:00 19:21	07:47 (1) 08:08 (1)	07:54 18:11	21	07:51 18:11	07:51 16:15	08:30 16:02
22	05:18 21:30	06:09 20:32	06:09 20:32	07:02 19:19	07:02 19:19	07:46 (1) 08:09 (1)	07:56 18:09	23	07:52 18:09	07:52 16:14	08:30 16:02
23	05:20 21:28	06:11 20:30	06:11 20:30	07:04 19:16	07:04 19:16	07:46 (1) 08:09 (1)	07:58 18:07	23	07:55 18:07	07:55 16:13	08:31 16:03
24	05:21 21:27	06:12 20:28	06:12 20:28	07:06 19:14	07:06 19:14	07:44 (1) 08:09 (1)	07:59 18:05	25	07:57 18:05	07:57 16:12	08:31 16:03
25	05:23 21:25	06:14 20:25	06:14 20:25	07:07 19:12	07:07 19:12	07:44 (1) 08:09 (1)	07:01 17:02	25	07:58 17:02	07:58 16:11	08:32 16:04
26	05:24 21:24	06:16 20:23	06:16 20:23	07:09 19:09	07:09 19:09	07:44 (1) 08:09 (1)	07:03 17:00	25	08:00 17:00	08:00 16:10	08:32 16:05
27	05:26 21:22	06:18 20:21	06:18 20:21	07:11 19:07	07:11 19:07	07:44 (1) 08:08 (1)	07:05 16:58	24	08:02 16:58	08:02 16:09	08:32 16:05
28	05:27 21:21	06:19 (9) 06:43 (8)	06:19 (9) 20:19	07:11 (4) 07:36 (4)	07:13 19:04	07:43 (1) 08:07 (1)	07:07 16:56	24	08:03 16:56	08:03 16:08	08:32 16:06
29	05:29 21:19	06:18 (9) 06:44 (8)	06:21 20:16	07:10 (4) 07:37 (4)	07:14 19:02	07:44 (1) 08:06 (1)	07:09 16:54	22	08:05 16:54	08:05 16:07	08:32 16:07
30	05:30 21:18	06:17 (9) 06:44 (8)	06:23 20:14	07:10 (4) 07:37 (4)	07:16 19:00	07:45 (1) 08:05 (1)	07:11 16:52	20	08:06 16:52	08:06 16:06	08:32 16:08
31	05:32 21:16	06:17 (9) 06:45 (8)	06:24 20:12	07:09 (4) 07:37 (4)	07:19 18:50	07:13 16:50	08:32 16:09	20	16:06 16:09	16:06 16:09	08:32 16:09
Sonnenscheinstunden	509	458	465	382	644	330	233		262	237	
astr.max.mögl.Beschattung	436		465		644		233				
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29				
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96				
Reduktion Windrichtung	0.72		0.72		0.70		0.66				
Gesamte Reduktion	0.26		0.29		0.23		0.18				
Met.wahrsch.Beschattung	114		136		150		43				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattende	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	---------------------------	------------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: ED - IO134
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:32	08:03	07:08	07:32 (2) 06:54	07:21 (3) 05:46	06:13 (9) 04:59	05:30 (7)
	16:10	17:00	17:55	13 07:45 (2) 19:51	21 07:42 (3) 20:45	17 06:30 (8) 21:34	15 05:45 (7)
2	08:32	08:02	07:05	07:29 (2) 06:52	07:19 (4) 05:44	06:11 (9) 04:58	05:31 (7)
	16:12	17:02	17:57	17 07:46 (2) 19:53	22 07:41 (3) 20:47	21 06:32 (8) 21:35	15 05:46 (7)
3	08:32	08:00	07:03	07:27 (2) 06:49	07:17 (4) 05:42	06:10 (9) 04:57	05:30 (7)
	16:13	17:04	17:58	19 07:46 (2) 19:55	24 07:41 (3) 20:49	23 06:33 (8) 21:36	16 05:46 (7)
4	08:32	07:58	07:01	07:27 (2) 06:47	07:15 (4) 05:41	06:09 (9) 04:56	05:30 (7)
	16:14	17:06	18:00	20 07:47 (2) 19:57	25 07:40 (3) 20:50	25 06:34 (8) 21:37	16 05:46 (7)
5	08:32	07:57	06:58	07:26 (2) 06:45	07:14 (4) 05:39	06:08 (9) 04:55	05:30 (7)
	16:15	17:08	18:02	20 07:46 (2) 19:59	25 07:39 (3) 20:52	26 06:34 (8) 21:38	17 05:47 (7)
6	08:31	07:55	06:56	07:27 (2) 06:42	07:12 (4) 05:37	06:07 (9) 04:55	05:30 (7)
	16:16	17:10	18:04	19 07:46 (2) 20:00	25 07:37 (4) 20:54	27 06:34 (8) 21:39	17 05:47 (7)
7	08:31	07:53	06:54	07:26 (2) 06:40	07:12 (4) 05:35	06:08 (9) 04:54	05:30 (7)
	16:18	17:12	18:06	19 07:45 (2) 20:02	26 07:38 (4) 20:56	28 06:36 (8) 21:40	18 05:48 (7)
8	08:30	07:51	06:51	07:27 (2) 06:37	07:11 (4) 05:33	06:07 (9) 04:53	05:30 (7)
	16:19	17:14	18:08	17 07:44 (2) 20:04	27 07:38 (4) 20:57	28 06:35 (8) 21:41	18 05:48 (7)
9	08:30	07:49	06:49	07:28 (2) 06:35	07:10 (4) 05:31	06:07 (9) 04:53	05:30 (7)
	16:20	17:16	18:10	15 07:43 (2) 20:06	27 07:37 (4) 20:59	28 06:35 (8) 21:42	19 05:49 (7)
10	08:29	07:48	06:47	07:29 (2) 06:33	07:10 (4) 05:29	06:08 (9) 04:52	05:30 (7)
	16:22	17:18	18:11	11 07:40 (2) 20:08	27 07:37 (4) 21:01	28 06:36 (8) 21:43	18 05:48 (7)
11	08:29	07:46	06:44	07:10 (1) 06:30	07:10 (4) 05:27	06:08 (9) 04:52	05:30 (7)
	16:23	17:20	18:13	11 07:36 (2) 20:09	27 07:37 (4) 21:03	27 06:35 (8) 21:44	19 05:49 (7)
12	08:28	07:44	06:42	07:07 (1) 06:28	07:10 (4) 05:26	06:08 (9) 04:52	05:31 (7)
	16:25	17:22	18:15	15 07:22 (1) 20:11	27 07:37 (4) 21:04	27 06:35 (8) 21:44	18 05:49 (7)
13	08:27	07:42	06:40	07:05 (1) 06:26	07:10 (4) 05:24	06:09 (9) 04:51	05:31 (7)
	16:26	17:24	18:17	18 07:23 (1) 20:13	25 07:35 (4) 21:06	26 06:35 (8) 21:45	19 05:50 (7)
14	08:26	07:40	06:37	07:04 (1) 06:23	07:10 (4) 05:22	06:10 (9) 04:51	05:30 (7)
	16:28	17:26	18:19	20 07:24 (1) 20:15	25 07:35 (4) 21:08	24 06:34 (8) 21:46	19 05:49 (7)
15	08:25	07:38	06:35	07:02 (1) 06:21	07:11 (4) 05:21	06:12 (9) 04:51	05:31 (7)
	16:30	17:28	18:21	22 07:24 (1) 20:17	23 07:34 (4) 21:09	22 06:34 (8) 21:46	19 05:50 (7)
16	08:24	07:36	06:32	07:02 (1) 06:19	07:12 (4) 05:19	06:13 (8) 04:51	05:31 (7)
	16:31	17:30	18:23	23 07:25 (1) 20:18	21 07:33 (4) 21:11	20 06:33 (8) 21:47	19 05:50 (7)
17	08:23	07:34	06:30	07:01 (1) 06:17	07:13 (4) 05:17	06:14 (8) 04:50	05:31 (7)
	16:33	17:32	18:24	23 07:24 (1) 20:20	17 07:30 (4) 21:12	19 06:33 (8) 21:47	19 05:50 (7)
18	08:22	07:32	06:28	07:01 (1) 06:14	07:15 (4) 05:16	06:16 (8) 04:50	05:31 (7)
	16:35	17:34	18:26	24 07:25 (1) 20:22	13 07:28 (4) 21:14	16 06:32 (8) 21:48	19 05:50 (7)
19	08:21	07:29	06:25	07:01 (1) 06:12	07:18 (4) 05:14	06:16 (8) 04:50	05:31 (7)
	16:36	17:35	18:28	24 07:25 (1) 20:24	6 07:24 (4) 21:16	14 06:30 (8) 21:48	19 05:50 (7)
20	08:20	07:27	06:23	07:00 (1) 06:10	07:19 (4) 05:13	06:18 (8) 04:51	05:33 (6)
	16:38	17:37	18:30	24 07:24 (1) 20:26	11 07:11 (4) 05:21	11 06:29 (8) 21:48	18 05:51 (7)
21	08:19	07:25	06:20	07:01 (1) 06:08	07:12 (4) 05:12	06:20 (8) 04:51	05:33 (6)
	16:40	17:39	18:32	22 07:23 (1) 20:27	21 07:12 (4) 05:19	8 06:28 (8) 21:49	18 05:51 (7)
22	08:18	07:23	06:18	07:01 (1) 06:06	07:12 (4) 05:10	06:13 (8) 04:51	05:33 (6)
	16:42	17:41	18:33	20 07:21 (1) 20:29	21 07:13 (4) 05:17	21 06:14 (8) 04:50	18 05:51 (7)
23	08:17	07:21	06:16	07:02 (1) 06:03	07:12 (4) 05:09	06:13 (8) 04:51	05:32 (7)
	16:43	17:43	18:35	18 07:20 (1) 20:31	21 07:14 (4) 05:16	21 06:15 (8) 04:51	19 05:51 (7)
24	08:15	07:19	06:13	07:03 (1) 06:01	07:12 (4) 05:07	06:13 (8) 04:51	05:33 (7)
	16:45	17:45	18:37	15 07:18 (1) 20:33	21 07:15 (4) 05:17	21 06:16 (8) 04:52	19 05:52 (7)
25	08:14	07:16	06:11	07:05 (1) 05:59	07:12 (4) 05:06	06:13 (8) 04:52	05:33 (7)
	16:47	17:47	18:39	10 07:15 (1) 20:35	21 07:16 (4) 05:18	21 06:17 (8) 04:53	19 05:52 (7)
26	08:13	07:14	06:08	06:32 (3) 05:57	07:13 (4) 05:05	06:14 (8) 04:52	05:33 (7)
	16:49	17:49	18:41	6 06:38 (3) 20:36	21 07:17 (4) 05:14	21 06:19 (8) 04:53	19 05:52 (7)
27	08:11	07:12	06:06	06:29 (3) 05:55	07:13 (4) 05:04	06:15 (8) 04:53	05:34 (7)
	16:51	17:51	5 07:41 (2) 18:42	10 06:39 (3) 20:38	21 07:18 (4) 05:16	4 05:39 (7) 21:49	19 05:53 (7)
28	08:10	07:10	06:04	06:27 (3) 05:53	07:13 (4) 05:03	06:16 (8) 04:53	05:33 (7)
	16:53	17:53	10 07:44 (2) 18:44	14 06:41 (3) 20:40	21 07:19 (4) 05:17	9 05:42 (7) 21:49	19 05:52 (7)
29	08:08		07:01	07:24 (3) 05:51	07:14 (4) 05:02	06:17 (8) 04:54	05:34 (7)
	16:55		19:46	17 07:41 (3) 20:42	21 07:20 (4) 05:19	11 05:43 (7) 21:49	19 05:53 (7)
30	08:07		06:59	07:23 (3) 05:49	06:16 (9) 05:00	06:18 (8) 04:54	05:34 (7)
	16:57		19:48	19 07:42 (3) 20:43	8 06:27 (8) 21:31	13 05:44 (7) 21:48	19 05:53 (7)
31	08:05		06:56	07:22 (3)	04:59	05:31 (7)	
	16:58		19:50	20 07:42 (3)	21:32	13 05:44 (7)	
Sonnenscheinstunden	253	275	367	419	491	506	545
astr. max.mögl. Beschattung		15	545	441	515	545	545
Red. Sonnenscheinwahrsch.		0.24	0.28	0.37	0.43	0.39	0.39
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96	0.96	0.96
Reduktion Windrichtung		0.65	0.68	0.72	0.73	0.72	0.72
Gesamte Reduktion		0.15	0.18	0.25	0.30	0.27	0.27
Met. wahrsch. Beschattung		2	98	112	154	145	145

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat Sonnenaufgang (SS:MM) Sonnenuntergang (SS:MM) Minuten mit Schatten Zeitpunkt (SS:MM) Schattenanfang Zeitpunkt (SS:MM) Schattende (WEA mit erstem Schatten) (WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt

-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: ED - IO134
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55	05:34 (7) 05:34	06:18 (9) 06:26	07:09 (4) 07:18	07:46 (1) 07:14	08:08
	21:48	19 05:53 (7) 21:14	27 06:45 (8) 20:09	27 07:36 (4) 18:57	16 08:02 (1) 16:48	16:05
2	04:56	05:35 (7) 05:35	06:18 (9) 06:28	07:09 (4) 07:20	07:48 (1) 07:16	08:09
	21:48	19 05:54 (7) 21:12	28 06:46 (8) 20:07	27 07:36 (4) 18:55	12 08:00 (1) 16:46	16:05
3	04:56	05:35 (7) 05:37	06:17 (9) 06:30	07:08 (4) 07:21	07:52 (1) 07:18	08:11
	21:47	19 05:54 (7) 21:11	28 06:45 (8) 20:05	27 07:35 (4) 18:52	9 08:17 (2) 16:44	16:04
4	04:57	05:35 (7) 05:38	06:17 (9) 06:31	07:08 (4) 07:23	08:06 (2) 07:20	08:12
	21:47	18 05:53 (7) 21:09	29 06:46 (8) 20:02	27 07:35 (4) 18:50	13 08:19 (2) 16:42	16:03
5	04:58	05:35 (7) 05:40	06:18 (9) 06:33	07:09 (4) 07:25	08:05 (2) 07:22	08:14
	21:46	19 05:54 (7) 21:07	28 06:46 (8) 20:00	26 07:35 (4) 18:48	15 08:20 (2) 16:41	16:03
6	04:59	05:36 (7) 05:42	06:17 (9) 06:35	07:08 (4) 07:27	08:04 (2) 07:24	08:15
	21:46	18 05:54 (7) 21:05	28 06:45 (8) 19:58	25 07:33 (4) 18:45	17 08:21 (2) 16:39	16:02
7	05:00	05:36 (7) 05:43	06:18 (9) 06:36	07:09 (4) 07:28	08:03 (2) 07:26	08:16
	21:45	18 05:54 (7) 21:03	27 06:45 (8) 19:55	25 07:34 (3) 18:43	19 08:22 (2) 16:37	16:02
8	05:01	05:37 (7) 05:45	06:17 (9) 06:38	07:10 (4) 07:30	08:01 (2) 07:28	08:18
	21:45	17 05:54 (7) 21:01	26 06:43 (8) 19:53	25 07:35 (3) 18:41	20 08:21 (2) 16:35	16:01
9	05:02	05:37 (7) 05:47	06:18 (9) 06:40	07:10 (4) 07:32	08:01 (2) 07:30	08:19
	21:44	17 05:54 (7) 20:59	25 06:43 (8) 19:50	24 07:34 (3) 18:38	20 08:21 (2) 16:33	16:01
10	05:03	05:38 (7) 05:48	06:18 (9) 06:42	07:12 (4) 07:34	08:01 (2) 07:31	08:20
	21:43	16 05:54 (7) 20:57	23 06:41 (8) 19:48	23 07:35 (3) 18:36	20 08:21 (2) 16:32	16:01
11	05:04	05:38 (7) 05:50	06:20 (9) 06:43	07:15 (3) 07:36	08:02 (2) 07:33	08:21
	21:42	15 05:53 (7) 20:55	20 06:40 (8) 19:46	20 07:35 (3) 18:34	18 08:20 (2) 16:30	16:01
12	05:05	05:39 (7) 05:52	06:22 (9) 06:45	07:14 (3) 07:37	08:04 (2) 07:35	08:22
	21:41	14 05:53 (7) 20:53	16 06:38 (8) 19:43	20 07:34 (3) 18:31	15 08:19 (2) 16:28	16:00
13	05:06	05:39 (7) 05:54	06:47	07:14 (3) 07:39	08:06 (2) 07:37	08:23
	21:40	13 05:52 (7) 20:51	19:41	19 07:33 (3) 18:29	12 08:18 (2) 16:27	16:00
14	05:07	05:40 (7) 05:55	06:48	07:15 (3) 07:41	08:08 (2) 07:39	08:24
	21:39	12 05:52 (7) 20:49	19:38	18 07:33 (3) 18:27	8 08:16 (2) 16:25	16:00
15	05:09	05:41 (7) 05:57	06:50	07:16 (3) 07:43	08:10 (2) 07:41	08:25
	21:38	10 05:51 (7) 20:47	19:36	15 07:31 (3) 18:24	3 08:13 (2) 16:24	16:00
16	05:10	05:43 (7) 05:59	06:52	07:18 (3) 07:45	07:43	08:26
	21:37	6 05:49 (7) 20:45	19:33	11 07:29 (3) 18:22	16:22	16:00
17	05:11	06:00	06:54	07:20 (3) 07:46	07:44	08:27
	21:36	20:43	19:31	7 07:27 (3) 18:20	16:21	16:01
18	05:13	06:02	06:55	07:53 (1) 07:48	07:46	08:28
	21:35	20:41	19:29	9 08:02 (1) 18:18	16:19	16:01
19	05:14	06:04	06:57	07:51 (1) 07:50	07:48	08:28
	21:34	20:39	19:26	14 08:05 (1) 18:15	16:18	16:01
20	05:15	06:05	06:59	07:49 (1) 07:52	07:50	08:29
	21:32	20:37	19:24	18 08:07 (1) 18:13	16:17	16:01
21	05:17	06:07	07:00	07:47 (1) 07:54	07:51	08:30
	21:31	20:34	19:21	20 08:07 (1) 18:11	16:15	16:02
22	05:18	06:31 (8) 06:09	07:02	07:46 (1) 07:56	07:53	08:30
	21:30	5 06:36 (8) 20:32	19:19	21 08:07 (1) 18:09	16:14	16:02
23	05:20	06:28 (8) 06:11	07:04	07:45 (1) 07:58	07:55	08:31
	21:28	10 06:38 (8) 20:30	19:16	23 08:08 (1) 18:07	16:13	16:03
24	05:21	06:27 (8) 06:12	07:21 (4) 07:06	07:43 (1) 07:59	07:57	08:31
	21:27	14 06:41 (8) 20:28	7 07:28 (4) 19:14	24 08:07 (1) 18:05	16:12	16:03
25	05:23	06:26 (8) 06:14	07:18 (4) 07:07	07:43 (1) 07:01	07:58	08:32
	21:26	15 06:41 (8) 20:25	14 07:32 (4) 19:12	24 08:07 (1) 17:02	16:11	16:04
26	05:24	06:26 (8) 06:16	07:15 (4) 07:09	07:43 (1) 07:03	08:00	08:32
	21:24	17 06:43 (8) 20:23	18 07:33 (4) 19:09	24 08:07 (1) 17:00	16:10	16:05
27	05:26	06:24 (8) 06:18	07:14 (4) 07:11	07:43 (1) 07:05	08:02	08:32
	21:22	19 06:43 (8) 20:21	21 07:35 (4) 19:07	24 08:07 (1) 16:58	16:09	16:05
28	05:27	06:23 (9) 06:19	07:12 (4) 07:13	07:43 (1) 07:07	08:03	08:32
	21:21	21 06:44 (8) 20:19	23 07:35 (4) 19:04	22 08:05 (1) 16:56	16:08	16:06
29	05:29	06:22 (9) 06:21	07:11 (4) 07:14	07:43 (1) 07:09	08:05	08:32
	21:19	23 06:45 (8) 20:16	25 07:36 (4) 19:02	22 08:05 (1) 16:54	16:07	16:07
30	05:30	06:20 (9) 06:23	07:11 (4) 07:16	07:44 (1) 07:11	08:06	08:32
	21:18	25 06:45 (8) 20:14	25 07:36 (4) 19:00	19 08:03 (1) 16:52	16:06	16:08
31	05:32	06:19 (9) 06:24	07:09 (4)		07:13	08:32
	21:16	26 06:45 (8) 20:12	27 07:36 (4)		16:50	16:09
Sonnenscheinstunden	509	458	382	330	262	237
astr. max. mögl. Beschattung	425	465	630	217		
Red. Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29		
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96		
Reduktion Windrichtung	0.72	0.72	0.70	0.66		
Gesamte Reduktion	0.26	0.29	0.23	0.18		
Met. wahrsch. Beschattung	111	136	147	40		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Schattenanfang (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM) Schattenende	Schattenende (WEA mit letztem Schatten)

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EE - IO135

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni								
1	08:32	08:03	07:08	07:32 (2)	06:54	07:21 (3)	05:46	04:59						
	16:10	17:00	17:55	17	07:49 (2)	19:51	21	07:42 (3)	20:45	21:34				
2	08:32	08:02	07:05	07:29 (2)	06:52	07:21 (3)	05:44	04:58						
	16:12	17:02	17:57	19	07:48 (2)	19:53	21	07:42 (3)	20:47	21:35				
3	08:32	08:00	07:03	07:29 (2)	06:49	07:19 (4)	05:42	04:57						
	16:13	17:04	17:58	20	07:49 (2)	19:55	23	07:42 (3)	20:49	6	06:10 (9)	04:57	5	05:30 (7)
4	08:32	07:58	07:01	07:29 (2)	06:47	07:16 (4)	05:41	04:56						
	16:14	17:06	18:00	20	07:49 (2)	19:57	24	07:40 (3)	20:50	16	06:24 (8)	21:37	8	05:36 (7)
5	08:32	07:57	06:58	07:28 (2)	06:45	07:14 (4)	05:39	04:55						
	16:15	17:08	18:02	21	07:49 (2)	19:59	26	07:40 (3)	20:52	20	06:26 (8)	21:38	10	05:38 (7)
6	08:31	07:55	06:56	07:29 (2)	06:42	07:12 (4)	05:37	04:55						
	16:16	17:10	18:04	19	07:48 (2)	20:00	26	07:38 (3)	20:54	22	06:27 (8)	21:39	11	05:38 (7)
7	08:31	07:53	06:54	07:28 (2)	06:40	07:11 (4)	05:35	04:54						
	16:18	17:12	18:06	19	07:47 (2)	20:02	26	07:37 (4)	20:56	24	06:29 (8)	21:40	13	05:40 (7)
8	08:30	07:51	06:51	07:29 (2)	06:37	07:10 (4)	05:33	04:53						
	16:19	17:14	18:08	17	07:46 (2)	20:04	27	07:37 (4)	20:57	26	06:30 (8)	21:41	14	05:40 (7)
9	08:30	07:49	06:49	07:31 (2)	06:35	07:09 (4)	05:31	04:53						
	16:20	17:16	18:10	14	07:45 (2)	20:06	28	07:37 (4)	20:59	27	06:30 (8)	21:42	14	05:41 (7)
10	08:29	07:48	06:47	07:32 (2)	06:33	07:08 (4)	05:29	04:52						
	16:22	17:18	18:11	10	07:42 (2)	20:08	29	07:37 (4)	21:01	28	06:31 (8)	21:43	15	05:41 (7)
11	08:29	07:46	06:44	07:11 (1)	06:30	07:08 (4)	05:27	04:52						
	16:23	17:20	18:13	11	07:22 (1)	20:09	29	07:37 (4)	21:03	28	06:31 (8)	21:44	15	05:41 (7)
12	08:28	07:44	06:42	07:09 (1)	06:28	07:08 (4)	05:26	04:52						
	16:25	17:22	18:15	15	07:24 (1)	20:11	29	07:37 (4)	21:04	28	06:31 (8)	21:44	16	05:42 (7)
13	08:27	07:42	06:40	07:06 (1)	06:26	07:07 (4)	05:24	04:51						
	16:26	17:24	18:17	19	07:25 (1)	20:13	29	07:36 (4)	21:06	29	06:32 (8)	21:45	16	05:43 (7)
14	08:26	07:40	06:37	07:05 (1)	06:23	07:08 (4)	05:22	04:51						
	16:28	17:26	18:19	22	07:27 (1)	20:15	28	07:36 (4)	21:08	28	06:31 (8)	21:46	16	05:42 (7)
15	08:25	07:38	06:35	07:03 (1)	06:21	07:08 (4)	05:21	04:51						
	16:30	17:28	18:21	24	07:27 (1)	20:17	27	07:35 (4)	21:09	28	06:32 (8)	21:46	17	05:43 (7)
16	08:24	07:36	06:32	07:03 (1)	06:19	07:08 (4)	05:19	04:51						
	16:31	17:30	18:23	24	07:27 (1)	20:18	27	07:35 (4)	21:11	27	06:31 (8)	21:47	17	05:43 (7)
17	08:23	07:34	06:30	07:02 (1)	06:17	07:08 (4)	05:17	04:50						
	16:33	17:32	18:24	25	07:27 (1)	20:20	25	07:33 (4)	21:12	26	06:31 (8)	21:47	17	05:43 (7)
18	08:22	07:32	06:28	07:02 (1)	06:14	07:09 (4)	05:16	04:50						
	16:35	17:34	18:26	25	07:27 (1)	20:22	23	07:32 (4)	21:14	26	06:32 (8)	21:48	18	05:44 (7)
19	08:21	07:29	06:25	07:02 (1)	06:12	07:10 (4)	05:14	04:50						
	16:36	17:35	18:28	25	07:27 (1)	20:24	20	07:30 (4)	21:16	24	06:31 (8)	21:48	18	05:44 (7)
20	08:20	07:27	06:23	07:01 (1)	06:10	07:12 (4)	05:13	04:51						
	16:38	17:37	18:30	25	07:26 (1)	20:26	17	07:29 (4)	21:17	23	06:31 (8)	21:48	17	05:44 (7)
21	08:19	07:25	06:20	07:02 (1)	06:08	07:14 (4)	05:12	04:51						
	16:40	17:39	18:32	24	07:26 (1)	20:27	12	07:26 (4)	21:19	23	06:31 (8)	21:49	17	05:45 (7)
22	08:18	07:23	06:18	07:01 (1)	06:05	07:08 (4)	05:10	04:51						
	16:42	17:41	18:33	23	07:24 (1)	20:29	21:20	21	06:29 (8)	21:49	17	05:45 (7)		
23	08:17	07:21	06:16	07:02 (1)	06:03	07:09 (4)	05:09	04:51						
	16:43	17:43	18:35	21	07:23 (1)	20:31	21:22	20	06:29 (8)	21:49	18	05:45 (7)		
24	08:15	07:19	06:13	07:03 (1)	06:01	07:08 (4)	05:07	04:51						
	16:45	17:45	18:37	18	07:21 (1)	20:33	21:23	19	06:29 (8)	21:49	18	05:46 (7)		
25	08:14	07:16	06:11	07:05 (1)	05:59	07:10 (4)	05:06	04:52						
	16:47	17:47	18:39	14	07:19 (1)	20:35	21:24	17	06:28 (8)	21:49	18	05:46 (7)		
26	08:13	07:14	06:08	07:08 (1)	05:57	07:08 (4)	05:05	04:52						
	16:49	17:49	4	07:43 (2)	18:41	8	07:16 (1)	20:36	21:26	15	06:27 (8)	21:49	17	05:45 (7)
27	08:11	07:12	06:06	07:36 (2)	06:06	06:29 (3)	05:55	04:53						
	16:51	17:51	9	07:45 (2)	18:42	9	06:38 (3)	20:38	21:27	13	06:26 (8)	21:49	17	05:46 (7)
28	08:10	07:10	06:04	07:34 (2)	06:04	06:27 (3)	05:53	04:53						
	16:53	17:53	13	07:47 (2)	18:44	13	06:40 (3)	20:40	21:29	10	06:25 (8)	21:49	16	05:45 (7)
29	08:08		07:01	07:24 (3)	05:51	07:02 (4)	05:02	04:54						
	16:55		19:46	16	07:40 (3)	20:42	21:30	6	06:23 (8)	21:49	16	05:46 (7)		
30	08:07		06:59	07:22 (3)	05:49	07:02 (4)	05:00	04:54						
	16:57		19:48	19	07:41 (3)	20:43	21:31	21:48	16	05:45 (7)				
31	08:05		06:56	07:22 (3)		19:50	07:42 (3)	21:32						
	16:58		19:50	20	07:42 (3)		21:32							
Sonnenscheinstunden	253	275	367	419	517	491	580	427						
astr.max.mögl.Beschattung		26	576	0.28	0.37	0.43	0.39	0.39						
Red.Sonnenscheinwahrsch.		0.24	0.28		0.37	0.43	0.39	0.39						
Reduktion Betriebsdauer		0.96	0.96		0.96	0.96	0.96	0.96						
Reduktion Windrichtung		0.65	0.68		0.72	0.73	0.72	0.72						
Gesamte Reduktion		0.15	0.18		0.25	0.30	0.26	0.26						
Met.wahrsch.Beschattung		4	103		132	173	113	113						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	--	---------------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EE - IO135

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:30 (7)	05:33	06:13 (9)	06:26	07:07 (4)	07:18	07:47 (1)	07:14	08:08		
	21:48	05:46 (7)	21:14	06:41 (8)	20:09	07:36 (4)	18:57	08:04 (1)	16:48	16:05		
2	04:56	05:31 (7)	05:35	06:13 (9)	06:28	07:07 (4)	07:20	07:49 (1)	07:16	08:09		
	21:48	05:46 (7)	21:12	06:41 (8)	20:07	07:36 (4)	18:55	08:02 (1)	16:46	16:05		
3	04:56	05:32 (7)	05:37	06:13 (9)	06:30	07:07 (4)	07:21	07:52 (1)	07:18	08:11		
	21:47	05:46 (7)	21:11	06:40 (8)	20:05	07:35 (4)	18:52	08:19 (2)	16:44	16:04		
4	04:57	05:31 (7)	05:38	06:13 (9)	06:31	07:07 (4)	07:23	08:08 (2)	07:20	08:12		
	21:47	05:45 (7)	21:09	06:40 (8)	20:02	07:35 (4)	18:50	08:21 (2)	16:42	16:03		
5	04:58	05:32 (7)	05:40	06:14 (9)	06:33	07:08 (4)	07:25	08:07 (2)	07:22	08:14		
	21:46	05:45 (7)	21:07	06:40 (8)	20:00	07:34 (4)	18:48	08:23 (2)	16:41	16:03		
6	04:59	05:33 (7)	05:42	06:14 (9)	06:35	07:08 (4)	07:27	08:06 (2)	07:24	08:15		
	21:46	05:45 (7)	21:05	06:38 (8)	19:58	07:34 (3)	18:45	08:24 (2)	16:39	16:02		
7	05:00	05:34 (7)	05:43	06:15 (9)	06:36	07:09 (4)	07:28	08:05 (2)	07:26	08:16		
	21:45	05:45 (7)	21:03	06:37 (8)	19:55	07:35 (3)	18:43	08:24 (2)	16:37	16:02		
8	05:01	05:35 (7)	05:45	06:16 (9)	06:38	07:11 (4)	07:30	08:03 (2)	07:28	08:18		
	21:45	05:44 (7)	21:01	06:35 (8)	19:53	07:35 (3)	18:41	08:24 (2)	16:35	16:01		
9	05:02	05:37 (7)	05:47	06:18 (9)	06:40	07:12 (4)	07:32	08:03 (2)	07:30	08:19		
	21:44	05:43 (7)	20:59	06:32 (8)	19:50	07:35 (3)	18:38	08:24 (2)	16:33	16:01		
10	05:03	05:39 (7)	05:48	06:20 (9)	06:42	07:14 (3)	07:34	08:03 (2)	07:31	08:20		
	21:43	05:41 (7)	20:57	06:24 (9)	19:48	07:35 (3)	18:36	08:23 (2)	16:32	16:01		
11	05:04		05:50		06:43	07:14 (3)	07:36	08:03 (2)	07:33	08:21		
	21:42		20:55		19:46	07:35 (3)	18:34	08:23 (2)	16:30	16:01		
12	05:05		05:52		06:45	07:13 (3)	07:37	08:04 (2)	07:35	08:22		
	21:41		20:53		19:43	07:33 (3)	18:31	08:22 (2)	16:28	16:00		
13	05:06		05:53		06:47	07:14 (3)	07:39	08:06 (2)	07:37	08:23		
	21:40		20:51		19:41	07:33 (3)	18:29	08:21 (2)	16:27	16:00		
14	05:07	06:27 (8)	05:55		06:48	07:15 (3)	07:41	08:08 (2)	07:39	08:24		
	21:39	06:30 (8)	20:49		19:38	07:32 (3)	18:27	08:20 (2)	16:25	16:00		
15	05:09	06:24 (8)	05:57		06:50	07:16 (3)	07:43	08:10 (2)	07:41	08:25		
	21:38	06:33 (8)	20:47		19:36	07:30 (3)	18:24	08:18 (2)	16:24	16:00		
16	05:10	06:22 (8)	05:59		06:52	07:18 (3)	07:45		07:43	08:26		
	21:37	06:34 (8)	20:45		19:33	07:28 (3)	18:22		16:22	16:00		
17	05:11	06:22 (8)	06:00		06:54	07:21 (3)	07:46		07:44	08:27		
	21:36	06:36 (8)	20:43		19:31	08:03 (1)	18:20		16:21	16:01		
18	05:13	06:21 (8)	06:02		06:55	07:53 (1)	07:48		07:46	08:28		
	21:35	06:37 (8)	20:41		19:29	08:06 (1)	18:18		16:19	16:01		
19	05:14	06:20 (8)	06:04		06:57	07:51 (1)	07:50		07:48	08:28		
	21:34	06:38 (8)	20:39		19:26	08:08 (1)	18:15		16:18	16:01		
20	05:15	06:19 (8)	06:05		06:59	07:49 (1)	07:52		07:50	08:29		
	21:32	06:38 (8)	20:37		19:24	08:09 (1)	18:13		16:17	16:01		
21	05:17	06:19 (8)	06:07	07:23 (4)	07:00	07:47 (1)	07:54		07:51	08:30		
	21:31	06:40 (8)	20:34	07:26 (4)	19:21	08:09 (1)	18:11		16:15	16:02		
22	05:18	06:18 (8)	06:09	07:19 (4)	07:02	07:46 (1)	07:56		07:53	08:30		
	21:30	06:40 (8)	20:32	07:31 (4)	19:19	08:10 (1)	18:09		16:14	16:02		
23	05:20	06:18 (8)	06:11	07:15 (4)	07:04	07:46 (1)	07:58		07:55	08:31		
	21:28	06:40 (8)	20:30	07:33 (4)	19:16	08:11 (1)	18:07		16:13	16:03		
24	05:21	06:18 (8)	06:12	07:14 (4)	07:06	07:44 (1)	07:59		07:57	08:31		
	21:27	06:41 (8)	20:28	07:34 (4)	19:14	08:10 (1)	18:05		16:12	16:03		
25	05:23	06:17 (8)	06:14	07:13 (4)	07:07	07:44 (1)	07:01		07:58	08:32		
	21:25	06:41 (8)	20:25	07:36 (4)	19:12	08:10 (1)	17:02		16:11	16:04		
26	05:24	06:16 (8)	06:16	07:11 (4)	07:09	07:44 (1)	07:03		08:00	08:32		
	21:24	06:42 (8)	20:23	07:36 (4)	19:09	08:10 (1)	17:00		16:10	16:05		
27	05:26	06:15 (8)	06:18	07:10 (4)	07:11	07:44 (1)	07:05		08:02	08:32		
	21:22	06:42 (8)	20:21	07:37 (4)	19:07	08:09 (1)	16:58		16:09	16:05		
28	05:27	06:14 (8)	06:19	07:09 (4)	07:13	07:44 (1)	07:07		08:03	08:32		
	21:21	06:42 (8)	20:19	07:36 (4)	19:04	08:08 (1)	16:56		16:08	16:06		
29	05:29	06:14 (8)	06:21	07:08 (4)	07:14	07:44 (1)	07:09		08:05	08:32		
	21:19	06:42 (8)	20:16	07:37 (4)	19:02	08:07 (1)	16:54		16:07	16:07		
30	05:30	06:13 (8)	06:23	07:08 (4)	07:16	07:45 (1)	07:11		08:06	08:32		
	21:18	06:42 (8)	20:14	07:37 (4)	19:00	08:06 (1)	16:52		16:06	16:08		
31	05:32	06:14 (8)	06:24	07:07 (4)			07:13			08:32		
	21:16	06:42 (8)	20:12	07:36 (4)			16:50			16:09		
Sonnenscheinstunden	509		458		382		330		262	237		
astr.max.mögl.Beschattung	481		461		661		244					
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96					
Reduktion Windrichtung	0.72		0.72		0.70		0.66					
Gesamte Reduktion	0.26		0.29		0.23		0.18					
Met.wahrsch.Beschattung	126		135		154		45					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EF - IO136

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46	04:59	05:56 (8)
	16:10	17:00	17:55	19:51	15 08:01 (1)	20:45	21:34	22 06:18 (8)
2	08:32	08:02	07:05	07:29 (2)	06:52	07:15 (3)	05:44	04:58
	16:12	17:02	17:57	19:53	15 07:30 (3)	20:47	21:35	22 06:19 (8)
3	08:32	08:00	07:03	07:27 (2)	06:49	07:13 (3)	05:42	04:57
	16:13	17:04	17:58	19:55	18 07:31 (3)	20:49	21:36	22 06:19 (8)
4	08:32	07:58	07:01	07:25 (2)	06:47	07:11 (3)	05:41	04:56
	16:14	17:06	18:00	19:57	20 07:31 (3)	20:50	21:37	20 06:18 (8)
5	08:32	07:57	06:58	07:22 (2)	06:45	07:11 (3)	05:39	04:55
	16:15	17:08	18:02	19:59	20 07:31 (3)	20:52	21:38	20 06:19 (8)
6	08:31	07:55	06:56	07:21 (2)	06:42	07:10 (3)	05:37	04:55
	16:16	17:10	18:04	19 07:40 (2)	20:00	21 07:31 (3)	20:54	21:39
7	08:31	07:53	06:54	07:19 (2)	06:40	07:10 (3)	05:35	04:54
	16:18	17:12	18:06	21 07:40 (2)	20:02	21 07:31 (3)	20:56	21:40
8	08:30	07:51	06:51	07:19 (2)	06:37	07:10 (3)	05:33	04:53
	16:19	17:14	18:08	21 07:40 (2)	20:04	21 07:31 (3)	20:57	21:41
9	08:30	07:49	06:49	07:19 (2)	06:35	07:05 (4)	05:31	04:53
	16:20	17:16	18:10	21 07:40 (2)	20:06	24 07:29 (3)	20:59	7 06:06
10	08:29	07:48	06:47	07:19 (2)	06:33	07:02 (4)	05:29	05:58
	16:22	17:18	18:11	20 07:39 (2)	20:08	27 07:28 (3)	21:01	11 06:09
11	08:29	07:46	06:44	07:19 (2)	06:30	07:00 (4)	05:27	05:56
	16:23	17:20	18:13	20 07:39 (2)	20:09	28 07:28 (3)	21:03	14 06:10
12	08:28	07:44	06:42	07:20 (2)	06:28	06:59 (4)	05:26	05:55
	16:25	17:22	18:15	18 07:38 (2)	20:11	27 07:26 (3)	21:04	16 06:11
13	08:27	07:42	06:40	07:20 (2)	06:26	06:57 (4)	05:24	05:54
	16:26	17:24	18:17	16 07:36 (2)	20:13	26 07:23 (3)	21:06	20 06:14
14	08:26	07:40	06:37	07:22 (2)	06:23	06:56 (4)	05:22	05:54
	16:28	17:26	18:19	12 07:34 (2)	20:15	26 07:22 (4)	21:08	20 06:14
15	08:25	07:38	06:35	07:25 (2)	06:21	06:55 (4)	05:21	05:54
	16:30	17:28	18:21	5 07:30 (2)	20:17	28 07:23 (4)	21:09	22 06:16
16	08:24	07:36	06:32	07:01 (1)	06:19	06:55 (4)	05:19	05:53
	16:31	17:30	18:23	7 07:08 (1)	20:18	28 07:23 (4)	21:11	23 06:16
17	08:23	07:34	06:30	06:56 (1)	06:17	06:53 (4)	05:17	05:53
	16:33	17:32	18:24	15 07:11 (1)	20:20	30 07:23 (4)	21:12	24 06:17
18	08:22	07:32	06:28	06:55 (1)	06:14	06:53 (4)	05:16	05:54
	16:35	17:34	18:26	18 07:13 (1)	20:22	30 07:23 (4)	21:14	24 06:18
19	08:21	07:29	06:25	06:53 (1)	06:12	06:53 (4)	05:14	05:53
	16:36	17:35	18:28	21 07:14 (1)	20:24	30 07:23 (4)	21:16	25 06:18
20	08:20	07:27	06:23	06:51 (1)	06:10	06:53 (4)	05:13	05:54
	16:38	17:37	18:30	23 07:14 (1)	20:26	29 07:22 (4)	21:17	25 06:19
21	08:19	07:25	06:20	06:51 (1)	06:08	06:53 (4)	05:12	05:54
	16:40	17:39	18:32	24 07:15 (1)	20:27	29 07:22 (4)	21:19	25 06:19
22	08:18	07:23	06:18	06:49 (1)	06:05	06:54 (4)	05:10	05:54
	16:42	17:41	18:33	26 07:15 (1)	20:29	27 07:21 (4)	21:20	25 06:19
23	08:17	07:21	06:16	06:49 (1)	06:03	06:54 (4)	05:09	05:54
	16:43	17:43	18:35	26 07:15 (1)	20:31	27 07:21 (4)	21:22	25 06:19
24	08:15	07:19	06:13	06:48 (1)	06:01	06:55 (4)	05:07	05:54
	16:45	17:45	18:37	26 07:14 (1)	20:33	25 07:20 (4)	21:23	25 06:19
25	08:14	07:16	06:11	06:49 (1)	05:59	06:54 (4)	05:06	05:54
	16:47	17:47	18:39	25 07:14 (1)	20:35	24 07:18 (4)	21:24	25 06:19
26	08:13	07:14	06:08	06:49 (1)	05:57	06:55 (4)	05:05	05:55
	16:49	17:49	18:41	25 07:14 (1)	20:36	21 07:16 (4)	21:26	24 06:19
27	08:11	07:12	06:06	06:49 (1)	05:55	06:57 (4)	05:04	05:55
	16:50	17:51	18:42	23 07:12 (1)	20:38	18 07:15 (4)	21:27	24 06:19
28	08:10	07:10	06:04	06:49 (1)	05:53	06:58 (4)	05:03	05:55
	16:53	17:53	18:44	23 07:12 (1)	20:40	14 07:12 (4)	21:29	24 06:19
29	08:08	07:01	06:00	07:50 (1)	05:51	07:02 (4)	05:02	05:55
	16:55	19:46	20 08:10 (1)	20:42	7 07:09 (4)	21:30	24 06:19	24 06:19
30	08:07	06:59	07:51 (1)	05:49		05:00	05:56	04:54
	16:57	19:48	17 08:08 (1)	20:43		21:31	23 06:19	21:48
31	08:05	06:56	07:20 (3)			04:59	05:56	
	16:58	19:50	19 08:06 (1)			21:32	23 06:19	
Sonnenscheinstunden	253	275	367	419	491	506	430	
astr.max.mögl.Beschattung			553	676	498	430	0.39	
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39	0.96	
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96	0.73	
Reduktion Windrichtung			0.68	0.72	0.73	0.73	0.27	
Gesamte Reduktion			0.18	0.26	0.30	0.27	116	
Met.wahrsch.Beschattung			100	173	149	116		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EF - IO136

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

		Juli		August		September		Oktober		November		Dezember	
1	04:55	06:06 (8)	05:33	06:05 (9)	06:26	06:59 (4)	07:18	07:59 (2)	07:14	08:08			
	21:48	06:21 (8)	21:14	06:20 (9)	20:09	07:27 (3)	18:57	08:16 (2)	16:48	16:05			
2	04:56	06:06 (8)	05:35	06:07 (9)	06:28	07:01 (4)	07:20	07:58 (2)	07:16	08:09			
	21:48	06:22 (8)	21:12	06:20 (9)	20:07	07:28 (3)	18:55	08:17 (2)	16:46	16:05			
3	04:56	06:06 (8)	05:37	06:08 (9)	06:30	07:03 (4)	07:21	07:57 (2)	07:18	08:11			
	21:47	06:23 (8)	21:11	06:18 (9)	20:05	07:27 (3)	18:52	08:17 (2)	16:44	16:04			
4	04:57	06:05 (8)	05:38	06:11 (9)	06:31	07:07 (3)	07:23	07:56 (2)	07:20	08:12			
	21:47	06:23 (8)	21:09	06:16 (9)	20:02	07:28 (3)	18:50	08:17 (2)	16:42	16:03			
5	04:58	06:05 (8)	05:40	06:33		07:07 (3)	07:25	07:56 (2)	07:22	08:14			
	21:46	06:23 (8)	21:07	20:00		07:28 (3)	18:48	08:17 (2)	16:41	16:03			
6	04:59	06:05 (8)	05:42	06:35		07:06 (3)	07:27	07:56 (2)	07:24	08:15			
	21:46	06:24 (8)	21:05	19:58		07:27 (3)	18:45	08:17 (2)	16:39	16:02			
7	05:00	06:05 (8)	05:43	06:36		07:06 (3)	07:28	07:56 (2)	07:26	08:16			
	21:45	06:25 (8)	21:03	19:55		07:27 (3)	18:43	08:16 (2)	16:37	16:02			
8	05:01	06:05 (8)	05:45	06:38		07:06 (3)	07:30	07:56 (2)	07:28	08:18			
	21:45	06:25 (8)	21:01	19:53		07:26 (3)	18:41	08:14 (2)	16:35	16:01			
9	05:02	06:05 (8)	05:47	06:40		07:06 (3)	07:32	07:58 (2)	07:30	08:19			
	21:44	06:26 (8)	20:59	19:50		07:24 (3)	18:38	08:13 (2)	16:33	16:01			
10	05:03	06:05 (8)	05:48	06:42		07:08 (3)	07:34	08:00 (2)	07:31	08:20			
	21:43	06:26 (8)	20:57	19:48		07:23 (3)	18:36	08:12 (2)	16:32	16:01			
11	05:04	06:05 (8)	05:50	06:43		07:10 (3)	07:36	08:02 (2)	07:33	08:21			
	21:42	06:27 (8)	20:55	19:46		07:22 (3)	18:34	08:09 (2)	16:30	16:01			
12	05:05	06:04 (8)	05:52	06:45		07:11 (3)	07:37		07:35	08:22			
	21:41	06:27 (8)	20:53	19:43		07:57 (1)	18:31		16:28	16:00			
13	05:06	06:04 (8)	05:53	06:47		07:43 (1)	07:39		07:37	08:23			
	21:40	06:27 (8)	20:51	19:41		07:59 (1)	18:29		16:27	16:00			
14	05:07	06:04 (8)	05:55	07:09 (4)	06:48	07:41 (1)	07:41		07:39	08:24			
	21:39	06:28 (8)	20:49	07:19 (4)	19:38	08:01 (1)	18:27		16:25	16:00			
15	05:09	06:04 (8)	05:57	07:06 (4)	06:50	07:39 (1)	07:43		07:41	08:25			
	21:38	06:28 (8)	20:47	07:21 (4)	19:36	08:01 (1)	18:24		16:24	16:00			
16	05:10	06:04 (8)	05:59	07:04 (4)	06:52	07:38 (1)	07:45		07:43	08:26			
	21:37	06:28 (8)	20:45	07:23 (4)	19:33	08:02 (1)	18:22		16:22	16:00			
17	05:11	06:04 (8)	06:00	07:03 (4)	06:54	07:37 (1)	07:46		07:44	08:27			
	21:36	06:29 (8)	20:43	07:24 (4)	19:31	08:02 (1)	18:20		16:21	16:01			
18	05:13	06:04 (8)	06:02	07:01 (4)	06:55	07:36 (1)	07:48		07:46	08:28			
	21:35	06:29 (8)	20:41	07:25 (4)	19:29	08:02 (1)	18:18		16:19	16:01			
19	05:14	06:04 (8)	06:04	07:00 (4)	06:57	07:36 (1)	07:50		07:48	08:28			
	21:34	06:29 (8)	20:39	07:26 (4)	19:26	08:02 (1)	18:15		16:18	16:01			
20	05:15	06:04 (9)	06:05	06:59 (4)	06:59	07:36 (1)	07:52		07:50	08:29			
	21:32	06:29 (8)	20:37	07:25 (4)	19:24	08:02 (1)	18:13		16:17	16:01			
21	05:17	06:05 (9)	06:07	06:58 (4)	07:00	07:35 (1)	07:54		07:51	08:30			
	21:31	06:29 (8)	20:34	07:26 (4)	19:21	08:00 (1)	18:11		16:15	16:02			
22	05:18	06:04 (9)	06:09	06:58 (4)	07:02	07:35 (1)	07:56		07:53	08:30			
	21:30	06:29 (8)	20:32	07:27 (4)	19:19	08:00 (1)	18:09		16:14	16:02			
23	05:20	06:03 (9)	06:11	06:57 (4)	07:04	07:36 (1)	07:58		07:55	08:31			
	21:28	06:28 (8)	20:30	07:26 (4)	19:16	07:59 (1)	18:07		16:13	16:03			
24	05:21	06:04 (9)	06:12	06:57 (4)	07:06	07:36 (1)	07:59		07:57	08:31			
	21:27	06:29 (8)	20:28	07:26 (4)	19:14	07:57 (1)	18:05		16:12	16:03			
25	05:23	06:03 (9)	06:14	06:57 (4)	07:07	07:37 (1)	07:01		07:58	08:32			
	21:25	06:28 (8)	20:25	07:26 (4)	19:12	07:56 (1)	17:02		16:11	16:04			
26	05:24	06:04 (9)	06:16	06:56 (4)	07:09	07:38 (1)	07:03		08:00	08:32			
	21:24	06:28 (8)	20:23	07:25 (4)	19:09	07:54 (1)	17:00		16:10	16:05			
27	05:26	06:04 (9)	06:18	06:57 (4)	07:11	07:41 (1)	07:05		08:02	08:32			
	21:22	06:27 (8)	20:21	07:25 (4)	19:07	07:51 (1)	16:58		16:09	16:05			
28	05:27	06:03 (9)	06:19	06:56 (4)	07:13		07:07		08:03	08:32			
	21:21	06:26 (8)	20:19	07:24 (4)	19:04		16:56		16:08	16:06			
29	05:29	06:04 (9)	06:21	06:57 (4)	07:14	08:03 (2)	07:09		08:05	08:32			
	21:19	06:26 (8)	20:16	07:23 (4)	19:02	08:13 (2)	16:54		16:07	16:07			
30	05:30	06:04 (9)	06:23	06:58 (4)	07:16	08:01 (2)	07:11		08:06	08:32			
	21:18	06:24 (8)	20:14	07:24 (3)	19:00	08:15 (2)	16:52		16:06	16:08			
31	05:32	06:05 (9)	06:24	06:58 (4)			07:13			08:32			
	21:16	06:23 (8)	20:12	07:25 (3)			16:50			16:09			
	Sonnenscheinstunden	509	458	382	330			262	237				
	astr.max.mögl.Beschattung	679	492	595	191								
	Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29								
	Reduktion Betriebsdauer	0.96	0.96	0.96	0.96								
	Reduktion Windrichtung	0.73	0.72	0.70	0.66								
	Gesamte Reduktion	0.26	0.29	0.23	0.18								
	Met.wahrsch.Beschattung	179	143	139	35								

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EG - IO137

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:08	06:54	07:18 (3)	05:46
	16:10	17:00	17:55	19:51	19 08:05 (1)	14 07:10 (4)
2	08:32	08:02	07:05	06:52	07:15 (3)	05:44
	16:12	17:02	17:57	19:53	20 08:02 (1)	7 07:06 (4)
3	08:32	08:00	07:03	06:49	07:13 (3)	05:42
	16:13	17:04	17:58	8 07:35 (2)	15 07:28 (3)	25 06:16 (8)
4	08:32	07:58	07:01	07:25 (2)	06:47	07:10 (3)
	16:14	17:06	18:00	12 07:37 (2)	19:57	18 07:28 (3)
5	08:32	07:57	06:58	07:22 (2)	06:45	07:09 (3)
	16:15	17:08	18:02	16 07:38 (2)	19:59	20 07:29 (3)
6	08:31	07:55	06:56	07:20 (2)	06:42	07:08 (3)
	16:16	17:10	18:04	19 07:39 (2)	20:00	21 07:29 (3)
7	08:31	07:53	06:54	07:19 (2)	06:40	07:07 (3)
	16:18	17:12	18:06	20 07:39 (2)	20:02	22 07:29 (3)
8	08:30	07:51	06:51	07:19 (2)	06:37	07:07 (3)
	16:19	17:14	18:08	21 07:40 (2)	20:04	22 07:29 (3)
9	08:30	07:49	06:49	07:19 (2)	06:35	07:07 (3)
	16:20	17:16	18:10	21 07:40 (2)	20:06	21 07:28 (3)
10	08:29	07:48	06:47	07:18 (2)	06:33	07:07 (3)
	16:22	17:18	18:11	21 07:39 (2)	20:08	21 07:28 (3)
11	08:29	07:46	06:44	07:18 (2)	06:30	07:02 (4)
	16:23	17:20	18:13	21 07:39 (2)	20:09	25 07:27 (3)
12	08:28	07:44	06:42	07:19 (2)	06:28	06:59 (4)
	16:25	17:22	18:15	19 07:38 (2)	20:11	27 07:26 (3)
13	08:27	07:42	06:40	07:19 (2)	06:26	06:56 (4)
	16:26	17:24	18:17	17 07:36 (2)	20:13	28 07:24 (3)
14	08:26	07:40	06:37	07:20 (2)	06:23	06:54 (4)
	16:28	17:26	18:19	15 07:35 (2)	20:15	28 07:22 (3)
15	08:25	07:38	06:35	07:22 (2)	06:21	06:53 (4)
	16:30	17:28	18:21	10 07:32 (2)	20:17	26 07:19 (3)
16	08:24	07:36	06:32	07:21 (2)	06:19	06:52 (4)
	16:31	17:30	18:23	20:18	28 07:20 (4)	21:11
17	08:23	07:34	06:30	06:58 (1)	06:17	06:51 (4)
	16:33	17:32	18:24	8 07:06 (1)	20:20	28 07:19 (4)
18	08:22	07:32	06:28	06:55 (1)	06:14	06:50 (4)
	16:35	17:34	18:26	15 07:10 (1)	20:22	30 07:20 (4)
19	08:21	07:29	06:25	06:53 (1)	06:12	06:50 (4)
	16:36	17:35	18:28	19 07:12 (1)	20:24	30 07:20 (4)
20	08:20	07:27	06:23	06:51 (1)	06:10	06:50 (4)
	16:38	17:37	18:30	21 07:12 (1)	20:26	30 07:20 (4)
21	08:19	07:25	06:20	06:50 (1)	06:08	06:49 (4)
	16:40	17:39	18:32	23 07:13 (1)	20:27	31 07:20 (4)
22	08:18	07:23	06:18	06:48 (1)	06:05	06:48 (4)
	16:42	17:41	18:33	25 07:13 (1)	20:29	31 07:20 (4)
23	08:17	07:21	06:16	06:48 (1)	06:03	06:50 (4)
	16:43	17:43	18:35	26 07:14 (1)	20:31	29 07:19 (4)
24	08:15	07:19	06:13	06:47 (1)	06:01	06:50 (4)
	16:45	17:45	18:37	26 07:13 (1)	20:33	29 07:19 (4)
25	08:14	07:16	06:11	06:47 (1)	05:59	06:49 (4)
	16:47	17:47	18:39	26 07:13 (1)	20:35	28 07:17 (4)
26	08:13	07:14	06:08	06:47 (1)	05:57	06:50 (4)
	16:49	17:49	18:41	26 07:13 (1)	20:36	26 07:16 (4)
27	08:11	07:12	06:06	06:46 (1)	05:55	06:50 (4)
	16:50	17:51	18:42	26 07:12 (1)	20:38	25 07:15 (4)
28	08:10	07:10	06:04	06:47 (1)	05:53	06:51 (4)
	16:53	17:53	18:44	25 07:12 (1)	20:40	23 07:14 (4)
29	08:08	07:01	07:47 (1)	05:51	06:52 (4)	05:02
	16:55	19:46	23 08:10 (1)	20:42	21 07:13 (4)	21:30
30	08:07	06:59	07:48 (1)	05:49	06:54 (4)	05:00
	16:57	19:48	21 08:09 (1)	20:43	18 07:12 (4)	21:31
31	08:05	06:56	07:49 (1)	05:48	04:59	05:50 (8)
	16:58	19:50	19 08:08 (1)	20:44	21:32	25 06:15 (8)
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung			549	740	452	665
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.68	0.72	0.73	0.73
Gesamte Reduktion			0.18	0.26	0.30	0.27
Met.wahrsch.Beschattung			99	189	135	179

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt: 20190529_Bostelwiebeck II

Lizenzierter Anwender: I17-Wind GmbH & Co. KG Am Westersielzug 11 DE-25840 Friedrichstadt

Berechnung: 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GB Schattenrezeptor: EG - IO137

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November		Dezember		
1	04:55	05:58 (8)	05:33	06:05 (9)	06:26	07:01 (4)	07:18	07:58 (2)	07:14	08:08		
	21:48	06:20 (8)	21:14	06:13 (9)	20:09	07:26 (3)	18:57	08:17 (2)	16:48	16:05		
2	04:56	05:58 (8)	05:35		06:28	07:06 (3)	07:20	07:57 (2)	07:16	08:09		
	21:48	06:21 (8)	21:12		20:07	07:27 (3)	18:55	08:17 (2)	16:46	16:05		
3	04:56	05:58 (8)	05:37		06:30	07:05 (3)	07:21	07:56 (2)	07:18	08:11		
	21:47	06:21 (8)	21:11		20:05	07:26 (3)	18:52	08:17 (2)	16:44	16:04		
4	04:57	05:58 (8)	05:38		06:31	07:04 (3)	07:23	07:55 (2)	07:20	08:12		
	21:47	06:21 (8)	21:09		20:02	07:26 (3)	18:50	08:17 (2)	16:42	16:03		
5	04:58	05:58 (8)	05:40		06:33	07:05 (3)	07:25	07:55 (2)	07:22	08:14		
	21:46	06:22 (8)	21:07		20:00	07:26 (3)	18:48	08:17 (2)	16:41	16:03		
6	04:59	05:58 (8)	05:42		06:35	07:04 (3)	07:27	07:56 (2)	07:24	08:15		
	21:46	06:22 (8)	21:05		19:58	07:25 (3)	18:45	08:16 (2)	16:39	16:02		
7	05:00	05:58 (8)	05:43		06:36	07:04 (3)	07:28	07:56 (2)	07:26	08:16		
	21:45	06:22 (8)	21:03		19:55	07:24 (3)	18:43	08:16 (2)	16:37	16:02		
8	05:01	05:58 (8)	05:45		06:38	07:05 (3)	07:30	07:56 (2)	07:28	08:18		
	21:45	06:23 (8)	21:01		19:53	07:23 (3)	18:41	08:14 (2)	16:35	16:01		
9	05:02	05:58 (8)	05:47		06:40	07:06 (3)	07:32	07:58 (2)	07:30	08:19		
	21:44	06:23 (8)	20:59		19:50	07:21 (3)	18:38	08:12 (2)	16:33	16:01		
10	05:03	05:58 (8)	05:48		06:42	07:08 (3)	07:34	08:00 (2)	07:31	08:20		
	21:43	06:23 (8)	20:57		19:48	07:55 (1)	18:36	08:10 (2)	16:32	16:01		
11	05:04	05:58 (8)	05:50	07:06 (4)	06:43	07:10 (3)	07:36	08:02 (2)	07:33	08:21		
	21:42	06:24 (8)	20:55	10	07:16 (4)	19:46	07:58 (1)	18:34	5	08:07 (2)	16:30	16:01
12	05:05	05:58 (8)	05:52	07:04 (4)	06:45	07:40 (1)	07:37			07:35	08:22	
	21:41	06:24 (8)	20:53	15	07:19 (4)	19:43	07:59 (1)	18:31		16:28	16:00	
13	05:06	05:58 (8)	05:53	07:01 (4)	06:47	07:39 (1)	07:39			07:37	08:23	
	21:40	06:24 (8)	20:51	19	07:20 (4)	19:41	08:00 (1)	18:29		16:27	16:00	
14	05:07	05:58 (8)	05:55	07:00 (4)	06:48	07:38 (1)	07:41			07:39	08:24	
	21:39	06:24 (8)	20:49	22	07:22 (4)	19:38	08:01 (1)	18:27		16:25	16:00	
15	05:09	05:58 (8)	05:57	06:58 (4)	06:50	07:36 (1)	07:43			07:41	08:25	
	21:38	06:24 (8)	20:47	24	07:22 (4)	19:36	08:01 (1)	18:24		16:24	16:00	
16	05:10	05:58 (8)	05:59	06:58 (4)	06:52	07:36 (1)	07:45			07:43	08:26	
	21:37	06:24 (8)	20:45	25	07:23 (4)	19:33	08:01 (1)	18:22		16:22	16:00	
17	05:11	05:59 (8)	06:00	06:57 (4)	06:54	07:35 (1)	07:46			07:44	08:27	
	21:36	06:25 (8)	20:43	27	07:24 (4)	19:31	08:02 (1)	18:20		16:21	16:01	
18	05:13	05:59 (8)	06:02	06:56 (4)	06:55	07:34 (1)	07:48			07:46	08:28	
	21:35	06:24 (8)	20:41	28	07:24 (4)	19:29	08:01 (1)	18:18		16:19	16:01	
19	05:14	05:59 (8)	06:04	06:55 (4)	06:57	07:34 (1)	07:50			07:48	08:28	
	21:34	06:24 (8)	20:39	29	07:24 (4)	19:26	08:01 (1)	18:15		16:18	16:01	
20	05:15	05:59 (9)	06:05	06:54 (4)	06:59	07:34 (1)	07:52			07:50	08:29	
	21:32	06:23 (8)	20:37	30	07:24 (4)	19:24	08:00 (1)	18:13		16:17	16:01	
21	05:17	06:00 (9)	06:07	06:54 (4)	07:00	07:34 (1)	07:54			07:51	08:30	
	21:31	06:24 (8)	20:34	30	07:24 (4)	19:21	07:59 (1)	18:11		16:15	16:02	
22	05:18	05:59 (9)	06:09	06:54 (4)	07:02	07:34 (1)	07:56			07:53	08:30	
	21:30	06:23 (8)	20:32	31	07:25 (4)	19:19	07:58 (1)	18:09		16:14	16:02	
23	05:20	05:59 (9)	06:11	06:53 (4)	07:04	07:35 (1)	07:58			07:55	08:31	
	21:28	06:22 (8)	20:30	31	07:24 (4)	19:16	07:57 (1)	18:07		16:13	16:03	
24	05:21	06:00 (9)	06:12	06:54 (4)	07:06	07:35 (1)	07:59			07:57	08:31	
	21:27	06:22 (8)	20:28	30	07:24 (4)	19:14	07:55 (1)	18:05		16:12	16:03	
25	05:23	06:00 (9)	06:14	06:54 (4)	07:07	07:37 (1)	07:01			07:58	08:32	
	21:25	06:21 (8)	20:25	29	07:23 (4)	19:12	07:53 (1)	17:02		16:11	16:04	
26	05:24	06:01 (9)	06:16	06:54 (4)	07:09	07:39 (1)	07:03			08:00	08:32	
	21:24	06:21 (8)	20:23	28	07:22 (4)	19:09	07:50 (1)	17:00		16:10	16:05	
27	05:26	06:01 (9)	06:18	06:54 (4)	07:11		07:05			08:02	08:32	
	21:22	06:19 (9)	20:21	27	07:21 (4)	19:07		16:58		16:09	16:05	
28	05:27	06:01 (9)	06:19	06:54 (4)	07:13	08:04 (2)	07:07			08:03	08:32	
	21:21	06:18 (9)	20:19	26	07:20 (3)	19:04	8	08:12 (2)	16:56	16:08	16:06	
29	05:29	06:02 (9)	06:21	06:55 (4)	07:14	08:01 (2)	07:09			08:05	08:32	
	21:19	06:18 (9)	20:16	28	07:23 (3)	19:02	13	08:14 (2)	16:54	16:07	16:07	
30	05:30	06:02 (9)	06:23	06:57 (4)	07:16	07:59 (2)	07:11			08:06	08:32	
	21:18	06:16 (9)	20:14	28	07:25 (3)	19:00	17	08:16 (2)	16:52	16:06	16:08	
31	05:32	06:04 (9)	06:24	06:58 (4)			07:13				08:32	
	21:16	06:16 (9)	20:12	27	07:25 (3)		16:50				16:09	
Sonnenscheinstunden		508	458		382		330		262		237	
astr.max.mögl.Beschattung		705		552		601		191				
Red.Sonnenscheinwahrsch.		0.38		0.42		0.35		0.29				
Reduktion Betriebsdauer		0.96		0.96		0.96		0.96				
Reduktion Windrichtung		0.73		0.72		0.70		0.66				
Gesamte Reduktion		0.26		0.29		0.23		0.18				
Met.wahrsch.Beschattung		186		161		140		35				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EH - IO138

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:44 (1)	05:46	06:50 (4)	04:59
	16:10	17:00	17:55	19:51	20 08:04 (1)	20:45	19 07:09 (4)	21:34
2	08:32	08:02	07:05	06:52	07:16 (3)	05:44	06:52 (4)	04:58
	16:12	17:02	17:57	19:53	19 08:02 (1)	20:47	14 07:06 (4)	21:35
3	08:32	08:00	07:03	06:49	07:13 (3)	05:42	06:55 (4)	04:57
	16:13	17:04	17:58	19:55	22 08:00 (1)	20:49	8 07:03 (4)	21:36
4	08:32	07:58	07:01	06:47	07:10 (3)	05:41	04:56	05:49 (8)
	16:14	17:06	18:00	5 07:30 (2)	19:57	14 07:24 (3)	20:50	21:37
5	08:32	07:57	06:58	07:22 (2)	06:45	07:08 (3)	05:39	04:55
	16:15	17:08	18:02	10 07:32 (2)	19:59	18 07:26 (3)	20:52	21:38
6	08:31	07:55	06:56	07:20 (2)	06:42	07:06 (3)	05:37	04:55
	16:16	17:10	18:04	14 07:34 (2)	20:00	19 07:25 (3)	20:54	21:39
7	08:31	07:53	06:54	07:17 (2)	06:40	07:05 (3)	05:35	04:54
	16:18	17:12	18:06	18 07:35 (2)	20:02	21 07:26 (3)	20:56	21:40
8	08:30	07:51	06:51	07:16 (2)	06:37	07:05 (3)	05:33	04:53
	16:19	17:14	18:08	20 07:36 (2)	20:04	21 07:26 (3)	20:57	21:41
9	08:30	07:49	06:49	07:16 (2)	06:35	07:04 (3)	05:31	04:53
	16:20	17:16	18:10	20 07:36 (2)	20:06	21 07:25 (3)	20:59	21:42
10	08:29	07:48	06:47	07:15 (2)	06:33	07:04 (3)	05:29	04:52
	16:22	17:18	18:11	21 07:36 (2)	20:08	21 07:25 (3)	21:01	21:43
11	08:29	07:46	06:44	07:15 (2)	06:30	07:04 (3)	05:27	04:52
	16:23	17:20	18:13	21 07:36 (2)	20:09	21 07:25 (3)	21:03	21:44
12	08:28	07:44	06:42	07:15 (2)	06:28	07:00 (4)	05:26	04:52
	16:25	17:22	18:15	21 07:36 (2)	20:11	24 07:24 (3)	21:04	22 06:14 (8)
13	08:27	07:42	06:40	07:15 (2)	06:26	06:56 (4)	05:24	04:51
	16:26	17:24	18:17	19 07:34 (2)	20:13	27 07:23 (3)	21:06	22 06:14 (8)
14	08:26	07:40	06:37	07:16 (2)	06:23	06:53 (4)	05:22	04:51
	16:28	17:26	18:19	18 07:34 (2)	20:15	28 07:21 (3)	21:08	22 06:14 (8)
15	08:25	07:38	06:35	07:16 (2)	06:21	06:52 (4)	05:21	04:50
	16:30	17:28	18:21	16 07:32 (2)	20:17	28 07:20 (3)	21:09	22 06:14 (8)
16	08:24	07:36	06:32	07:18 (2)	06:19	06:51 (4)	05:19	04:51
	16:31	17:30	18:23	12 07:30 (2)	20:18	25 07:16 (3)	21:11	21 06:14 (8)
17	08:23	07:34	06:30	07:20 (2)	06:17	06:49 (4)	05:17	04:50
	16:33	17:32	18:24	5 07:25 (2)	20:20	26 07:15 (4)	21:12	17 06:06 (9)
18	08:22	07:32	06:28	06:14	06:48 (4)	05:16	05:49 (9)	04:50
	16:35	17:34	18:26	20:22	27 07:15 (4)	21:14	19 06:08 (8)	21:48
19	08:21	07:29	06:25	06:53 (1)	06:12	06:47 (4)	05:14	04:50
	16:36	17:35	18:28	11 07:04 (1)	20:24	29 07:16 (4)	21:16	20 06:08 (8)
20	08:20	07:27	06:23	06:50 (1)	06:10	06:47 (4)	05:13	04:51
	16:38	17:37	18:30	16 07:06 (1)	20:26	29 07:16 (4)	21:17	21 06:09 (8)
21	08:19	07:25	06:20	06:48 (1)	06:08	06:46 (4)	05:12	04:51
	16:40	17:39	18:32	20 07:08 (1)	20:27	30 07:16 (4)	21:19	22 06:10 (8)
22	08:18	07:23	06:18	06:46 (1)	06:05	06:46 (4)	05:10	04:51
	16:42	17:41	18:33	22 07:08 (1)	20:29	30 07:16 (4)	21:20	22 06:10 (8)
23	08:17	07:21	06:16	06:45 (1)	06:03	06:46 (4)	05:09	04:51
	16:43	17:43	18:35	24 07:09 (1)	20:31	30 07:16 (4)	21:22	23 06:11 (8)
24	08:15	07:19	06:13	06:44 (1)	06:01	06:46 (4)	05:07	04:51
	16:45	17:45	18:37	25 07:09 (1)	20:33	30 07:16 (4)	21:23	24 06:12 (8)
25	08:14	07:16	06:11	06:43 (1)	05:59	06:45 (4)	05:06	04:52
	16:47	17:47	18:39	26 07:09 (1)	20:35	29 07:14 (4)	21:24	24 06:12 (8)
26	08:13	07:14	06:08	06:43 (1)	05:57	06:46 (4)	05:05	04:52
	16:49	17:49	18:41	27 07:10 (1)	20:36	27 07:13 (4)	21:26	24 06:12 (8)
27	08:11	07:12	06:06	06:42 (1)	05:55	06:46 (4)	05:04	04:53
	16:51	17:51	18:42	27 07:09 (1)	20:38	27 07:13 (4)	21:27	25 06:13 (8)
28	08:10	07:10	06:04	06:43 (1)	05:53	06:47 (4)	05:03	04:53
	16:53	17:53	18:44	25 07:08 (1)	20:40	25 07:12 (4)	21:29	25 06:13 (8)
29	08:08	07:01	06:42 (1)	05:51	06:47 (4)	05:02	05:48 (8)	04:54
	16:55	19:46	25 08:07 (1)	20:42	24 07:11 (4)	21:30	25 06:13 (8)	21:49
30	08:07	06:59	07:43 (1)	05:49	06:49 (4)	05:00	05:48 (8)	04:54
	16:57	19:48	24 08:07 (1)	20:43	21 07:10 (4)	21:31	25 06:13 (8)	21:48
31	08:05	06:56	07:44 (1)	05:48	04:59	05:48 (8)	04:54	04:54
	16:58	19:50	22 08:06 (1)	05:48	21:32	25 06:13 (8)	04:54	04:54
Sonnenscheinstunden	253	275	367	418	491	506	670	0.39
astr.max.mögl.Beschattung			514	733	443	0.43	0.39	0.96
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.73	0.73	0.27
Reduktion Betriebsdauer			0.69	0.96	0.96	0.73	0.73	180
Reduktion Windrichtung			0.69	0.72	0.73	0.73	0.27	
Gesamte Reduktion			0.18	0.26	0.30	0.27		
Met.wahrsch.Beschattung			93	187	132	180		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Libenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EH - IO138

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November		Dezember			
1	04:55	05:55 (8)	05:34	06:06 (9)	06:26	07:03 (3)	07:18	07:54 (2)	07:14	08:08			
2	23	06:18 (8)	21:14	3	06:09 (9)	20:09	21	07:24 (3)	18:57	20	08:14 (2)	16:48	16:05
	04:56	05:56 (8)	05:35		06:28	07:03 (3)	07:20		07:54 (2)		07:16	08:09	
	23	06:19 (8)	21:12		20:07	21	07:24 (3)	18:55	21	08:15 (2)	16:46	16:05	
3	04:56	05:56 (8)	05:37		06:30	07:02 (3)	07:21		07:52 (2)		07:18	08:11	
	23	06:19 (8)	21:11		20:05	21	07:23 (3)	18:52	22	08:14 (2)	16:44	16:04	
4	04:57	05:55 (8)	05:38		06:31	07:02 (3)	07:23		07:53 (2)		07:20	08:12	
	24	06:19 (8)	21:09		20:02	21	07:23 (3)	18:50	20	08:13 (2)	16:42	16:03	
5	04:58	05:56 (8)	05:40		06:33	07:02 (3)	07:25		07:53 (2)		07:22	08:14	
	23	06:19 (8)	21:07		20:00	21	07:23 (3)	18:48	20	08:13 (2)	16:41	16:03	
6	04:59	05:56 (8)	05:42		06:35	07:02 (3)	07:27		07:53 (2)		07:24	08:15	
	24	06:20 (8)	21:05		19:58	20	07:22 (3)	18:45	19	08:12 (2)	16:39	16:02	
7	05:00	05:56 (8)	05:43		06:36	07:03 (3)	07:28		07:55 (2)		07:26	08:16	
	24	06:20 (8)	21:03		19:55	18	07:21 (3)	18:43	16	08:11 (2)	16:37	16:02	
8	05:01	05:56 (8)	05:45		06:38	07:05 (3)	07:30		07:56 (2)		07:28	08:18	
	25	06:21 (8)	21:01		19:53	14	07:19 (3)	18:41	13	08:09 (2)	16:35	16:01	
9	05:02	05:56 (8)	05:47		06:40	07:06 (3)	07:32		07:58 (2)		07:30	08:19	
	25	06:21 (8)	20:59		19:50	23	07:53 (1)	18:38	8	08:06 (2)	16:33	16:01	
10	05:03	05:56 (8)	05:48		07:02 (4)	06:42	07:09 (3)	07:34			07:31	08:20	
	25	06:21 (8)	20:57	11	07:13 (4)	19:48	20	07:55 (1)	18:36		16:32	16:01	
11	05:04	05:56 (8)	05:50		07:00 (4)	06:43	07:37 (1)	07:36			07:33	08:21	
	25	06:21 (8)	20:55	16	07:16 (4)	19:46	20	07:57 (1)	18:34		16:30	16:01	
12	05:05	05:56 (8)	05:52		06:58 (4)	06:45	07:35 (1)	07:37			07:35	08:22	
	25	06:21 (8)	20:53	20	07:18 (4)	19:43	22	07:57 (1)	18:31		16:28	16:00	
13	05:06	05:57 (8)	05:53		06:56 (4)	06:47	07:34 (1)	07:39			07:37	08:23	
	25	06:22 (8)	20:51	22	07:18 (4)	19:41	24	07:58 (1)	18:29		16:27	16:00	
14	05:07	05:57 (8)	05:55		06:56 (4)	06:48	07:34 (1)	07:41			07:39	08:24	
	25	06:22 (8)	20:49	23	07:19 (4)	19:38	24	07:58 (1)	18:27		16:25	16:00	
15	05:09	05:57 (8)	05:57		06:54 (4)	06:50	07:32 (1)	07:43			07:41	08:25	
	24	06:21 (8)	20:47	26	07:20 (4)	19:36	26	07:58 (1)	18:24		16:24	16:00	
16	05:10	05:57 (8)	05:59		06:54 (4)	06:52	07:32 (1)	07:45			07:43	08:26	
	24	06:21 (8)	20:45	26	07:20 (4)	19:33	26	07:58 (1)	18:22		16:22	16:00	
17	05:11	05:58 (8)	06:00		06:53 (4)	06:54	07:32 (1)	07:46			07:44	08:27	
	24	06:22 (8)	20:43	28	07:21 (4)	19:31	26	07:58 (1)	18:20		16:21	16:01	
18	05:13	05:58 (8)	06:02		06:52 (4)	06:55	07:31 (1)	07:48			07:46	08:28	
	24	06:22 (8)	20:41	29	07:21 (4)	19:29	26	07:57 (1)	18:18		16:19	16:01	
19	05:14	05:58 (8)	06:04		06:52 (4)	06:57	07:31 (1)	07:50			07:48	08:28	
	23	06:21 (8)	20:39	29	07:21 (4)	19:26	25	07:56 (1)	18:15		16:18	16:01	
20	05:15	05:58 (8)	06:05		06:51 (4)	06:59	07:32 (1)	07:52			07:50	08:29	
	23	06:21 (8)	20:37	30	07:21 (4)	19:24	24	07:56 (1)	18:13		16:17	16:01	
21	05:17	05:58 (8)	06:07		06:51 (4)	07:00	07:31 (1)	07:54			07:51	08:30	
	23	06:21 (8)	20:34	30	07:21 (4)	19:21	23	07:54 (1)	18:11		16:15	16:02	
22	05:18	05:58 (8)	06:09		06:51 (4)	07:02	07:32 (1)	07:56			07:53	08:30	
	22	06:20 (8)	20:32	30	07:21 (4)	19:19	21	07:53 (1)	18:09		16:14	16:02	
23	05:20	05:58 (8)	06:11		06:51 (4)	07:04	07:34 (1)	07:58			07:55	08:31	
	21	06:19 (8)	20:30	29	07:20 (4)	19:16	17	07:51 (1)	18:07		16:13	16:03	
24	05:21	05:59 (8)	06:12		06:51 (4)	07:06	07:35 (1)	07:59			07:57	08:31	
	20	06:19 (8)	20:28	28	07:19 (4)	19:14	13	07:48 (1)	18:05		16:12	16:03	
25	05:23	05:58 (8)	06:14		06:52 (4)	07:07	07:39 (1)	07:01			07:58	08:32	
	20	06:18 (8)	20:25	27	07:19 (4)	19:12	5	07:44 (1)	17:02		16:11	16:04	
26	05:24	05:59 (8)	06:16		06:51 (4)	07:09		07:03			08:00	08:32	
	18	06:17 (8)	20:23	26	07:17 (4)	19:09		17:00			16:10	16:05	
27	05:26	05:59 (8)	06:18		06:52 (4)	07:11	10	08:01 (2)	07:05		08:02	08:32	
	18	06:17 (8)	20:21	27	07:19 (3)	19:07		08:11 (2)	16:58		16:09	16:05	
28	05:27	06:00 (8)	06:19		06:53 (4)	07:13	07:57 (2)	07:07			08:03	08:32	
	16	06:16 (8)	20:19	28	07:21 (3)	19:04	15	08:12 (2)	16:56		16:08	16:06	
29	05:29	06:01 (8)	06:21		06:54 (4)	07:14	07:56 (2)	07:09			08:05	08:32	
	14	06:15 (8)	20:16	28	07:22 (3)	19:02	17	08:13 (2)	16:54		16:07	16:07	
30	05:30	06:02 (8)	06:23		06:57 (4)	07:16	07:55 (2)	07:11			08:06	08:32	
	12	06:14 (8)	20:14	27	07:24 (3)	19:00	19	08:14 (2)	16:52		16:06	16:08	
31	05:32	06:04 (8)	06:24		06:59 (4)			07:13				08:32	
	9	06:13 (8)	20:12	24	07:23 (3)			16:50				16:09	
	Sonnenscheinstunden	508	458		382			330			262	237	
	astr.max.mögl.Beschattung	674	567		583			159					
	Red.Sonnenscheinwahrsch.	0.38	0.42		0.35			0.29					
	Reduktion Betriebsdauer	0.96	0.96		0.96			0.96					
	Reduktion Windrichtung	0.73	0.72		0.70			0.67					
	Gesamte Reduktion	0.26	0.29		0.23			0.19					
	Met.wahrsch.Beschattung	177	165		136			29					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EI - IO139

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	06:54	07:46 (1)	05:46	06:55 (4)	04:59	05:51 (8)
	16:10	17:00	17:55	19:51	17	08:03 (1)	20:45	12	07:07 (4)
2	08:32	08:02	07:05	06:52	07:15 (3)	05:44	04:58	24	06:15 (8)
	16:12	17:02	17:57	19:53	21	08:01 (1)	20:47		21:35
3	08:32	08:00	07:03	06:49	07:13 (3)	05:42	04:57	24	06:16 (8)
	16:13	17:04	17:58	19:55	17	07:57 (1)	20:49		21:36
4	08:32	07:58	07:01	06:47	07:10 (3)	05:41	04:56	24	06:16 (8)
	16:14	17:06	18:00	7 07:32 (2)	19:57	07:26 (3)	20:50		21:37
5	08:32	07:57	06:58	06:45	07:22 (2)	06:45	07:08 (3)	23	06:15 (8)
	16:15	17:08	18:02	11 07:33 (2)	19:59	19 07:27 (3)	20:52		04:55
6	08:31	07:55	06:56	06:42	07:20 (2)	06:42	07:07 (3)	23	06:16 (8)
	16:16	17:10	18:04	15 07:35 (2)	20:00	20 07:27 (3)	20:54		04:55
7	08:31	07:53	06:54	06:40	07:17 (2)	06:40	07:06 (3)	22	06:15 (8)
	16:18	17:12	18:06	18 07:35 (2)	20:02	21 07:27 (3)	20:56		21:39
8	08:30	07:51	06:51	06:37	07:16 (2)	06:37	07:06 (3)	22	06:15 (8)
	16:19	17:14	18:08	20 07:36 (2)	20:04	22 07:28 (3)	20:57		04:53
9	08:30	07:49	06:49	06:35	07:16 (2)	06:35	07:05 (3)	21	06:15 (8)
	16:20	17:16	18:10	21 07:37 (2)	20:06	21 07:26 (3)	20:59		21:42
10	08:29	07:48	06:47	06:33	07:15 (2)	06:33	07:06 (3)	21	06:16 (8)
	16:22	17:18	18:11	21 07:36 (2)	20:08	20 07:26 (3)	21:01		04:52
11	08:29	07:46	06:44	06:30	07:15 (2)	06:30	07:02 (4)	21	06:15 (8)
	16:23	17:20	18:13	21 07:36 (2)	20:09	24 07:26 (3)	21:03	7	05:56 (9)
12	08:28	07:44	06:42	06:28	07:16 (2)	06:28	06:58 (4)	20	06:03 (9)
	16:25	17:22	18:15	20 07:36 (2)	20:11	27 07:25 (3)	21:04		05:53 (9)
13	08:27	07:42	06:40	06:26	07:16 (2)	06:26	06:55 (4)	19	06:05 (9)
	16:26	17:24	18:17	18 07:34 (2)	20:13	28 07:23 (3)	21:06	12	06:05 (9)
14	08:26	07:40	06:37	06:23	07:17 (2)	06:23	06:54 (4)	14	05:53 (9)
	16:28	17:26	18:19	17 07:34 (2)	20:15	27 07:21 (3)	21:08		05:51 (9)
15	08:25	07:38	06:35	06:21	07:17 (2)	06:21	06:52 (4)	16	06:07 (9)
	16:30	17:28	18:21	14 07:31 (2)	20:17	27 07:19 (3)	21:09		21:46
16	08:24	07:36	06:32	06:19	07:19 (2)	06:19	06:52 (4)	17	06:08 (9)
	16:31	17:30	18:23	10 07:29 (2)	20:18	25 07:17 (4)	21:11	19	05:50 (9)
17	08:23	07:34	06:30	06:17	07:18 (2)	06:17	06:50 (4)	19	06:09 (8)
	16:33	17:32	18:24	20:20	27 07:17 (4)	21:12	21 06:11 (8)		05:50 (9)
18	08:22	07:32	06:28	06:14	07:03 (1)	06:14	06:49 (4)	21	06:11 (8)
	16:35	17:34	18:26	7 07:03 (1)	20:22	29 07:18 (4)	21:14		05:51 (9)
19	08:21	07:29	06:25	06:12	07:07 (1)	06:12	06:49 (4)	21	06:12 (8)
	16:36	17:35	18:28	15 07:07 (1)	20:24	29 07:18 (4)	21:16	22	06:12 (8)
20	08:20	07:27	06:23	06:10	07:08 (1)	06:10	06:49 (4)	22	06:12 (8)
	16:38	17:37	18:30	18 07:08 (1)	20:26	29 07:18 (4)	21:17		05:50 (9)
21	08:19	07:25	06:20	06:08	07:08 (1)	06:08	06:48 (4)	23	06:13 (8)
	16:40	17:39	18:32	21 07:09 (1)	20:27	30 06:48 (4)	05:12		21:48
22	08:18	07:23	06:18	06:05	06:47 (1)	06:05	06:52 (4)	23	06:13 (8)
	16:42	17:41	18:33	23 07:10 (1)	20:29	30 07:18 (4)	21:20		05:51 (9)
23	08:17	07:21	06:16	06:03	06:46 (1)	06:03	06:48 (4)	24	06:14 (8)
	16:43	17:43	18:35	24 07:10 (1)	20:31	29 07:17 (4)	21:22	24	06:14 (8)
24	08:15	07:19	06:13	06:01	06:45 (1)	06:01	06:49 (4)	25	06:14 (8)
	16:45	17:45	18:37	25 07:10 (1)	20:33	28 07:17 (4)	21:23		05:50 (9)
25	08:14	07:16	06:11	05:59	06:44 (1)	05:59	06:48 (4)	25	06:15 (8)
	16:47	17:47	18:39	26 07:10 (1)	20:35	27 07:15 (4)	21:24		05:51 (9)
26	08:13	07:14	06:08	05:57	06:44 (1)	05:57	06:48 (4)	24	06:15 (8)
	16:49	17:49	18:41	26 07:10 (1)	20:36	26 07:14 (4)	21:26		05:51 (9)
27	08:11	07:12	06:06	05:55	06:44 (1)	05:55	06:49 (4)	24	06:15 (8)
	16:51	17:51	18:42	25 07:09 (1)	20:38	24 07:13 (4)	21:27		05:51 (9)
28	08:10	07:10	06:04	05:53	06:44 (1)	05:53	06:50 (4)	24	06:15 (8)
	16:53	17:53	18:44	25 07:09 (1)	20:40	22 07:12 (4)	21:29		05:51 (9)
29	08:08	07:01	05:51	05:51	07:09 (1)	05:51	06:51 (4)	24	06:15 (8)
	16:55	19:46	24 08:08 (1)	20:42	20 07:11 (4)	21:30	24 06:15 (8)		05:51 (9)
30	08:07	06:59	07:44 (1)	05:49	06:53 (4)	05:00	05:51 (8)	24	06:15 (8)
	16:57	19:48	23 08:07 (1)	20:43	17 07:10 (4)	21:31	24 06:15 (8)		05:51 (9)
31	08:05	06:56	07:46 (1)	05:48	04:59	04:59	05:51 (8)	19	06:18 (8)
	16:58	19:50	20 08:06 (1)	08:06 (1)	21:32	24 06:15 (8)			
Sonnenscheinstunden	253	275	367	418	491	506			
astr.max.mögl.Beschattung			515	719	448	589			
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39			
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96			
Reduktion Windrichtung			0.68	0.72	0.73	0.73			
Gesamte Reduktion			0.18	0.26	0.30	0.27			
Met.wahrsch.Beschattung			93	184	134	159			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EI - IO139

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November		Dezember			
1	04:55	05:59 (8)	05:34	06:05 (9)	06:26	07:01 (4)	07:18	07:55 (2)	07:14	08:08			
	21:48	06:19 (8)	21:14	06:15 (9)	20:09	24	07:25 (3)	18:57	20	08:15 (2)	16:48	16:05	
2	04:56	06:00 (8)	05:35	06:07 (9)	06:28	07:05 (3)	07:20	07:54 (2)	07:16	08:09			
	21:48	06:20 (8)	21:12	6	06:13 (9)	20:07	20	07:25 (3)	18:55	21	08:15 (2)	16:46	16:05
3	04:56	06:00 (8)	05:37		06:30	07:03 (3)	07:21	07:53 (2)	07:18	08:11			
	21:47	06:21 (8)	21:11		20:05	21	07:24 (3)	18:52	21	08:14 (2)	16:44	16:04	
4	04:57	05:59 (8)	05:38		06:31	07:03 (3)	07:23	07:53 (2)	07:20	08:12			
	21:47	06:20 (8)	21:09		20:02	22	07:25 (3)	18:50	21	08:14 (2)	16:42	16:03	
5	04:58	05:59 (8)	05:40		06:33	07:04 (3)	07:25	07:53 (2)	07:22	08:14			
	21:46	06:21 (8)	21:07		20:00	20	07:24 (3)	18:48	20	08:13 (2)	16:41	16:03	
6	04:59	05:59 (8)	05:42		06:35	07:03 (3)	07:27	07:54 (2)	07:24	08:15			
	21:46	06:21 (8)	21:05		19:58	20	07:23 (3)	18:45	19	08:13 (2)	16:39	16:02	
7	05:00	05:59 (8)	05:43		06:36	07:04 (3)	07:28	07:55 (2)	07:26	08:16			
	21:45	06:22 (8)	21:03		19:55	18	07:22 (3)	18:43	17	08:12 (2)	16:37	16:02	
8	05:01	05:59 (8)	05:45		06:38	07:05 (3)	07:30	07:56 (2)	07:28	08:18			
	21:45	06:22 (8)	21:01		19:53	16	07:21 (3)	18:41	13	08:09 (2)	16:35	16:01	
9	05:02	06:00 (8)	05:47		06:40	07:06 (3)	07:32	07:58 (2)	07:30	08:19			
	21:44	06:23 (8)	20:59		19:50	15	07:49 (1)	18:38	9	08:07 (2)	16:33	16:01	
10	05:03	06:00 (8)	05:48		06:42	07:08 (3)	07:34	08:01 (2)	07:31	08:20			
	21:43	06:23 (8)	20:57		19:48	21	07:54 (1)	18:36	2	08:03 (2)	16:32	16:01	
11	05:04	05:59 (8)	05:50		07:06 (4)	06:43	07:40 (1)	07:36		07:33	08:21		
	21:42	06:23 (8)	20:55	7	07:13 (4)	19:46	16	07:56 (1)	18:34		16:30	16:01	
12	05:05	05:59 (8)	05:52		07:03 (4)	06:45	07:37 (1)	07:37		07:35	08:22		
	21:41	06:24 (8)	20:53	13	07:16 (4)	19:43	20	07:57 (1)	18:31		16:28	16:00	
13	05:06	05:59 (8)	05:54		07:00 (4)	06:47	07:36 (1)	07:39		07:37	08:23		
	21:40	06:24 (8)	20:51	18	07:18 (4)	19:41	22	07:58 (1)	18:29		16:27	16:00	
14	05:07	05:59 (8)	05:55		06:59 (4)	06:48	07:35 (1)	07:41		07:39	08:24		
	21:39	06:24 (8)	20:49	20	07:19 (4)	19:38	24	07:59 (1)	18:27		16:25	16:00	
15	05:09	05:59 (8)	05:57		06:57 (4)	06:50	07:34 (1)	07:43		07:41	08:25		
	21:38	06:24 (8)	20:47	23	07:20 (4)	19:36	24	07:58 (1)	18:24		16:24	16:00	
16	05:10	05:59 (8)	05:59		06:56 (4)	06:52	07:33 (1)	07:45		07:43	08:26		
	21:37	06:24 (8)	20:45	25	07:21 (4)	19:33	26	07:59 (1)	18:22		16:22	16:00	
17	05:11	06:00 (8)	06:00		06:56 (4)	06:54	07:33 (1)	07:46		07:44	08:27		
	21:36	06:25 (8)	20:43	26	07:22 (4)	19:31	26	07:59 (1)	18:20		16:21	16:01	
18	05:13	06:00 (8)	06:02		06:55 (4)	06:55	07:32 (1)	07:48		07:46	08:28		
	21:35	06:25 (8)	20:41	27	07:22 (4)	19:29	26	07:58 (1)	18:18		16:19	16:01	
19	05:14	06:00 (8)	06:04		06:54 (4)	06:57	07:32 (1)	07:50		07:48	08:28		
	21:34	06:24 (8)	20:39	28	07:22 (4)	19:26	25	07:57 (1)	18:15		16:18	16:01	
20	05:15	06:00 (9)	06:05		06:53 (4)	06:59	07:32 (1)	07:52		07:50	08:29		
	21:32	06:24 (8)	20:37	29	07:22 (4)	19:24	25	07:57 (1)	18:13		16:17	16:01	
21	05:17	06:01 (9)	06:07		06:53 (4)	07:00	07:32 (1)	07:54		07:51	08:30		
	21:31	06:24 (8)	20:34	29	07:22 (4)	19:21	23	07:55 (1)	18:11		16:15	16:02	
22	05:18	06:00 (9)	06:09		06:53 (4)	07:02	07:33 (1)	07:56		07:53	08:30		
	21:30	06:24 (8)	20:32	29	07:22 (4)	19:19	21	07:54 (1)	18:09		16:14	16:02	
23	05:20	06:00 (9)	06:11		06:52 (4)	07:04	07:34 (1)	07:58		07:55	08:31		
	21:28	06:23 (8)	20:30	30	07:22 (4)	19:16	19	07:53 (1)	18:07		16:13	16:03	
24	05:21	06:01 (9)	06:12		06:53 (4)	07:06	07:34 (1)	07:59		07:57	08:31		
	21:27	06:23 (8)	20:28	28	07:21 (4)	19:14	16	07:50 (1)	18:05		16:12	16:03	
25	05:23	06:00 (9)	06:14		06:53 (4)	07:07	07:37 (1)	07:01		07:58	08:32		
	21:25	06:22 (8)	20:25	28	07:21 (4)	19:12	10	07:47 (1)	17:02		16:11	16:04	
26	05:24	06:01 (9)	06:16		06:53 (4)	07:09		07:03		08:00	08:32		
	21:24	06:22 (8)	20:23	27	07:20 (4)	19:09		17:00		16:10	16:05		
27	05:26	06:01 (9)	06:18		06:53 (4)	07:11	8	08:02 (2)	07:05		08:02	08:32	
	21:22	06:21 (8)	20:21	26	07:19 (4)	19:07	8	08:10 (2)	16:58		16:09	16:05	
28	05:27	06:01 (9)	06:19		06:53 (4)	07:13	07:59 (2)	07:07		08:03	08:32		
	21:21	06:19 (8)	20:19	27	07:20 (3)	19:04	12	08:11 (2)	16:56		16:08	16:06	
29	05:29	06:02 (9)	06:21		06:55 (4)	07:14	07:57 (2)	07:09		08:05	08:32		
	21:19	06:18 (9)	20:16	27	07:22 (3)	19:02	16	08:13 (2)	16:54		16:07	16:07	
30	05:30	06:02 (9)	06:23		06:56 (4)	07:16	07:56 (2)	07:11		08:06	08:32		
	21:18	06:17 (9)	20:14	28	07:24 (3)	19:00	18	08:14 (2)	16:52		16:06	16:08	
31	05:32	06:04 (9)	06:24		06:57 (4)			07:13			08:32		
	21:16	06:17 (9)	20:12	27	07:24 (3)			16:50			16:09		
Sonnenscheinstunden	508	458			382			330		262		237	
astr.max.mögl.Beschattung	682		538		574			163					
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35			0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96			0.96					
Reduktion Windrichtung	0.73		0.72		0.70			0.67					
Gesamte Reduktion	0.26		0.29		0.23			0.19					
Met.wahrsch.Beschattung	180		157		134			30					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EJ - IO140

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46	04:59	05:54 (8)	
	16:10	17:00	17:55	19:51	19 08:02 (1)	20:45	21:34	22 06:16 (8)	
2	08:32	08:02	07:05	06:52	07:15 (3)	05:44	04:58	05:55 (8)	
	16:12	17:02	17:57	19:53	18 07:59 (1)	20:47	21:35	22 06:17 (8)	
3	08:32	08:00	07:03	06:49	07:13 (3)	05:42	04:57	05:55 (8)	
	16:13	17:04	17:58	19:55	15 07:28 (3)	20:49	21:36	22 06:17 (8)	
4	08:32	07:58	07:01	06:47	07:10 (3)	05:41	04:56	05:55 (8)	
	16:14	17:06	18:00	8 07:33 (2)	19:57	07:28 (3)	20:50	21:37	21 06:16 (8)
5	08:32	07:57	06:58	06:45	07:02 (3)	05:39	04:55	05:56 (8)	
	16:15	17:08	18:02	12 07:34 (2)	19:59	20 07:29 (3)	20:52	21:38	21 06:17 (8)
6	08:31	07:55	06:56	06:42	07:08 (3)	05:37	04:55	05:56 (8)	
	16:16	17:10	18:04	16 07:36 (2)	20:00	20 07:28 (3)	20:54	21:39	20 06:16 (8)
7	08:31	07:53	06:54	06:40	07:07 (3)	05:35	04:54	05:57 (8)	
	16:18	17:12	18:06	19 07:36 (2)	20:02	21 07:28 (3)	20:56	21:40	19 06:16 (8)
8	08:30	07:51	06:51	06:37	07:07 (3)	05:33	04:53	05:57 (8)	
	16:19	17:14	18:08	20 07:37 (2)	20:04	21 07:28 (3)	20:57	21:41	19 06:16 (8)
9	08:30	07:49	06:49	06:35	07:07 (3)	05:31	04:53	05:58 (8)	
	16:20	17:16	18:10	20 07:37 (2)	20:06	20 07:27 (3)	20:59	21:42	18 06:16 (8)
10	08:29	07:48	06:47	06:33	07:04 (4)	05:29	04:52	05:58 (8)	
	16:22	17:18	18:11	20 07:36 (2)	20:08	23 07:27 (3)	21:01	9 06:06 (9)	17 06:15 (8)
11	08:29	07:46	06:44	06:30	07:00 (4)	05:27	05:55 (9)	04:52	05:59 (8)
	16:23	17:20	18:13	20 07:36 (2)	20:09	26 07:26 (3)	21:03	12 06:07 (9)	16 06:15 (8)
12	08:28	07:44	06:42	06:28	07:17 (2)	05:26	05:54 (9)	04:52	06:00 (8)
	16:25	17:22	18:15	19 07:36 (2)	20:11	27 07:25 (3)	21:04	14 06:08 (9)	15 06:15 (8)
13	08:27	07:42	06:40	06:26	07:16 (2)	05:24	05:53 (9)	04:51	06:00 (8)
	16:26	17:24	18:17	18 07:34 (2)	20:13	28 07:23 (3)	21:06	17 06:10 (8)	16 06:16 (8)
14	08:26	07:40	06:37	06:23	07:18 (2)	05:22	05:52 (9)	04:51	06:00 (8)
	16:28	17:26	18:19	15 07:33 (2)	20:15	26 07:20 (3)	21:08	19 06:11 (8)	15 06:15 (8)
15	08:25	07:38	06:35	06:21	07:18 (2)	05:21	05:52 (9)	04:51	06:01 (8)
	16:30	17:28	18:21	13 07:31 (2)	20:17	26 07:19 (4)	21:09	21 06:13 (8)	14 06:15 (8)
16	08:24	07:36	06:32	06:19	07:22 (2)	05:19	05:52 (9)	04:51	06:01 (8)
	16:31	17:30	18:23	6 07:28 (2)	20:18	27 07:19 (4)	21:11	21 06:13 (8)	14 06:15 (8)
17	08:23	07:34	06:30	06:17	07:19 (4)	05:17	05:52 (9)	04:50	06:02 (8)
	16:33	17:32	18:24	20:20	28 07:19 (4)	21:12	22 06:14 (8)	21:47	13 06:15 (8)
18	08:22	07:32	06:28	06:14	06:51 (4)	05:16	05:52 (9)	04:50	06:02 (8)
	16:35	17:34	18:26	12 07:06 (1)	20:22	28 07:19 (4)	21:14	23 06:15 (8)	13 06:15 (8)
19	08:21	07:29	06:25	06:12	06:50 (4)	05:14	05:52 (9)	04:50	06:02 (8)
	16:36	17:35	18:28	17 07:09 (1)	20:24	29 07:19 (4)	21:16	23 06:15 (8)	13 06:15 (8)
20	08:20	07:27	06:23	06:10	06:50 (4)	05:13	05:52 (9)	04:51	06:04 (8)
	16:38	17:37	18:30	19 07:09 (1)	20:26	29 07:19 (4)	21:17	24 06:16 (8)	12 06:16 (8)
21	08:19	07:25	06:20	06:08	06:50 (4)	05:12	05:52 (9)	04:51	06:04 (8)
	16:40	17:39	18:32	22 07:11 (1)	20:27	29 07:19 (4)	21:19	25 06:17 (8)	12 06:16 (8)
22	08:18	07:23	06:18	06:05	06:50 (4)	05:10	05:52 (9)	04:51	06:04 (8)
	16:42	17:41	18:33	24 07:11 (1)	20:29	29 07:19 (4)	21:20	24 06:16 (8)	12 06:16 (8)
23	08:17	07:21	06:16	06:03	06:47 (1)	05:09	05:52 (8)	04:51	06:03 (8)
	16:43	17:43	18:35	24 07:11 (1)	20:31	27 07:18 (4)	21:22	24 06:16 (8)	13 06:16 (8)
24	08:15	07:19	06:13	06:01	06:45 (1)	05:07	05:52 (8)	04:51	06:04 (8)
	16:45	17:45	18:37	26 07:11 (1)	20:33	26 07:17 (4)	21:23	25 06:17 (8)	13 06:17 (8)
25	08:14	07:16	06:11	05:59	06:45 (1)	05:06	05:53 (8)	04:52	06:04 (8)
	16:47	17:47	18:39	26 07:11 (1)	20:35	25 07:15 (4)	21:24	24 06:17 (8)	13 06:17 (8)
26	08:13	07:14	06:08	05:57	06:45 (1)	05:05	05:53 (8)	04:52	06:03 (8)
	16:49	17:49	18:41	26 07:11 (1)	20:36	23 07:14 (4)	21:26	24 06:17 (8)	14 06:17 (8)
27	08:11	07:12	06:06	05:55	06:45 (1)	05:04	05:53 (8)	04:53	06:04 (8)
	16:51	17:51	18:42	25 07:10 (1)	20:38	21 07:13 (4)	21:27	24 06:17 (8)	14 06:18 (8)
28	08:10	07:10	06:04	05:53	06:45 (1)	05:03	05:53 (8)	04:53	06:03 (8)
	16:53	17:53	18:44	24 07:09 (1)	20:40	19 07:12 (4)	21:29	24 06:17 (8)	14 06:18 (8)
29	08:08	07:01	06:45	05:51	06:55 (4)	05:02	05:53 (8)	04:54	06:04 (8)
	16:55	17:46	18:37	23 08:08 (1)	20:42	14 07:09 (4)	21:30	24 06:17 (8)	15 06:19 (8)
30	08:07	06:59	07:46	05:49	06:58 (4)	05:00	05:53 (8)	04:54	06:03 (8)
	16:57	19:48	21 08:07 (1)	20:43	9 07:07 (4)	21:31	24 06:17 (8)	21:48	16 06:19 (8)
31	08:05	06:56	07:48 (1)			04:59	05:54 (8)		
	16:58	19:50	17 08:05 (1)			21:32	23 06:17 (8)		
Sonnenscheinstunden	253	275	367	419	491	491	506	479	
astr.max.mögl.Beschattung			512	691	470			0.39	
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43			0.39	
Reduktion Betriebsdauer			0.96	0.96	0.96			0.96	
Reduktion Windrichtung			0.68	0.72	0.73			0.73	
Gesamte Reduktion			0.18	0.26	0.30			0.27	
Met.wahrsch.Beschattung			93	177	141			129	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
i17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EJ - IO140
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55 06:03 (8) 05:34		06:04 (9) 06:26	06:59 (4) 07:18	07:56 (2) 07:14	08:08
	21:48 06:19 (8) 21:14	14	06:18 (9) 20:09	26 07:25 (3) 18:57	19 08:15 (2) 16:48	16:05
2	04:56 06:03 (8) 05:35		06:06 (9) 06:28	07:03 (4) 07:20	07:55 (2) 07:16	08:09
	21:48 06:20 (8) 21:12	11	06:17 (9) 20:07	23 07:26 (3) 18:55	20 08:15 (2) 16:46	16:05
3	04:56 06:04 (8) 05:37		06:08 (9) 06:30	07:05 (3) 07:21	07:54 (2) 07:18	08:11
	21:47 06:21 (8) 21:11	7	06:15 (9) 20:05	20 07:25 (3) 18:52	20 08:14 (2) 16:44	16:04
4	04:57 06:03 (8) 05:38			06:31 07:04 (3) 07:23	07:53 (2) 07:20	08:12
	21:47 06:21 (8) 21:09			20 07:25 (3) 18:50	21 08:14 (2) 16:42	16:03
5	04:58 06:03 (8) 05:40			06:33 07:04 (3) 07:25	07:54 (2) 07:22	08:14
	21:46 06:22 (8) 21:07			20 07:25 (3) 18:48	20 08:14 (2) 16:41	16:03
6	04:59 06:03 (8) 05:42			06:35 07:04 (3) 07:27	07:54 (2) 07:24	08:15
	21:46 06:22 (8) 21:05			19:58 20 07:24 (3) 18:45	19 08:13 (2) 16:39	16:02
7	05:00 06:03 (8) 05:43			06:36 07:04 (3) 07:28	07:55 (2) 07:26	08:16
	21:45 06:23 (8) 21:03			19:55 20 07:24 (3) 18:43	17 08:12 (2) 16:37	16:02
8	05:01 06:03 (8) 05:45			06:38 07:05 (3) 07:30	07:56 (2) 07:28	08:18
	21:45 06:23 (8) 21:01			19:53 18 07:23 (3) 18:41	14 08:10 (2) 16:35	16:01
9	05:02 06:03 (8) 05:47			06:40 07:06 (3) 07:32	07:58 (2) 07:30	08:19
	21:44 06:24 (8) 20:59			19:50 15 07:21 (3) 18:38	10 08:08 (2) 16:33	16:01
10	05:03 06:02 (8) 05:48			06:42 07:08 (3) 07:34	08:00 (2) 07:31	08:20
	21:43 06:24 (8) 20:57			19:48 17 07:52 (1) 18:36	5 08:05 (2) 16:32	16:01
11	05:04 06:02 (8) 05:50			06:43 07:10 (3) 07:36		07:33 08:21
	21:42 06:25 (8) 20:55			19:46 19 07:55 (1) 18:34		16:30 16:01
12	05:05 06:02 (8) 05:52			06:45 07:39 (1) 07:37		07:35 08:22
	21:41 06:25 (8) 20:53			19:43 17 07:56 (1) 18:31		16:28 16:00
13	05:06 06:02 (8) 05:54		07:05 (4) 06:47	07:38 (1) 07:39		07:37 08:23
	21:40 06:25 (8) 20:51	11	07:16 (4) 19:41	20 07:58 (1) 18:29		16:27 16:00
14	05:07 06:02 (8) 05:55		07:03 (4) 06:48	07:37 (1) 07:41		07:39 08:24
	21:39 06:26 (8) 20:49	16	07:19 (4) 19:38	22 07:59 (1) 18:27		16:25 16:00
15	05:09 06:02 (8) 05:57		07:00 (4) 06:50	07:35 (1) 07:43		07:41 08:25
	21:38 06:26 (8) 20:47	19	07:19 (4) 19:36	24 07:59 (1) 18:24		16:24 16:00
16	05:10 06:01 (8) 05:59		06:59 (4) 06:52	07:34 (1) 07:45		07:43 08:26
	21:37 06:26 (8) 20:45	22	07:21 (4) 19:33	25 07:59 (1) 18:22		16:22 16:00
17	05:11 06:02 (8) 06:00		06:59 (4) 06:54	07:34 (1) 07:46		07:44 08:27
	21:36 06:27 (8) 20:43	23	07:22 (4) 19:31	25 07:59 (1) 18:20		16:21 16:01
18	05:13 06:02 (8) 06:02		06:57 (4) 06:55	07:33 (1) 07:48		07:46 08:28
	21:35 06:27 (8) 20:41	25	07:22 (4) 19:29	25 07:58 (1) 18:18		16:19 16:01
19	05:14 06:02 (8) 06:04		06:56 (4) 06:57	07:33 (1) 07:50		07:48 08:28
	21:34 06:26 (8) 20:39	27	07:23 (4) 19:26	25 07:58 (1) 18:15		16:18 16:01
20	05:15 06:02 (9) 06:05		06:55 (4) 06:59	07:33 (1) 07:52		07:50 08:29
	21:32 06:26 (8) 20:37	28	07:23 (4) 19:24	25 07:58 (1) 18:13		16:17 16:01
21	05:17 06:03 (9) 06:07		06:55 (4) 07:00	07:32 (1) 07:54		07:51 08:30
	21:31 06:27 (8) 20:34	28	07:23 (4) 19:21	24 07:56 (1) 18:11		16:15 16:02
22	05:18 06:02 (9) 06:09		06:55 (4) 07:02	07:33 (1) 07:56		07:53 08:30
	21:30 06:26 (8) 20:32	29	07:24 (4) 19:19	23 07:56 (1) 18:09		16:14 16:02
23	05:20 06:02 (9) 06:11		06:54 (4) 07:04	07:34 (1) 07:58		07:55 08:31
	21:28 06:26 (8) 20:30	29	07:23 (4) 19:16	20 07:54 (1) 18:07		16:13 16:03
24	05:21 06:02 (9) 06:12		06:54 (4) 07:06	07:34 (1) 07:59		07:57 08:31
	21:27 06:26 (8) 20:28	29	07:23 (4) 19:14	18 07:52 (1) 18:05		16:12 16:03
25	05:23 06:02 (9) 06:14		06:54 (4) 07:07	07:36 (1) 07:01		07:58 08:32
	21:25 06:25 (8) 20:25	29	07:23 (4) 19:12	14 07:50 (1) 17:02		16:11 16:04
26	05:24 06:03 (9) 06:16		06:54 (4) 07:09	07:40 (1) 07:03		08:00 08:32
	21:24 06:25 (8) 20:23	28	07:22 (4) 19:09	6 07:46 (1) 17:00		16:10 16:05
27	05:26 06:02 (9) 06:18		06:54 (4) 07:11		07:05	08:02 08:32
	21:22 06:24 (8) 20:21	27	07:21 (4) 19:07		16:58	16:09 16:05
28	05:27 06:02 (9) 06:19		06:54 (4) 07:13	08:00 (2) 07:07		08:03 08:32
	21:21 06:23 (8) 20:19	26	07:20 (4) 19:04	11 08:11 (2) 16:56		16:08 16:06
29	05:29 06:03 (9) 06:21		06:55 (4) 07:14	07:58 (2) 07:09		08:05 08:32
	21:19 06:23 (8) 20:16	26	07:21 (3) 19:02	15 08:13 (2) 16:54		16:07 16:07
30	05:30 06:03 (9) 06:23		06:56 (4) 07:16	07:57 (2) 07:11		08:06 08:32
	21:18 06:21 (8) 20:14	28	07:24 (3) 19:00	17 08:14 (2) 16:52		16:06 16:08
31	05:32 06:04 (9) 06:24		06:57 (4)		07:13	08:32
	21:16 06:19 (9) 20:12	27	07:24 (3)		16:50	16:09
Sonnenscheinstunden	508	458	382	330	262	237
astr. max. mögl. Beschattung	666	509	576	165		
Red. Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29		
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96		
Reduktion Windrichtung	0.73	0.72	0.70	0.66		
Gesamte Reduktion	0.26	0.29	0.23	0.18		
Met. wahrsch. Beschattung	175	148	135	31		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EK - IO141

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	07:17 (3)	05:46	04:59	05:58 (8)		
	16:10	17:00	17:55	19:51	18 08:01 (1)	20:45	21:34	19 06:17 (8)		
2	08:32	08:02	07:05	06:52	07:15 (3)	05:44	04:58	05:59 (8)		
	16:12	17:02	17:57	19:53	13 07:28 (3)	20:47	21:35	19 06:18 (8)		
3	08:32	08:00	07:03	06:49	07:13 (3)	05:42	04:57	05:59 (8)		
	16:13	17:04	17:58	19:55	16 07:29 (3)	20:49	21:36	18 06:17 (8)		
4	08:32	07:58	07:01	06:47	07:10 (3)	05:41	04:56	05:59 (8)		
	16:14	17:06	18:00	8 07:33 (2)	19:57	19 07:29 (3)	20:50	21:37	18 06:17 (8)	
5	08:32	07:57	06:58	07:22 (2)	06:45	07:10 (3)	05:39	04:55	06:01 (8)	
	16:15	17:08	18:02	12 07:34 (2)	19:59	20 07:30 (3)	20:52	21:38	16 06:17 (8)	
6	08:31	07:55	06:56	07:20 (2)	06:42	07:08 (3)	05:37	04:55	06:01 (8)	
	16:16	17:10	18:04	16 07:36 (2)	20:00	21 07:29 (3)	20:54	21:39	15 06:16 (8)	
7	08:31	07:53	06:54	07:17 (2)	06:40	07:08 (3)	05:35	04:54	06:02 (8)	
	16:18	17:12	18:06	19 07:36 (2)	20:02	21 07:29 (3)	20:56	21:40	14 06:16 (8)	
8	08:30	07:51	06:51	07:17 (2)	06:37	07:08 (3)	05:33	06:01 (9)	04:53	06:03 (8)
	16:19	17:14	18:08	19 07:36 (2)	20:04	21 07:29 (3)	20:57	5 06:06 (9)	21:41	12 06:15 (8)
9	08:30	07:49	06:49	07:17 (2)	06:35	07:05 (4)	05:31	05:58 (9)	04:53	06:04 (8)
	16:20	17:16	18:10	20 07:37 (2)	20:06	23 07:28 (3)	20:59	10 06:08 (9)	21:42	11 06:15 (8)
10	08:29	07:48	06:47	07:16 (2)	06:33	07:01 (4)	05:29	05:57 (9)	04:52	06:04 (8)
	16:22	17:18	18:11	20 07:36 (2)	20:08	26 07:27 (3)	21:01	13 06:10 (9)	21:43	10 06:14 (8)
11	08:29	07:46	06:44	07:16 (2)	06:30	06:59 (4)	05:27	05:56 (9)	04:52	06:05 (8)
	16:23	17:20	18:13	20 07:36 (2)	20:09	27 07:26 (3)	21:03	16 06:12 (8)	21:44	9 06:14 (8)
12	08:28	07:44	06:42	07:17 (2)	06:28	06:58 (4)	05:26	05:55 (9)	04:52	06:07 (8)
	16:25	17:22	18:15	19 07:36 (2)	20:11	27 07:25 (3)	21:04	18 06:13 (8)	21:44	6 06:13 (8)
13	08:27	07:42	06:40	07:17 (2)	06:26	06:56 (4)	05:24	05:55 (9)	04:51	06:08 (8)
	16:26	17:24	18:17	17 07:34 (2)	20:13	26 07:22 (3)	21:06	20 06:15 (8)	21:45	4 06:12 (8)
14	08:26	07:40	06:37	07:18 (2)	06:23	06:55 (4)	05:22	05:54 (9)	04:51	05:24 (7)
	16:28	17:26	18:19	15 07:33 (2)	20:15	25 07:20 (4)	21:08	21 06:15 (8)	21:46	4 05:28 (7)
15	08:25	07:38	06:35	07:19 (2)	06:21	06:54 (4)	05:21	05:54 (9)	04:51	05:24 (7)
	16:30	17:28	18:21	11 07:30 (2)	20:17	27 07:21 (4)	21:09	23 06:17 (8)	21:46	5 05:29 (7)
16	08:24	07:36	06:32	07:24 (2)	06:19	06:53 (4)	05:19	05:53 (9)	04:51	05:23 (7)
	16:31	17:30	18:23	1 07:25 (2)	20:18	28 07:21 (4)	21:11	24 06:17 (8)	21:47	7 05:30 (7)
17	08:23	07:34	06:30	06:57 (1)	06:17	06:52 (4)	05:17	05:54 (9)	04:50	05:23 (7)
	16:33	17:32	18:24	7 07:04 (1)	20:20	28 07:20 (4)	21:12	24 06:18 (8)	21:47	7 05:30 (7)
18	08:22	07:32	06:28	06:54 (1)	06:14	06:52 (4)	05:16	05:54 (9)	04:50	05:23 (7)
	16:35	17:34	18:26	14 07:08 (1)	20:22	28 07:20 (4)	21:14	24 06:18 (8)	21:48	8 05:31 (7)
19	08:21	07:29	06:25	06:52 (1)	06:12	06:52 (4)	05:14	05:54 (9)	04:50	05:23 (7)
	16:36	17:35	18:28	18 07:10 (1)	20:24	28 07:20 (4)	21:16	24 06:18 (8)	21:48	8 05:31 (7)
20	08:20	07:27	06:23	06:50 (1)	06:10	06:52 (4)	05:13	05:54 (9)	04:51	05:24 (7)
	16:38	17:37	18:30	20 07:10 (1)	20:26	28 07:20 (4)	21:17	25 06:19 (8)	21:48	8 05:32 (7)
21	08:19	07:25	06:20	06:49 (1)	06:08	06:52 (4)	05:12	05:55 (9)	04:51	05:24 (7)
	16:40	17:39	18:32	22 07:11 (1)	20:27	28 07:20 (4)	21:19	24 06:19 (8)	21:49	8 05:32 (7)
22	08:18	07:23	06:18	06:47 (1)	06:06	06:52 (4)	05:10	05:54 (9)	04:51	05:24 (7)
	16:42	17:41	18:33	24 07:11 (1)	20:29	27 07:19 (4)	21:20	24 06:18 (8)	21:49	8 05:32 (7)
23	08:17	07:21	06:16	06:47 (1)	06:03	06:53 (4)	05:09	05:55 (9)	04:51	05:24 (7)
	16:43	17:43	18:35	25 07:12 (1)	20:31	25 07:18 (4)	21:22	24 06:19 (8)	21:49	8 05:32 (7)
24	08:15	07:19	06:13	06:46 (1)	06:01	06:53 (4)	05:07	05:55 (9)	04:51	05:25 (7)
	16:45	17:45	18:37	25 07:11 (1)	20:33	24 07:17 (4)	21:23	24 06:19 (8)	21:49	8 05:33 (7)
25	08:14	07:16	06:11	06:46 (1)	05:59	06:53 (4)	05:06	05:55 (9)	04:52	05:25 (7)
	16:47	17:47	18:39	25 07:11 (1)	20:35	22 07:15 (4)	21:24	24 06:19 (8)	21:49	8 05:33 (7)
26	08:13	07:14	06:08	06:46 (1)	05:57	06:54 (4)	05:05	05:56 (9)	04:52	05:25 (7)
	16:49	17:49	18:41	25 07:11 (1)	20:36	20 07:14 (4)	21:26	23 06:19 (8)	21:49	7 05:32 (7)
27	08:11	07:12	06:06	06:46 (1)	05:55	06:56 (4)	05:04	05:56 (9)	04:53	05:27 (7)
	16:51	17:51	18:42	24 07:10 (1)	20:38	16 07:12 (4)	21:27	23 06:19 (8)	21:49	5 05:32 (7)
28	08:10	07:10	06:04	06:46 (1)	05:53	06:58 (4)	05:03	05:56 (9)	04:53	05:27 (7)
	16:53	17:53	18:44	23 07:09 (1)	20:40	12 07:10 (4)	21:29	23 06:19 (8)	21:49	4 05:31 (7)
29	08:08	07:01	06:01	07:46 (1)	05:51	05:02	05:02	05:57 (8)	04:54	05:29 (7)
	16:55	19:46	21 08:07 (1)	20:42	05:00	21:30	21 06:18 (8)	21:49	5 06:15 (8)	
30	08:07	06:59	07:47 (1)	05:49	05:00	05:57 (8)	04:54	06:10 (8)		
	16:57	19:48	19 08:06 (1)	20:43	21:31	21 06:18 (8)	21:48	6 06:16 (8)		
31	08:05	06:56	07:49 (1)	05:48	04:59	05:57 (8)	04:54			
	16:58	19:50	15 08:04 (1)	20:44	21:32	21 06:18 (8)	21:48			
Sonnenscheinstunden	253	275	367	418	491		506			
astr.max.mögl.Beschattung			504		644		499		285	
Red.Sonnenscheinwahrsch.			0.28		0.37		0.43		0.39	
Reduktion Betriebsdauer			0.96		0.96		0.96		0.96	
Reduktion Windrichtung			0.68		0.72		0.73		0.72	
Gesamte Reduktion			0.18		0.26		0.30		0.27	
Met.wahrsch.Beschattung			91		165		149		76	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EK - IO141

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember							
1	04:55 21:48	06:10 (8) 06:17 (8)	05:34 21:14	18	06:05 (9) 06:23 (8)	06:26 20:09	27	06:58 (4) 07:25 (3)	07:18 18:57	18	07:56 (2) 08:14 (2)	07:14 16:48	08:08 16:05
2	04:56 21:48	06:10 (8) 06:19 (8)	05:35 21:12	15	06:06 (9) 06:21 (9)	06:28 20:07	26	07:00 (4) 07:26 (3)	07:20 18:55	20	07:52 (2) 08:15 (2)	07:16 16:46	08:09 16:05
3	04:56 21:47	06:09 (8) 06:20 (8)	05:37 21:11	12	06:07 (9) 06:19 (9)	06:30 20:05	23	07:03 (4) 07:26 (3)	07:21 18:52	20	07:54 (2) 08:14 (2)	07:18 16:44	08:11 16:04
4	04:57 21:47	06:08 (8) 06:20 (8)	05:38 21:09	9	06:08 (9) 06:18 (9)	06:31 20:02	21	07:05 (3) 07:26 (3)	07:23 18:50	20	07:54 (2) 08:14 (2)	07:20 16:42	08:12 16:03
5	04:58 21:46	06:08 (8) 06:21 (8)	05:40 21:07	20	06:33 20:00	06:43 19:48	13	07:05 (3) 07:26 (3)	07:25 18:48	6	07:54 (2) 08:14 (2)	07:22 16:41	08:14 16:03
6	04:59 21:46	06:08 (8) 06:22 (8)	05:42 21:05	19	06:35 19:58	06:45 19:48	17	07:04 (3) 07:25 (3)	07:27 18:45	19	07:54 (2) 08:13 (2)	07:24 16:39	08:15 16:02
7	05:00 21:45	06:07 (8) 06:23 (8)	05:43 21:03	17	06:36 19:55	06:47 19:41	14	07:05 (3) 07:25 (3)	07:28 18:43	17	07:55 (2) 08:12 (2)	07:26 16:37	08:16 16:02
8	05:01 21:45	06:07 (8) 06:24 (8)	05:45 21:01	14	06:38 19:53	06:48 19:41	18	07:05 (3) 07:24 (3)	07:30 18:41	14	07:56 (2) 08:10 (2)	07:28 16:35	08:18 16:01
9	05:02 21:44	06:07 (8) 06:24 (8)	05:47 20:59	6	06:40 19:50	06:48 19:41	20	07:06 (3) 07:22 (3)	07:32 18:38	11	07:58 (2) 08:09 (2)	07:30 16:33	08:19 16:01
10	05:03 21:43	06:06 (8) 06:25 (8)	05:48 20:57	13	06:42 19:48	06:52 19:33	22	07:08 (3) 07:21 (3)	07:34 18:36	6	08:00 (2) 08:06 (2)	07:31 16:32	08:20 16:01
11	05:04 21:42	06:06 (8) 06:26 (8)	05:50 20:55	20	06:43 19:46	06:54 19:33	24	07:10 (3) 07:53 (1)	07:36 18:34			07:33 16:30	08:21 16:01
12	05:05 21:41	06:06 (8) 06:26 (8)	05:52 20:53	14	06:45 19:43	06:55 19:29	25	07:41 (1) 07:55 (1)	07:37 18:31			07:35 16:28	08:22 16:00
13	05:06 21:40	06:06 (8) 06:26 (8)	05:54 20:51	18	06:47 19:41	06:57 19:26	25	07:39 (1) 07:57 (1)	07:39 18:29			07:37 16:27	08:23 16:00
14	05:07 21:39	06:05 (8) 06:27 (8)	05:55 20:49	6	06:48 19:38	06:58 19:24	25	07:38 (1) 07:58 (1)	07:41 18:27			07:39 16:25	08:24 16:00
15	05:09 21:38	06:05 (8) 06:27 (8)	05:57 20:47	13	07:05 (4) 07:18 (4)	06:50 19:36	22	07:36 (1) 07:58 (1)	07:43 18:24			07:41 16:24	08:25 16:00
16	05:10 21:37	06:05 (8) 06:27 (8)	05:59 20:45	17	07:03 (4) 07:20 (4)	06:52 19:33	24	07:35 (1) 07:59 (1)	07:45 18:22			07:43 16:22	08:26 16:00
17	05:11 21:36	06:05 (8) 06:28 (8)	06:00 20:43	20	07:02 (4) 07:22 (4)	06:54 19:31	24	07:35 (1) 07:59 (1)	07:46 18:20			07:44 16:21	08:27 16:01
18	05:13 21:35	06:05 (8) 06:28 (8)	06:02 20:41	22	07:00 (4) 07:22 (4)	06:55 19:29	25	07:33 (1) 07:58 (1)	07:48 18:18			07:46 16:19	08:28 16:01
19	05:14 21:34	06:05 (8) 06:28 (8)	06:04 20:39	24	06:59 (4) 07:23 (4)	06:57 19:26	25	07:33 (1) 07:58 (1)	07:50 18:15			07:48 16:18	08:28 16:01
20	05:15 21:32	06:04 (8) 06:28 (8)	06:05 20:37	26	06:57 (4) 07:23 (4)	06:59 19:24	25	07:33 (1) 07:58 (1)	07:52 18:13			07:50 16:17	08:29 16:01
21	05:17 21:31	06:05 (8) 06:29 (8)	06:07 20:34	27	06:57 (4) 07:24 (4)	07:00 19:21	24	07:33 (1) 07:57 (1)	07:54 18:11			07:51 16:15	08:30 16:02
22	05:18 21:30	06:05 (8) 06:29 (8)	06:09 20:32	27	06:57 (4) 07:24 (4)	07:02 19:19	23	07:33 (1) 07:56 (1)	07:56 18:09			07:53 16:14	08:30 16:02
23	05:20 21:28	06:04 (9) 06:28 (8)	06:11 20:30	28	06:56 (4) 07:24 (4)	07:04 19:16	21	07:34 (1) 07:55 (1)	07:58 18:07			07:55 16:13	08:31 16:03
24	05:21 21:27	06:05 (9) 06:29 (8)	06:12 20:28	28	06:56 (4) 07:24 (4)	07:06 19:14	19	07:34 (1) 07:53 (1)	07:59 18:05			07:57 16:12	08:31 16:03
25	05:23 21:25	06:04 (9) 06:28 (8)	06:14 20:25	28	06:56 (4) 07:24 (4)	07:07 19:12	15	07:36 (1) 07:51 (1)	07:01 17:02			07:58 16:11	08:32 16:04
26	05:24 21:24	06:05 (9) 06:29 (8)	06:16 20:23	28	06:55 (4) 07:23 (4)	07:09 19:09	10	07:38 (1) 07:48 (1)	07:03 17:00			08:00 16:10	08:32 16:05
27	05:26 21:22	06:04 (9) 06:28 (8)	06:18 20:21	28	06:55 (4) 07:23 (4)	07:11 19:07		07:05 16:58	08:02 16:09			08:02 16:05	08:32 16:05
28	05:27 21:21	06:04 (9) 06:27 (8)	06:19 20:19	26	06:55 (4) 07:21 (4)	07:13 19:04	9	07:33 (1) 08:01 (2)	07:56 16:56			08:03 16:08	08:32 16:06
29	05:29 21:19	06:04 (9) 06:27 (8)	06:21 20:16	25	06:56 (4) 07:21 (4)	07:14 19:02	14	07:58 (2) 08:12 (2)	07:09 16:54			08:05 16:07	08:32 16:07
30	05:30 21:18	06:04 (9) 06:25 (8)	06:23 20:14	27	06:56 (4) 07:23 (3)	07:16 19:00	16	07:57 (2) 08:13 (2)	07:11 16:52			08:06 16:06	08:32 16:08
31	05:32 21:16	06:05 (9) 06:25 (8)	06:24 20:12	27	06:57 (4) 07:24 (3)			07:13 16:50				08:06 16:09	08:32 16:09
Sonnenscheinstunden	509	458	481	382	572	330	165	262	237				
astr.max.mögl.Beschattung	609	481	572	330	165	262	237						
Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29	0.29	0.29	0.29	0.29	0.29				
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96				
Reduktion Windrichtung	0.73	0.72	0.70	0.66	0.66	0.66	0.66	0.66	0.66				
Gesamte Reduktion	0.26	0.29	0.23	0.18	0.18	0.18	0.18	0.18	0.18				
Met.wahrsch.Beschattung	160	140	134	31									

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang (SS:MM)	Schattenende (SS:MM)	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	------------------------	----------------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EL - IO142

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:40 (1)	05:46	06:48 (4)	04:59
	16:10	17:00	17:55	19:51	22 08:02 (1)	20:45	19 07:07 (4)	21:34
2	08:32	08:02	07:05	06:52	07:42 (1)	05:44	06:50 (4)	04:58
	16:12	17:02	17:57	19:53	19 08:01 (1)	20:47	15 07:05 (4)	21:35
3	08:32	08:00	07:03	06:49	07:13 (3)	05:42	06:52 (4)	04:57
	16:13	17:04	17:58	19:55	22 07:59 (1)	20:49	10 07:02 (4)	21:36
4	08:32	07:58	07:01	06:47	07:10 (3)	05:41	04:56	05:49 (8)
	16:14	17:06	18:00	19:57	21 07:55 (1)	20:50	21:37	23 06:12 (8)
5	08:32	07:57	06:58	06:45	07:08 (3)	05:39	04:55	05:50 (8)
	16:15	17:08	18:02	4 07:22 (2)	19:59	15 07:23 (3)	20:52	21:38
6	08:31	07:55	06:56	06:42	07:05 (3)	05:37	04:55	05:49 (8)
	16:16	17:10	18:04	10 07:30 (2)	20:00	18 07:23 (3)	20:54	21:39
7	08:31	07:53	06:54	06:40	07:04 (3)	05:35	04:54	05:50 (8)
	16:18	17:12	18:06	14 07:31 (2)	20:02	20 07:24 (3)	20:56	21:40
8	08:30	07:51	06:51	06:37	07:04 (3)	05:33	04:53	05:50 (8)
	16:19	17:14	18:08	17 07:32 (2)	20:04	20 07:24 (3)	20:57	21:41
9	08:30	07:49	06:49	06:35	07:03 (3)	05:31	04:53	05:51 (8)
	16:20	17:16	18:10	19 07:33 (2)	20:06	21 07:24 (3)	20:59	21:42
10	08:29	07:48	06:47	06:33	07:03 (3)	05:29	04:52	05:51 (8)
	16:22	17:18	18:11	21 07:33 (2)	20:08	21 07:24 (3)	21:01	21:43
11	08:29	07:46	06:44	06:30	07:03 (3)	05:27	04:52	05:51 (8)
	16:23	17:20	18:13	21 07:33 (2)	20:09	20 07:23 (3)	21:03	21:44
12	08:28	07:44	06:42	06:28	07:03 (3)	05:26	6 05:54 (9)	04:52
	16:25	17:22	18:15	20 07:33 (2)	20:11	20 07:23 (3)	21:04	21 06:13 (8)
13	08:27	07:42	06:40	06:26	07:12 (2)	05:24	05:52 (9)	04:51
	16:26	17:24	18:17	20 07:32 (2)	20:13	25 07:21 (3)	21:06	11 06:03 (9)
14	08:26	07:40	06:37	06:23	07:13 (2)	05:22	05:50 (9)	04:51
	16:28	17:26	18:19	19 07:32 (2)	20:15	27 07:20 (3)	21:08	13 06:03 (9)
15	08:25	07:38	06:35	06:21	07:12 (2)	05:21	05:50 (9)	04:51
	16:30	17:28	18:21	18 07:30 (2)	20:17	28 07:19 (3)	21:09	15 06:05 (9)
16	08:24	07:36	06:32	06:19	07:14 (2)	05:19	05:49 (9)	04:51
	16:31	17:30	18:23	15 07:29 (2)	20:18	27 07:17 (3)	21:11	16 06:05 (9)
17	08:23	07:34	06:30	06:17	07:15 (2)	05:17	05:49 (9)	04:50
	16:33	17:32	18:24	11 07:26 (2)	20:20	25 07:12 (4)	21:12	17 06:06 (9)
18	08:22	07:32	06:28	06:14	07:19 (2)	05:16	05:49 (9)	04:50
	16:35	17:34	18:26	3 07:22 (2)	20:22	26 07:13 (4)	21:14	18 06:07 (9)
19	08:21	07:29	06:25	06:12	07:13 (4)	05:14	05:48 (9)	04:50
	16:36	17:35	18:28	20:24	27 07:13 (4)	21:16	20 06:08 (8)	21:48
20	08:20	07:27	06:23	06:10	06:45 (4)	05:13	05:48 (9)	04:51
	16:38	17:37	18:30	11 07:01 (1)	20:26	29 07:14 (4)	21:17	21 06:09 (8)
21	08:19	07:25	06:20	06:08	06:45 (4)	05:12	05:48 (9)	04:51
	16:40	17:39	18:32	16 07:03 (1)	20:27	29 07:14 (4)	21:19	22 06:10 (8)
22	08:18	07:23	06:18	06:05	06:45 (4)	05:10	05:48 (9)	04:51
	16:42	17:41	18:33	19 07:04 (1)	20:29	29 07:14 (4)	21:20	22 06:10 (8)
23	08:17	07:21	06:16	06:03	06:44 (4)	05:09	05:48 (9)	04:51
	16:43	17:43	18:35	21 07:05 (1)	20:31	29 07:14 (4)	21:22	22 06:10 (8)
24	08:15	07:19	06:13	06:01	06:45 (4)	05:07	05:48 (9)	04:51
	16:45	17:45	18:37	23 07:05 (1)	20:33	28 07:13 (4)	21:23	23 06:11 (8)
25	08:14	07:16	06:11	06:01	06:44 (4)	05:06	05:48 (8)	04:52
	16:47	17:47	18:39	25 07:06 (1)	20:35	28 07:12 (4)	21:24	23 06:11 (8)
26	08:13	07:14	06:08	06:01	06:44 (4)	05:05	05:48 (8)	04:52
	16:49	17:49	18:41	25 07:06 (1)	20:36	27 07:11 (4)	21:26	24 06:12 (8)
27	08:11	07:12	06:06	06:00	06:40 (1)	05:55	06:44 (4)	05:04
	16:50	17:51	18:42	26 07:06 (1)	20:38	27 07:11 (4)	21:27	24 06:12 (8)
28	08:10	07:10	06:04	06:00	06:40 (1)	05:53	06:45 (4)	05:03
	16:53	17:53	18:44	26 07:06 (1)	20:40	25 07:10 (4)	21:29	24 06:12 (8)
29	08:08	07:01	06:39	05:51	06:45 (4)	05:02	05:48 (8)	04:54
	16:55	19:46	26 08:05 (1)	20:42	24 07:09 (4)	21:30	24 06:12 (8)	21:49
30	08:07	06:59	07:40 (1)	05:49	06:47 (4)	05:00	05:48 (8)	04:54
	16:57	19:48	24 08:04 (1)	20:43	22 07:09 (4)	21:31	24 06:12 (8)	21:48
31	08:05	06:56	07:41 (1)	05:48	04:59	05:48 (8)	06:12 (8)	05:48 (8)
	16:58	19:50	23 08:04 (1)	20:44	21:32	24 06:12 (8)	05:48 (8)	06:12 (8)
Sonnenscheinstunden	253	275	367	418	491	506	636	
astr.max.mögl.Beschattung			477	721	437	0.39		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.69	0.72	0.73	0.73		
Gesamte Reduktion			0.18	0.26	0.30	0.27		
Met.wahrsch.Beschattung			87	184	131	171		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EL - IO142

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November		Dezember			
1	04:55	05:56 (8)	05:34	06:06 (9)	06:26	07:02 (3)	07:18	07:51 (2)	07:14	08:08			
	21	06:17 (8)	21:14	2	06:08 (9)	20:09	20	07:22 (3)	18:57	21	08:12 (2)	16:48	16:05
2	04:56	05:56 (8)	05:35			06:28		07:02 (3)	07:20		07:51 (2)	07:16	08:09
	22	06:18 (8)	21:12			20:07	21	07:23 (3)	18:55	21	08:12 (2)	16:46	16:05
3	04:56	05:56 (8)	05:37			06:30		07:01 (3)	07:21		07:50 (2)	07:18	08:11
	22	06:18 (8)	21:11			20:05	21	07:22 (3)	18:52	21	08:11 (2)	16:44	16:04
4	04:57	05:55 (8)	05:38			06:31		07:01 (3)	07:23		07:51 (2)	07:20	08:12
	23	06:18 (8)	21:09			20:02	20	07:21 (3)	18:50	19	08:10 (2)	16:42	16:03
5	04:58	05:56 (8)	05:40			06:33		07:01 (3)	07:25		07:51 (2)	07:22	08:14
	22	06:18 (8)	21:07			20:00	20	07:21 (3)	18:48	19	08:10 (2)	16:41	16:03
6	04:59	05:56 (8)	05:42			06:35		07:01 (3)	07:27		07:53 (2)	07:24	08:15
	23	06:19 (8)	21:05			19:58	18	07:19 (3)	18:45	15	08:08 (2)	16:39	16:02
7	05:00	05:56 (8)	05:43			06:36		07:03 (3)	07:28		07:55 (2)	07:26	08:16
	23	06:19 (8)	21:03			19:55	15	07:18 (3)	18:43	12	08:07 (2)	16:37	16:02
8	05:01	05:56 (8)	05:45			06:38		07:05 (3)	07:30		07:56 (2)	07:28	08:18
	24	06:20 (8)	21:01			19:53	22	07:50 (1)	18:41	7	08:03 (2)	16:35	16:01
9	05:02	05:56 (8)	05:47			06:40		07:06 (3)	07:32			07:30	08:19
	24	06:20 (8)	20:59	4	07:04 (4)	19:50	22	07:52 (1)	18:38			16:33	16:01
10	05:03	05:56 (8)	05:48			06:59 (4)	06:42	07:35 (1)	07:34			07:31	08:20
	24	06:20 (8)	20:57	13	07:12 (4)	19:48	19	07:54 (1)	18:36			16:32	16:01
11	05:04	05:56 (8)	05:50			06:58 (4)	06:43	07:34 (1)	07:36			07:33	08:21
	25	06:21 (8)	20:55	16	07:14 (4)	19:46	21	07:55 (1)	18:34			16:30	16:01
12	05:05	05:56 (8)	05:52			06:56 (4)	06:45	07:32 (1)	07:37			07:35	08:22
	25	06:21 (8)	20:53	20	07:16 (4)	19:43	23	07:55 (1)	18:31			16:28	16:00
13	05:06	05:56 (8)	05:54			06:54 (4)	06:47	07:31 (1)	07:39			07:37	08:23
	25	06:21 (8)	20:51	22	07:16 (4)	19:41	25	07:56 (1)	18:29			16:27	16:00
14	05:07	05:56 (8)	05:55			06:54 (4)	06:48	07:31 (1)	07:41			07:39	08:24
	25	06:21 (8)	20:49	24	07:18 (4)	19:38	25	07:56 (1)	18:27			16:25	16:00
15	05:09	05:56 (8)	05:57			06:52 (4)	06:50	07:29 (1)	07:43			07:41	08:25
	25	06:21 (8)	20:47	26	07:18 (4)	19:36	26	07:55 (1)	18:24			16:24	16:00
16	05:10	05:56 (8)	05:59			06:52 (4)	06:52	07:29 (1)	07:45			07:43	08:26
	25	06:21 (8)	20:45	26	07:18 (4)	19:33	26	07:55 (1)	18:22			16:22	16:00
17	05:11	05:57 (8)	06:00			06:51 (4)	06:54	07:29 (1)	07:46			07:44	08:27
	24	06:21 (8)	20:43	28	07:19 (4)	19:31	26	07:55 (1)	18:20			16:21	16:01
18	05:13	05:57 (8)	06:02			06:50 (4)	06:55	07:29 (1)	07:48			07:46	08:28
	24	06:21 (8)	20:41	29	07:19 (4)	19:29	25	07:54 (1)	18:18			16:19	16:01
19	05:14	05:58 (9)	06:04			06:50 (4)	06:57	07:29 (1)	07:50			07:48	08:28
	23	06:21 (8)	20:39	29	07:19 (4)	19:26	24	07:53 (1)	18:15			16:18	16:01
20	05:15	05:58 (9)	06:05			06:49 (4)	06:59	07:30 (1)	07:52			07:50	08:29
	22	06:20 (8)	20:37	29	07:18 (4)	19:24	22	07:52 (1)	18:13			16:17	16:01
21	05:17	05:58 (9)	06:07			06:49 (4)	07:00	07:30 (1)	07:54			07:51	08:30
	22	06:20 (8)	20:34	29	07:18 (4)	19:21	20	07:50 (1)	18:11			16:15	16:02
22	05:18	05:58 (9)	06:09			06:50 (4)	07:02	07:31 (1)	07:56			07:53	08:30
	22	06:20 (8)	20:32	28	07:18 (4)	19:19	17	07:48 (1)	18:09			16:14	16:02
23	05:20	05:58 (9)	06:11			06:49 (4)	07:04	07:34 (1)	07:58			07:55	08:31
	21	06:19 (8)	20:30	28	07:17 (4)	19:16	12	07:46 (1)	18:07			16:13	16:03
24	05:21	05:58 (9)	06:12			06:50 (4)	07:06	07:37 (1)	07:59			07:57	08:31
	21	06:19 (8)	20:28	27	07:17 (4)	19:14	3	07:40 (1)	18:05			16:12	16:03
25	05:23	05:58 (9)	06:14			06:50 (4)	07:07		07:01			07:58	08:32
	20	06:18 (8)	20:25	26	07:16 (4)	19:12			17:02			16:11	16:04
26	05:24	05:59 (9)	06:16			06:50 (4)	07:09	07:58 (2)	07:03			08:00	08:32
	18	06:17 (9)	20:23	25	07:15 (4)	19:09	10	08:08 (2)	17:00			16:10	16:05
27	05:26	05:59 (9)	06:18			06:52 (4)	07:11	07:56 (2)	07:05			08:02	08:32
	17	06:16 (9)	20:21	27	07:19 (3)	19:07	14	08:10 (2)	16:58			16:09	16:05
28	05:27	05:59 (9)	06:19			06:52 (4)	07:13	07:54 (2)	07:07			08:03	08:32
	16	06:15 (9)	20:19	28	07:20 (3)	19:04	16	08:10 (2)	16:56			16:08	16:06
29	05:29	06:01 (9)	06:21			06:54 (4)	07:14	07:53 (2)	07:09			08:05	08:32
	14	06:15 (9)	20:16	27	07:21 (3)	19:02	18	08:11 (2)	16:54			16:07	16:07
30	05:30	06:01 (9)	06:23			06:57 (4)	07:16	07:52 (2)	07:11			08:06	08:32
	12	06:13 (9)	20:14	25	07:22 (3)	19:00	20	08:12 (2)	16:52			16:06	16:08
31	05:32	06:03 (9)	06:24			07:02 (3)			07:13				08:32
	9	06:12 (9)	20:12	20	07:22 (3)				16:50				16:09
													237
Sonnenscheinstunden	508		458		382		330				262		
astr.max.mögl.Beschattung	663		558		571		135						
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29						
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96						
Reduktion Windrichtung	0.73		0.72		0.70		0.67						
Gesamte Reduktion	0.26		0.29		0.23		0.19						
Met.wahrsch.Beschattung	174		162		133		25						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EM - IO143

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	07:39 (1)	05:46	06:44 (4)	04:59	05:45 (8)	
	16:10	17:00	17:55	19:51	23 08:02 (1)	20:45	23 07:07 (4)	21:34	24 06:09 (8)	
2	08:32	08:02	07:05	06:52	07:40 (1)	05:44	06:45 (4)	04:58	05:45 (8)	
	16:12	17:02	17:57	19:53	21 08:01 (1)	20:47	21 07:06 (4)	21:35	25 06:10 (8)	
3	08:32	08:00	07:03	06:49	07:41 (1)	05:42	06:46 (4)	04:57	05:45 (8)	
	16:13	17:04	17:58	19:55	19 08:00 (1)	20:49	18 07:04 (4)	21:36	25 06:10 (8)	
4	08:32	07:58	07:01	06:47	07:10 (3)	05:41	06:47 (4)	04:56	05:45 (8)	
	16:14	17:06	18:00	19:57	24 07:57 (1)	20:50	15 07:02 (4)	21:37	25 06:10 (8)	
5	08:32	07:57	06:58	06:45	07:08 (3)	05:39	06:50 (4)	04:55	05:46 (8)	
	16:15	17:08	18:02	19:59	22 07:54 (1)	20:52	9 06:59 (4)	21:38	25 06:11 (8)	
6	08:31	07:55	06:56	07:20 (2)	06:42	07:05 (3)	05:37	04:55	05:46 (8)	
	16:16	17:10	18:04	9 07:29 (2)	20:00	16 07:21 (3)	20:54	21:39	24 06:10 (8)	
7	08:31	07:53	06:54	07:17 (2)	06:40	07:03 (3)	05:35	04:54	05:46 (8)	
	16:18	17:12	18:06	13 07:30 (2)	20:02	19 07:22 (3)	20:56	21:40	25 06:11 (8)	
8	08:30	07:51	06:51	07:15 (2)	06:37	07:03 (3)	05:33	04:53	05:46 (8)	
	16:19	17:14	18:08	17 07:32 (2)	20:04	20 07:23 (3)	20:57	21:41	25 06:11 (8)	
9	08:30	07:49	06:49	07:14 (2)	06:35	07:01 (3)	05:31	04:53	05:47 (8)	
	16:20	17:16	18:10	19 07:33 (2)	20:06	21 07:22 (3)	20:59	21:42	24 06:11 (8)	
10	08:29	07:48	06:47	07:12 (2)	06:33	07:01 (3)	05:29	04:52	05:47 (8)	
	16:22	17:18	18:11	21 07:33 (2)	20:08	22 07:23 (3)	21:01	21:43	24 06:11 (8)	
11	08:29	07:46	06:44	07:12 (2)	06:30	07:01 (3)	05:27	04:52	05:47 (8)	
	16:23	17:20	18:13	21 07:33 (2)	20:09	22 07:23 (3)	21:03	21:44	24 06:11 (8)	
12	08:28	07:44	06:42	07:12 (2)	06:28	07:02 (3)	05:26	04:52	05:48 (8)	
	16:25	17:22	18:15	21 07:33 (2)	20:11	20 07:22 (3)	21:04	21:44	23 06:11 (8)	
13	08:27	07:42	06:40	07:11 (2)	06:26	07:01 (3)	05:24	04:51	05:48 (8)	
	16:26	17:24	18:17	21 07:32 (2)	20:13	20 07:21 (3)	21:06	21:45	24 06:12 (8)	
14	08:26	07:40	06:37	07:12 (2)	06:23	06:54 (4)	05:22	9 05:50 (9)	04:51	05:48 (8)
	16:28	17:26	18:19	20 07:32 (2)	20:15	26 07:20 (3)	21:08	9 05:59 (9)	21:46	23 06:11 (8)
15	08:25	07:38	06:35	07:12 (2)	06:21	06:51 (4)	05:21	12 05:49 (9)	04:51	05:48 (8)
	16:30	17:28	18:21	18 07:30 (2)	20:17	28 07:19 (3)	21:09	12 06:01 (9)	21:46	23 06:11 (8)
16	08:24	07:36	06:32	07:13 (2)	06:19	06:49 (4)	05:19	13 06:01 (9)	04:51	05:48 (8)
	16:31	17:30	18:23	16 07:29 (2)	20:18	28 07:17 (3)	21:11	13 06:01 (9)	21:47	23 06:11 (8)
17	08:23	07:34	06:30	07:14 (2)	06:17	06:47 (4)	05:17	16 06:03 (9)	04:50	05:49 (8)
	16:33	17:32	18:24	13 07:27 (2)	20:20	27 07:14 (3)	21:12	16 06:03 (9)	21:47	23 06:12 (8)
18	08:22	07:32	06:28	07:17 (2)	06:14	06:45 (4)	05:16	17 06:04 (9)	04:50	05:49 (8)
	16:35	17:34	18:26	7 07:24 (2)	20:22	25 07:10 (4)	21:14	17 06:04 (9)	21:48	23 06:12 (8)
19	08:21	07:29	06:25	06:12	06:44 (4)	05:14	05:46 (9)	04:50	05:49 (8)	
	16:36	17:35	18:28	20:24	27 07:11 (4)	21:16	18 06:04 (9)	21:48	23 06:12 (8)	
20	08:20	07:27	06:23	06:51 (1)	06:10	06:44 (4)	05:13	18 06:04 (9)	04:51	05:50 (8)
	16:38	17:37	18:30	7 06:58 (1)	20:26	27 07:11 (4)	21:17	18 06:04 (9)	21:48	23 06:13 (8)
21	08:19	07:25	06:20	06:47 (1)	06:08	06:43 (4)	05:12	19 06:05 (9)	04:51	05:50 (8)
	16:40	17:39	18:32	15 07:02 (1)	20:27	29 07:12 (4)	21:19	19 06:05 (9)	21:49	23 06:13 (8)
22	08:18	07:23	06:18	06:45 (1)	06:05	06:43 (4)	05:10	20 06:05 (8)	04:51	05:50 (8)
	16:42	17:41	18:33	18 07:03 (1)	20:29	29 07:12 (4)	21:20	20 06:05 (8)	21:49	23 06:13 (8)
23	08:17	07:21	06:16	06:43 (1)	06:03	06:42 (4)	05:09	21 06:06 (8)	04:51	05:50 (8)
	16:43	17:43	18:35	21 07:04 (1)	20:31	30 07:12 (4)	21:22	21 06:06 (8)	21:49	23 06:13 (8)
24	08:15	07:19	06:13	06:41 (1)	06:01	06:42 (4)	05:07	22 06:07 (8)	04:51	05:51 (8)
	16:45	17:45	18:37	23 07:04 (1)	20:33	30 07:12 (4)	21:23	21 06:07 (8)	21:49	23 06:14 (8)
25	08:14	07:16	06:11	06:41 (1)	05:59	06:41 (4)	05:06	22 06:08 (8)	04:52	05:51 (8)
	16:47	17:47	18:39	24 07:05 (1)	20:35	30 07:11 (4)	21:24	22 06:08 (8)	21:49	23 06:14 (8)
26	08:13	07:14	06:08	06:40 (1)	05:57	06:41 (4)	05:05	23 06:09 (8)	04:52	05:50 (8)
	16:49	17:49	18:41	26 07:06 (1)	20:36	29 07:10 (4)	21:26	22 06:08 (8)	21:49	24 06:14 (8)
27	08:11	07:12	06:06	06:39 (1)	05:55	06:41 (4)	05:04	24 06:09 (8)	04:53	05:51 (8)
	16:51	17:51	18:42	26 07:05 (1)	20:38	29 07:10 (4)	21:27	24 06:09 (8)	21:49	23 06:14 (8)
28	08:10	07:10	06:04	06:39 (1)	05:53	06:42 (4)	05:03	25 06:09 (8)	04:53	05:51 (8)
	16:53	17:53	18:44	26 07:05 (1)	20:40	27 07:09 (4)	21:29	24 06:09 (8)	21:49	23 06:14 (8)
29	08:08	07:01	06:38 (1)	05:51	06:42 (4)	05:02	05:45 (8)	25 06:09 (8)	04:54	05:51 (8)
	16:55	17:55	18:46	26 08:04 (1)	20:42	26 07:08 (4)	21:30	24 06:09 (8)	21:49	24 06:15 (8)
30	08:07	06:59	07:38 (1)	05:49	06:43 (4)	05:00	05:45 (8)	25 06:09 (8)	04:54	05:51 (8)
	16:57	17:57	18:48	26 08:04 (1)	20:43	25 07:08 (4)	21:31	24 06:09 (8)	21:48	24 06:15 (8)
31	08:05	06:56	07:39 (1)	05:49	06:44 (4)	05:00	05:45 (8)	25 06:09 (8)	04:54	05:51 (8)
	16:58	17:58	18:49	25 08:04 (1)	20:44	24 07:09 (4)	21:32	24 06:09 (8)	04:54	05:51 (8)
Sonnenscheinstunden	253	275	367	418	491	506	711			
astr.max.mögl.Beschattung			479	741	434	711				
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39				
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96				
Reduktion Windrichtung			0.69	0.72	0.72	0.73				
Gesamte Reduktion			0.18	0.26	0.30	0.27				
Met.wahrsch.Beschattung			87	189	129	191				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EM - IO143

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:51 (8)	05:34		06:26	07:00 (3)	07:18		07:51 (2)	07:14	08:08	
	24	06:15 (8)	21:14		20:09	22	07:22 (3)	18:57	21	08:12 (2)	16:48	16:05
2	04:56	05:52 (8)	05:35		06:28	07:00 (3)	07:20		07:51 (2)	07:16	08:09	
	24	06:16 (8)	21:12		20:07	22	07:22 (3)	18:55	21	08:12 (2)	16:46	16:05
3	04:56	05:52 (8)	05:37		06:30	06:59 (3)	07:21		07:50 (2)	07:18	08:11	
	24	06:16 (8)	21:11		20:05	21	07:20 (3)	18:52	21	08:11 (2)	16:44	16:04
4	04:57	05:51 (8)	05:38		06:31	07:00 (3)	07:23		07:50 (2)	07:20	08:12	
	25	06:16 (8)	21:09		20:02	20	07:20 (3)	18:50	20	08:10 (2)	16:42	16:03
5	04:58	05:52 (8)	05:40		06:33	07:00 (3)	07:25		07:51 (2)	07:22	08:14	
	24	06:16 (8)	21:07		20:00	20	07:20 (3)	18:48	18	08:09 (2)	16:41	16:03
6	04:59	05:52 (8)	05:42		06:35	07:01 (3)	07:27		07:53 (2)	07:24	08:15	
	25	06:17 (8)	21:05		19:58	17	07:18 (3)	18:45	15	08:08 (2)	16:39	16:02
7	05:00	05:52 (8)	05:43		06:36	07:03 (3)	07:28		07:55 (2)	07:26	08:16	
	25	06:17 (8)	21:03		19:55	22	07:49 (1)	18:43	11	08:06 (2)	16:37	16:02
8	05:01	05:53 (8)	05:45	06:58 (4)	06:38	07:05 (3)	07:30		07:56 (2)	07:28	08:18	
	24	06:17 (8)	21:01	12	07:10 (4)	19:53	24	07:52 (1)	18:41	7	08:03 (2)	16:35
9	05:02	05:53 (8)	05:47		06:56 (4)	06:40		07:34 (1)	07:32		07:30	08:19
	25	06:18 (8)	20:59	16	07:12 (4)	19:50	19	07:53 (1)	18:38		16:33	16:01
10	05:03	05:53 (8)	05:48		06:54 (4)	06:42		07:33 (1)	07:34		07:31	08:20
	25	06:18 (8)	20:57	19	07:13 (4)	19:48	21	07:54 (1)	18:36		16:32	16:01
11	05:04	05:53 (8)	05:50		06:53 (4)	06:43		07:32 (1)	07:36		07:33	08:21
	25	06:18 (8)	20:55	22	07:15 (4)	19:46	23	07:55 (1)	18:34		16:30	16:01
12	05:05	05:53 (8)	05:52		06:52 (4)	06:45		07:30 (1)	07:37		07:35	08:22
	25	06:18 (8)	20:53	24	07:16 (4)	19:43	25	07:55 (1)	18:31		16:28	16:00
13	05:06	05:53 (8)	05:54		06:51 (4)	06:47		07:30 (1)	07:39		07:37	08:23
	25	06:18 (8)	20:51	25	07:16 (4)	19:41	25	07:55 (1)	18:29		16:27	16:00
14	05:07	05:53 (8)	05:55		06:50 (4)	06:48		07:30 (1)	07:41		07:39	08:24
	25	06:18 (8)	20:49	27	07:17 (4)	19:38	26	07:56 (1)	18:27		16:25	16:00
15	05:09	05:54 (8)	05:57		06:49 (4)	06:50		07:28 (1)	07:43		07:41	08:25
	23	06:17 (8)	20:47	28	07:17 (4)	19:36	27	07:55 (1)	18:24		16:24	16:00
16	05:10	05:54 (8)	05:59		06:49 (4)	06:52		07:28 (1)	07:45		07:43	08:26
	23	06:17 (8)	20:45	29	07:18 (4)	19:33	27	07:55 (1)	18:22		16:22	16:00
17	05:11	05:55 (8)	06:00		06:49 (4)	06:54		07:29 (1)	07:46		07:44	08:27
	23	06:18 (8)	20:43	29	07:18 (4)	19:31	25	07:54 (1)	18:20		16:21	16:01
18	05:13	05:55 (9)	06:02		06:48 (4)	06:55		07:28 (1)	07:48		07:46	08:28
	22	06:17 (8)	20:41	29	07:17 (4)	19:29	25	07:53 (1)	18:18		16:19	16:01
19	05:14	05:55 (9)	06:04		06:48 (4)	06:57		07:29 (1)	07:50		07:48	08:28
	22	06:17 (8)	20:39	30	07:18 (4)	19:26	23	07:52 (1)	18:15		16:18	16:01
20	05:15	05:55 (9)	06:05		06:47 (4)	06:59		07:29 (1)	07:52		07:50	08:29
	21	06:16 (8)	20:37	30	07:17 (4)	19:24	22	07:51 (1)	18:13		16:17	16:01
21	05:17	05:56 (9)	06:07		06:47 (4)	07:00		07:30 (1)	07:54		07:51	08:30
	20	06:16 (8)	20:34	30	07:17 (4)	19:21	19	07:49 (1)	18:11		16:15	16:02
22	05:18	05:56 (9)	06:09		06:48 (4)	07:02		07:31 (1)	07:56		07:53	08:30
	19	06:15 (9)	20:32	28	07:16 (4)	19:19	16	07:47 (1)	18:09		16:14	16:02
23	05:20	05:55 (9)	06:11		06:48 (4)	07:04		07:34 (1)	07:58		07:55	08:31
	19	06:14 (9)	20:30	27	07:15 (4)	19:16	10	07:44 (1)	18:07		16:13	16:03
24	05:21	05:56 (9)	06:12		06:48 (4)	07:06			07:59		07:57	08:31
	19	06:15 (9)	20:28	26	07:14 (4)	19:14			18:05		16:12	16:03
25	05:23	05:56 (9)	06:14		06:49 (4)	07:07		08:01 (2)	07:01		07:58	08:32
	18	06:14 (9)	20:25	25	07:14 (4)	19:12	4	08:05 (2)	17:02		16:11	16:04
26	05:24	05:58 (9)	06:16		06:50 (4)	07:09		07:57 (2)	07:03		08:00	08:32
	16	06:14 (9)	20:23	27	07:17 (3)	19:09	12	08:09 (2)	17:00		16:10	16:05
27	05:26	05:58 (9)	06:18		06:51 (4)	07:11		07:55 (2)	07:05		08:02	08:32
	15	06:13 (9)	20:21	28	07:19 (3)	19:07	16	08:11 (2)	16:58		16:09	16:05
28	05:27	05:58 (9)	06:19		06:52 (4)	07:13		07:53 (2)	07:07		08:03	08:32
	13	06:11 (9)	20:19	28	07:20 (3)	19:04	18	08:11 (2)	16:56		16:08	16:06
29	05:29	06:00 (9)	06:21		06:55 (4)	07:14		07:52 (2)	07:09		08:05	08:32
	11	06:11 (9)	20:16	26	07:21 (3)	19:02	19	08:11 (2)	16:54		16:07	16:07
30	05:30	06:02 (9)	06:23		07:02 (3)	07:16		07:51 (2)	07:11		08:06	08:32
	6	06:08 (9)	20:14	20	07:22 (3)	19:00	21	08:12 (2)	16:52		16:06	16:08
31	05:32		06:24		07:00 (3)				07:13			08:32
	21	06:16	20:12	21	07:21 (3)				16:50			16:09
Sonnenscheinstunden	508		458		382			330		262		237
astr.max.mögl.Beschattung	635		606		591			134				
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35			0.29				
Reduktion Betriebsdauer	0.96		0.96		0.96			0.96				
Reduktion Windrichtung	0.73		0.72		0.70			0.67				
Gesamte Reduktion	0.26		0.29		0.23			0.19				
Met.wahrsch.Beschattung	167		176		138			25				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt

Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EN - IO144

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32 08:03 07:08			06:54	07:34 (1) 05:46	06:38 (4) 04:59
	16:10 17:00 17:55			19:51	25 07:59 (1) 20:45	27 07:05 (4) 21:34
2	08:32 08:02 07:05			06:52	07:35 (1) 05:44	06:39 (4) 04:58
	16:12 17:02 17:57			19:53	24 07:59 (1) 20:47	25 07:04 (4) 21:35
3	08:32 08:00 07:03			06:49	07:35 (1) 05:42	06:39 (4) 04:57
	16:13 17:04 17:58			19:55	23 07:58 (1) 20:49	24 07:03 (4) 21:36
4	08:32 07:58 07:01			06:47	07:35 (1) 05:41	06:40 (4) 04:56
	16:14 17:06 18:00			19:57	21 07:56 (1) 20:50	22 07:02 (4) 21:37
5	08:32 07:57 06:58			06:45	07:08 (3) 05:39	06:41 (4) 04:55
	16:15 17:08 18:02			19:59	24 07:55 (1) 20:52	19 07:00 (4) 21:38
6	08:31 07:55 06:56			06:42	07:05 (3) 05:37	06:42 (4) 04:55
	16:16 17:10 18:04			20:00	25 07:52 (1) 20:54	16 06:58 (4) 21:39
7	08:31 07:53 06:54		07:17 (2)	06:40	07:03 (3) 05:35	06:45 (4) 04:54
	16:18 17:12 18:06		7 07:24 (2)	20:02	23 07:49 (1) 20:56	12 06:57 (4) 21:40
8	08:30 07:51 06:51		07:15 (2)	06:37	07:01 (3) 05:33	06:48 (4) 04:53
	16:19 17:14 18:08		12 07:27 (2)	20:04	18 07:19 (3) 20:57	5 06:53 (4) 21:41
9	08:30 07:49 06:49		07:13 (2)	06:35	06:59 (3) 05:31	04:53
	16:20 17:16 18:10		15 07:28 (2)	20:06	20 07:19 (3) 20:59	21:42
10	08:29 07:48 06:47		07:10 (2)	06:33	06:59 (3) 05:29	04:52
	16:22 17:18 18:11		19 07:29 (2)	20:08	20 07:19 (3) 21:01	21:43
11	08:29 07:46 06:44		07:10 (2)	06:30	06:58 (3) 05:27	04:52
	16:23 17:20 18:13		19 07:29 (2)	20:09	22 07:20 (3) 21:03	21:44
12	08:28 07:44 06:42		07:09 (2)	06:28	06:58 (3) 05:26	04:52
	16:25 17:22 18:15		21 07:30 (2)	20:11	22 07:20 (3) 21:04	21:44
13	08:27 07:42 06:40		07:08 (2)	06:26	06:57 (3) 05:24	04:51
	16:26 17:24 18:17		21 07:29 (2)	20:13	22 07:19 (3) 21:06	21:45
14	08:26 07:40 06:37		07:08 (2)	06:23	06:58 (3) 05:22	04:51
	16:28 17:26 18:19		21 07:29 (2)	20:15	20 07:18 (3) 21:08	21:46
15	08:25 07:38 06:35		07:08 (2)	06:21	06:58 (3) 05:21	05:51 (9) 04:51
	16:30 17:28 18:21		20 07:28 (2)	20:17	20 07:18 (3) 21:09	3 05:54 (9) 21:46
16	08:24 07:36 06:32		07:09 (2)	06:19	06:51 (4) 05:19	05:47 (8) 04:51
	16:31 17:30 18:23		19 07:28 (2)	20:18	26 07:17 (3) 21:11	9 05:56 (9) 21:47
17	08:23 07:34 06:30		07:09 (2)	06:17	06:46 (4) 05:17	05:46 (9) 04:50
	16:33 17:32 18:24		17 07:26 (2)	20:20	28 07:14 (3) 21:12	12 05:58 (9) 21:47
18	08:22 07:32 06:28		07:10 (2)	06:14	06:44 (4) 05:16	05:46 (9) 04:50
	16:35 17:34 18:26		15 07:25 (2)	20:22	29 07:13 (3) 21:14	14 06:00 (9) 21:48
19	08:21 07:29 06:25		07:12 (2)	06:12	06:43 (4) 05:14	05:44 (9) 04:50
	16:36 17:35 18:28		11 07:23 (2)	20:24	26 07:09 (3) 21:16	16 06:00 (9) 21:48
20	08:20 07:27 06:23			06:10	06:42 (4) 05:13	05:44 (9) 04:51
	16:38 17:37 18:30			20:26	24 07:06 (4) 21:17	17 06:01 (9) 21:48
21	08:19 07:25 06:20			06:08	06:41 (4) 05:12	05:44 (9) 04:51
	16:40 17:39 18:32			20:27	25 07:06 (4) 21:19	18 06:02 (9) 21:49
22	08:18 07:23 06:18		06:46 (1)	06:05	06:40 (4) 05:10	05:43 (9) 04:51
	16:42 17:41 18:33		8 06:54 (1)	20:29	27 07:07 (4) 21:20	18 06:01 (9) 21:49
23	08:17 07:21 06:16		06:43 (1)	06:03	06:39 (4) 05:09	05:43 (9) 04:51
	16:43 17:43 18:35		14 06:57 (1)	20:31	28 07:07 (4) 21:22	19 06:02 (9) 21:49
24	08:15 07:19 06:13		06:40 (1)	06:01	06:39 (4) 05:07	05:43 (9) 04:51
	16:45 17:45 18:37		18 06:58 (1)	20:33	29 07:08 (4) 21:23	19 06:02 (9) 21:49
25	08:14 07:16 06:11		06:39 (1)	05:59	06:37 (4) 05:06	05:43 (9) 04:52
	16:47 17:47 18:39		21 07:00 (1)	20:35	30 07:07 (4) 21:24	19 06:02 (9) 21:49
26	08:13 07:14 06:08		06:38 (1)	05:57	06:37 (4) 05:05	05:43 (9) 04:52
	16:49 17:49 18:41		23 07:01 (1)	20:36	30 07:07 (4) 21:26	20 06:03 (8) 21:49
27	08:11 07:12 06:06		06:36 (1)	05:55	06:37 (4) 05:04	05:43 (9) 04:53
	16:50 17:51 18:42		25 07:01 (1)	20:38	29 07:06 (4) 21:27	21 06:04 (8) 21:49
28	08:10 07:10 06:04		06:36 (1)	05:53	06:37 (4) 05:03	05:43 (8) 04:53
	16:53 17:53 18:44		25 07:01 (1)	20:40	29 07:06 (4) 21:29	21 06:04 (8) 21:49
29	08:08 07:01 05:51		07:35 (1)	05:51	06:37 (4) 05:02	05:43 (8) 04:54
	16:55 17:46 18:37		26 08:01 (1)	20:42	29 07:06 (4) 21:30	22 06:05 (8) 21:49
30	08:07 06:59 05:49		07:34 (1)	05:49	06:38 (4) 05:00	05:42 (8) 04:54
	16:57 17:48 18:39		27 08:01 (1)	20:43	28 07:06 (4) 21:31	23 06:05 (8) 21:48
31	08:05 06:56 05:46		07:35 (1)		04:59	05:42 (8)
	16:58 17:49 18:40		26 08:01 (1)		21:32	23 06:05 (8)
Sonnenscheinstunden	253	275	367	418	491	506
astr. max.mögl. Beschattung			430	746	444	725
Red. Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.69	0.72	0.72	0.73
Gesamte Reduktion			0.18	0.26	0.30	0.27
Met. wahrsch. Beschattung			79	190	132	195

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EN - IO144

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55	05:48 (8) 05:34	06:26	06:57 (3) 07:18	07:48 (2) 07:14	08:08
	24	06:12 (8) 21:14	20:09	22 07:19 (3) 18:57	21 08:09 (2) 16:48	16:05
2	04:56	05:48 (8) 05:35	06:28	06:58 (3) 07:20	07:48 (2) 07:16	08:09
	25	06:13 (8) 21:12	20:07	20 07:18 (3) 18:55	21 08:09 (2) 16:46	16:05
3	04:56	05:49 (8) 05:37	06:30	06:57 (3) 07:21	07:48 (2) 07:18	08:11
	24	06:13 (8) 21:11	20:05	20 07:17 (3) 18:52	19 08:07 (2) 16:44	16:04
4	04:57	05:48 (8) 05:38	06:31	06:58 (3) 07:23	07:49 (2) 07:20	08:12
	25	06:13 (8) 21:09	20:02	18 07:16 (3) 18:50	17 08:06 (2) 16:42	16:03
5	04:58	05:48 (8) 05:40	06:33	07:00 (3) 07:25	07:51 (2) 07:22	08:14
	25	06:13 (8) 21:07	8 07:05 (4) 20:00	23 07:46 (1) 18:48	13 08:04 (2) 16:41	16:03
6	04:59	05:49 (8) 05:42	06:35	07:01 (3) 07:27	07:53 (2) 07:24	08:15
	24	06:13 (8) 21:05	14 07:07 (4) 19:58	25 07:48 (1) 18:45	9 08:02 (2) 16:39	16:02
7	05:00	05:49 (8) 05:43	06:36	07:03 (3) 07:28	07:26	08:16
	25	06:14 (8) 21:03	17 07:09 (4) 19:55	24 07:50 (1) 18:43	16:37	16:02
8	05:01	05:49 (8) 05:45	06:38	07:31 (1) 07:30	07:28	08:18
	25	06:14 (8) 21:01	20 07:10 (4) 19:53	20 07:51 (1) 18:41	16:35	16:01
9	05:02	05:50 (8) 05:47	06:40	07:29 (1) 07:32	07:30	08:19
	24	06:14 (8) 20:59	23 07:12 (4) 19:50	22 07:51 (1) 18:38	16:33	16:01
10	05:03	05:50 (8) 05:48	06:42	07:28 (1) 07:34	07:31	08:20
	24	06:14 (8) 20:57	24 07:12 (4) 19:48	24 07:52 (1) 18:36	16:32	16:01
11	05:04	05:50 (8) 05:50	06:47 (4) 06:43	07:27 (1) 07:36	07:33	08:21
	24	06:14 (8) 20:55	26 07:13 (4) 19:46	26 07:53 (1) 18:34	16:30	16:01
12	05:05	05:50 (8) 05:52	06:47 (4) 06:45	07:26 (1) 07:37	07:35	08:22
	24	06:14 (8) 20:53	27 07:14 (4) 19:43	26 07:52 (1) 18:31	16:28	16:00
13	05:06	05:51 (8) 05:54	06:46 (4) 06:47	07:26 (1) 07:39	07:37	08:23
	23	06:14 (8) 20:51	28 07:14 (4) 19:41	26 07:52 (1) 18:29	16:27	16:00
14	05:07	05:51 (8) 05:55	06:45 (4) 06:48	07:26 (1) 07:41	07:39	08:24
	22	06:13 (8) 20:49	29 07:14 (4) 19:38	26 07:52 (1) 18:27	16:25	16:00
15	05:09	05:51 (8) 05:57	06:44 (4) 06:50	07:25 (1) 07:43	07:41	08:25
	22	06:13 (8) 20:47	30 07:14 (4) 19:36	26 07:51 (1) 18:24	16:24	16:00
16	05:10	05:51 (8) 05:59	06:45 (4) 06:52	07:25 (1) 07:45	07:43	08:26
	22	06:13 (8) 20:45	29 07:14 (4) 19:33	25 07:50 (1) 18:22	16:22	16:00
17	05:11	05:53 (9) 06:00	06:45 (4) 06:54	07:26 (1) 07:46	07:44	08:27
	20	06:13 (8) 20:43	29 07:14 (4) 19:31	23 07:49 (1) 18:20	16:21	16:01
18	05:13	05:53 (9) 06:02	06:44 (4) 06:55	07:26 (1) 07:48	07:46	08:28
	19	06:12 (9) 20:41	29 07:13 (4) 19:29	22 07:48 (1) 18:18	16:19	16:01
19	05:14	05:53 (9) 06:04	06:44 (4) 06:57	07:27 (1) 07:50	07:48	08:28
	19	06:12 (9) 20:39	29 07:13 (4) 19:26	19 07:46 (1) 18:15	16:18	16:01
20	05:15	05:53 (9) 06:05	06:44 (4) 06:59	07:29 (1) 07:52	07:50	08:29
	18	06:11 (9) 20:37	28 07:12 (4) 19:24	15 07:44 (1) 18:13	16:17	16:01
21	05:17	05:53 (9) 06:07	06:45 (4) 07:00	07:30 (1) 07:54	07:51	08:30
	19	06:12 (9) 20:34	27 07:12 (4) 19:21	11 07:41 (1) 18:11	16:15	16:02
22	05:18	05:53 (9) 06:09	06:45 (4) 07:02	07:25 (1) 07:56	07:53	08:30
	18	06:11 (9) 20:32	26 07:11 (4) 19:19	18:09	16:14	16:02
23	05:20	05:54 (9) 06:11	06:45 (4) 07:04	07:58	07:55	08:31
	17	06:11 (9) 20:30	24 07:09 (4) 19:16	18:07	16:13	16:03
24	05:21	05:55 (9) 06:12	06:47 (4) 07:06	07:56 (2) 07:59	07:57	08:31
	16	06:11 (9) 20:28	27 07:14 (3) 19:14	9 08:05 (2) 18:05	16:12	16:03
25	05:23	05:55 (9) 06:14	06:48 (4) 07:07	07:53 (2) 07:01	07:58	08:32
	15	06:10 (9) 20:25	29 07:17 (3) 19:12	14 08:07 (2) 17:02	16:11	16:04
26	05:24	05:56 (9) 06:16	06:49 (4) 07:09	07:52 (2) 07:03	08:00	08:32
	14	06:10 (9) 20:23	28 07:17 (3) 19:09	16 08:08 (2) 17:00	16:10	16:05
27	05:26	05:57 (9) 06:18	06:53 (4) 07:11	07:51 (2) 07:05	08:02	08:32
	11	06:08 (9) 20:21	25 07:19 (3) 19:07	18 08:09 (2) 16:58	16:09	16:05
28	05:27	05:59 (9) 06:19	06:59 (3) 07:13	07:49 (2) 07:07	08:03	08:32
	7	06:06 (9) 20:19	19 07:18 (3) 19:04	20 08:09 (2) 16:56	16:08	16:06
29	05:29	06:21	06:59 (3) 07:14	07:48 (2) 07:09	08:05	08:32
	21	20:16	20 07:19 (3) 19:02	21 08:09 (2) 16:54	16:07	16:07
30	05:30	06:23	06:58 (3) 07:16	07:48 (2) 07:11	08:06	08:32
	21	20:14	21 07:19 (3) 19:00	21 08:09 (2) 16:52	16:06	16:08
31	05:32	06:24	06:57 (3)	07:13	08:32	
	21	20:12	22 07:19 (3)	16:50	16:09	
Sonnenscheinstunden	508	458	382	330	262	237
astr.max.mögl.Beschattung	575	658	582	100		
Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29		
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96		
Reduktion Windrichtung	0.73	0.72	0.70	0.67		
Gesamte Reduktion	0.26	0.29	0.23	0.19		
Met.wahrsch.Beschattung	151	191	136	19		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EO - IO145

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:34 (1)	05:46	06:41 (4)	04:59
	16:10	17:00	17:55	19:51	24 07:58 (1)	20:45	23 07:04 (4)	21:34
2	08:32	08:02	07:05	06:52	07:34 (1)	05:44	06:42 (4)	04:58
	16:12	17:02	17:57	19:53	23 07:57 (1)	20:47	21 07:03 (4)	21:35
3	08:32	08:00	07:03	06:49	07:35 (1)	05:42	06:43 (4)	04:57
	16:13	17:04	17:58	19:55	22 07:57 (1)	20:49	18 07:01 (4)	21:36
4	08:32	07:58	07:01	06:47	07:35 (1)	05:41	06:44 (4)	04:56
	16:14	17:06	18:00	19:57	20 07:55 (1)	20:50	16 07:00 (4)	21:37
5	08:32	07:57	06:58	06:45	07:08 (3)	05:39	06:46 (4)	04:55
	16:15	17:08	18:02	19:59	24 07:53 (1)	20:52	11 06:57 (4)	21:38
6	08:31	07:55	06:56	06:42	07:05 (3)	05:37		04:55
	16:16	17:10	18:04	20:00	24 07:50 (1)	20:54		21:39
7	08:31	07:53	06:54	07:17 (2)	06:40	07:03 (3)	05:35	04:54
	16:18	17:12	18:06	3 07:20 (2)	20:02	16 07:19 (3)	20:56	21:40
8	08:30	07:51	06:51	07:15 (2)	06:37	07:01 (3)	05:33	04:53
	16:19	17:14	18:08	9 07:24 (2)	20:04	19 07:20 (3)	20:57	21:41
9	08:30	07:49	06:49	07:13 (2)	06:35	06:59 (3)	05:31	04:53
	16:20	17:16	18:10	13 07:26 (2)	20:06	20 07:19 (3)	20:59	21:42
10	08:29	07:48	06:47	07:10 (2)	06:33	06:59 (3)	05:29	04:52
	16:22	17:18	18:11	17 07:27 (2)	20:08	21 07:20 (3)	21:01	21:43
11	08:29	07:46	06:44	07:09 (2)	06:30	06:59 (3)	05:27	04:52
	16:23	17:20	18:13	19 07:28 (2)	20:09	21 07:20 (3)	21:03	21:44
12	08:28	07:44	06:42	07:08 (2)	06:28	06:59 (3)	05:26	04:52
	16:25	17:22	18:15	20 07:28 (2)	20:11	21 07:20 (3)	21:04	22 06:10 (8)
13	08:27	07:42	06:40	07:07 (2)	06:26	06:58 (3)	05:24	04:51
	16:26	17:24	18:17	21 07:28 (2)	20:13	20 07:18 (3)	21:06	2 05:54 (9)
14	08:26	07:40	06:37	07:07 (2)	06:23	06:59 (3)	05:22	04:50
	16:28	17:26	18:19	21 07:28 (2)	20:15	19 07:18 (3)	21:08	8 05:58 (9)
15	08:25	07:38	06:35	07:07 (2)	06:21	06:52 (4)	05:21	04:49
	16:30	17:28	18:21	20 07:27 (2)	20:17	25 07:17 (3)	21:09	12 06:01 (9)
16	08:24	07:36	06:32	07:07 (2)	06:19	06:48 (4)	05:19	04:48
	16:31	17:30	18:23	19 07:26 (2)	20:18	28 07:16 (3)	21:11	14 06:01 (9)
17	08:23	07:34	06:30	07:07 (2)	06:17	06:45 (4)	05:17	04:47
	16:33	17:32	18:24	18 07:25 (2)	20:20	28 07:13 (3)	21:12	15 06:02 (9)
18	08:22	07:32	06:28	07:09 (2)	06:14	06:44 (4)	05:16	04:46
	16:35	17:34	18:26	14 07:23 (2)	20:22	26 07:10 (3)	21:14	16 06:03 (9)
19	08:21	07:29	06:25	07:11 (2)	06:12	06:43 (4)	05:14	04:45
	16:36	17:35	18:28	11 07:22 (2)	20:24	23 07:06 (4)	21:16	17 06:03 (9)
20	08:20	07:27	06:23	06:10	06:42 (4)	05:13	04:44	04:51
	16:38	17:37	18:30	20:26	25 07:07 (4)	21:17	18 06:04 (9)	21:48
21	08:19	07:25	06:20	06:08	06:41 (4)	05:12	04:43	04:51
	16:40	17:39	18:32	20:27	27 07:08 (4)	21:19	19 06:05 (8)	21:49
22	08:18	07:23	06:18	06:45 (1)	06:06	06:41 (4)	05:10	04:51
	16:42	17:41	18:33	8 06:53 (1)	20:29	27 07:08 (4)	21:20	20 06:05 (8)
23	08:17	07:21	06:16	06:42 (1)	06:03	06:40 (4)	05:09	04:50
	16:43	17:43	18:35	14 06:56 (1)	20:31	28 07:08 (4)	21:22	21 06:06 (8)
24	08:15	07:19	06:13	06:39 (1)	06:01	06:40 (4)	05:07	04:49
	16:45	17:45	18:37	18 06:57 (1)	20:33	28 07:08 (4)	21:23	21 06:06 (8)
25	08:14	07:16	06:11	06:38 (1)	05:59	06:39 (4)	05:06	04:48
	16:47	17:47	18:39	21 06:59 (1)	20:35	28 07:07 (4)	21:24	22 06:07 (8)
26	08:13	07:14	06:08	06:37 (1)	05:57	06:39 (4)	05:05	04:47
	16:49	17:49	18:41	23 07:00 (1)	20:36	28 07:07 (4)	21:26	22 06:07 (8)
27	08:11	07:12	06:06	06:36 (1)	05:55	06:39 (4)	05:04	04:46
	16:51	17:51	18:42	24 07:00 (1)	20:38	27 07:06 (4)	21:27	23 06:08 (8)
28	08:10	07:10	06:04	06:35 (1)	05:53	06:39 (4)	05:03	04:45
	16:53	17:53	18:44	25 07:00 (1)	20:40	27 07:06 (4)	21:29	23 06:08 (8)
29	08:08	07:01	06:34 (1)	05:51	06:40 (4)	05:02	04:44	04:54
	16:55	19:46	25 07:59 (1)	20:42	26 07:06 (4)	21:30	23 06:08 (8)	21:49
30	08:07	06:59	07:34 (1)	05:49	06:40 (4)	05:00	04:43	04:54
	16:57	19:48	25 07:59 (1)	20:43	25 07:05 (4)	21:31	23 06:08 (8)	21:48
31	08:05	06:56	07:34 (1)			04:59	04:42	
	16:58	19:50	25 07:59 (1)			21:32	23 06:08 (8)	
Sonnenscheinstunden	253	275	367	418	491	506	657	
astr.max.mögl.Beschattung			413	720	431	0.39		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.69	0.72	0.72	0.73		
Gesamte Reduktion			0.18	0.26	0.30	0.27		
Met.wahrsch.Beschattung			76	184	129	177		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EO - IO145

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.38	2.33	3.28	5.21	6.82	6.54	6.22	6.27	4.44	3.10	1.68	1.06

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
302	339	467	706	786	617	554	815	1,348	1,328	721	398	8,381

Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November		Dezember	
1	04:55	05:52 (8)	05:34		06:26	06:58 (3)	07:18	07:47 (2)	07:14	08:08	
	21:48	05:52 (8)	21:14		20:09	07:19 (3)	18:57	20	08:07 (2)	16:48	16:05
2	04:56	05:52 (8)	05:35		06:28	06:58 (3)	07:20		07:47 (2)	07:16	08:09
	21:48	06:14 (8)	21:12		20:07	07:19 (3)	18:55	20	08:07 (2)	16:46	16:05
3	04:56	05:52 (8)	05:37		06:30	06:57 (3)	07:21		07:47 (2)	07:18	08:11
	21:47	06:15 (8)	21:11		20:05	07:17 (3)	18:52	18	08:05 (2)	16:44	16:04
4	04:57	05:52 (8)	05:38		06:31	06:58 (3)	07:23		07:49 (2)	07:20	08:12
	21:47	06:15 (8)	21:09		20:02	07:17 (3)	18:50	15	08:04 (2)	16:42	16:03
5	04:58	05:52 (8)	05:40		06:33	07:00 (3)	07:25		07:51 (2)	07:22	08:14
	21:46	06:15 (8)	21:07		20:00	07:16 (3)	18:48	11	08:02 (2)	16:41	16:03
6	04:59	05:52 (8)	05:42		06:35	07:01 (3)	07:27		07:53 (2)	07:24	08:15
	21:46	06:15 (8)	21:05		19:58	07:46 (1)	18:45	7	08:00 (2)	16:39	16:02
7	05:00	05:52 (8)	05:43		06:36	07:03 (3)	07:28			07:26	08:16
	21:45	06:16 (8)	21:03	7	06:58 (4)	07:05 (4)	19:55	24	07:48 (1)	18:43	16:02
8	05:01	05:53 (8)	05:45		06:38	07:31 (1)	07:30			07:28	08:18
	21:45	06:16 (8)	21:01	12	07:07 (4)	19:53	19	07:50 (1)	18:41	16:35	16:01
9	05:02	05:53 (8)	05:47		06:40	07:29 (1)	07:32			07:30	08:19
	21:44	06:16 (8)	20:59	17	07:10 (4)	19:50	21	07:50 (1)	18:38	16:33	16:01
10	05:03	05:53 (8)	05:48		06:42	06:51 (4)	06:42		07:28 (1)	07:34	08:20
	21:43	06:17 (8)	20:57	19	07:10 (4)	19:48	23	07:51 (1)	18:36	16:32	16:01
11	05:04	05:53 (8)	05:50		06:43	06:50 (4)	06:43		07:27 (1)	07:36	08:21
	21:42	06:17 (8)	20:55	22	07:12 (4)	19:46	24	07:51 (1)	18:34	16:30	16:01
12	05:05	05:53 (8)	05:52		06:45	06:49 (4)	06:45		07:26 (1)	07:37	08:22
	21:41	06:17 (8)	20:53	24	07:13 (4)	19:43	25	07:51 (1)	18:31	16:28	16:00
13	05:06	05:53 (8)	05:54		06:47	06:48 (4)	06:47		07:25 (1)	07:39	08:23
	21:40	06:17 (8)	20:51	25	07:13 (4)	19:41	26	07:51 (1)	18:29	16:27	16:00
14	05:07	05:53 (8)	05:55		06:48	06:47 (4)	06:48		07:25 (1)	07:41	08:24
	21:39	06:17 (8)	20:49	27	07:14 (4)	19:38	26	07:51 (1)	18:27	16:25	16:00
15	05:09	05:53 (8)	05:57		06:50	06:46 (4)	06:50		07:25 (1)	07:43	08:25
	21:38	06:17 (8)	20:47	27	07:13 (4)	19:36	24	07:49 (1)	18:24	16:24	16:00
16	05:10	05:53 (8)	05:59		06:52	06:46 (4)	06:52		07:25 (1)	07:45	08:26
	21:37	06:16 (8)	20:45	28	07:14 (4)	19:33	24	07:49 (1)	18:22	16:22	16:00
17	05:11	05:55 (8)	06:00		06:54	06:46 (4)	06:54		07:25 (1)	07:46	08:27
	21:36	06:17 (8)	20:43	28	07:14 (4)	19:31	23	07:48 (1)	18:20	16:21	16:01
18	05:13	05:55 (9)	06:02		06:55	06:45 (4)	06:55		07:25 (1)	07:48	08:28
	21:35	06:17 (8)	20:41	29	07:14 (4)	19:29	21	07:46 (1)	18:18	16:19	16:01
19	05:14	05:55 (9)	06:04		06:57	06:45 (4)	06:57		07:26 (1)	07:50	08:28
	21:34	06:16 (8)	20:39	29	07:14 (4)	19:26	19	07:45 (1)	18:15	16:18	16:01
20	05:15	05:55 (9)	06:05		06:59	06:45 (4)	06:59		07:28 (1)	07:52	08:29
	21:32	06:15 (8)	20:37	28	07:13 (4)	19:24	16	07:44 (1)	18:13	16:17	16:01
21	05:17	05:56 (9)	06:07		07:00	06:45 (4)	07:00		07:29 (1)	07:54	08:30
	21:31	06:16 (8)	20:34	28	07:13 (4)	19:21	11	07:40 (1)	18:11	16:15	16:02
22	05:18	05:55 (9)	06:09		07:02	06:46 (4)	07:02			07:56	08:30
	21:30	06:15 (8)	20:32	26	07:12 (4)	19:19				18:09	16:02
23	05:20	05:55 (9)	06:11		07:04	06:46 (4)	07:04			07:58	08:31
	21:28	06:14 (8)	20:30	25	07:11 (4)	19:16				18:07	16:03
24	05:21	05:56 (9)	06:12		07:06	06:47 (4)	07:06		07:54 (2)	07:59	08:31
	21:27	06:14 (9)	20:28	23	07:10 (4)	19:14	9	08:03 (2)	18:05	16:12	16:03
25	05:23	05:56 (9)	06:14		07:07	06:48 (4)	07:07		07:52 (2)	07:01	08:32
	21:25	06:13 (9)	20:25	26	07:14 (3)	19:12	14	08:06 (2)	17:02	16:11	16:04
26	05:24	05:57 (9)	06:16		07:09	06:48 (4)	07:09		07:50 (2)	07:03	08:32
	21:24	06:13 (9)	20:23	28	07:16 (3)	19:09	17	08:07 (2)	17:00	16:10	16:05
27	05:26	05:58 (9)	06:18		07:11	06:50 (4)	07:11		07:49 (2)	07:05	08:32
	21:22	06:12 (9)	20:21	28	07:18 (3)	19:07	19	08:08 (2)	16:58	16:09	16:05
28	05:27	05:59 (9)	06:19		07:13	06:53 (4)	07:13		07:48 (2)	07:07	08:03
	21:21	06:12 (9)	20:19	25	07:18 (3)	19:04	19	08:07 (2)	16:56	16:08	16:06
29	05:29	06:00 (9)	06:21		07:14	07:00 (3)	07:14		07:47 (2)	07:09	08:05
	21:19	06:10 (9)	20:16	19	07:19 (3)	19:02	21	08:08 (2)	16:54	16:07	16:07
30	05:30	06:01 (9)	06:23		07:16	06:59 (3)	07:16		07:47 (2)	07:11	08:06
	21:18	06:08 (9)	20:14	20	07:19 (3)	19:00	21	08:08 (2)	16:52	16:06	16:08
31	05:32		06:24		06:58 (3)					07:13	08:32
	21:16		20:12	21	07:19 (3)					16:50	16:09
	Sonnenscheinstunden	508	458		382		330		262		237
	astr.max.mögl.Beschattung	612	591		566		91				
	Red.Sonnenscheinwahrsch.	0.38	0.42		0.35		0.29				
	Reduktion Betriebsdauer	0.96	0.96		0.96		0.96				
	Reduktion Windrichtung	0.73	0.72		0.70		0.68				
	Gesamte Reduktion	0.26	0.29		0.23		0.19				
	Met.wahrsch.Beschattung	161	172		132		17				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EP - IO146

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:31 (1)	05:46	06:37 (4)	04:59
	16:10	17:00	17:55	19:51	25 07:56 (1)	20:45	25 07:02 (4)	21:34
2	08:32	08:02	07:05	06:52	07:31 (1)	05:44	06:37 (4)	04:58
	16:12	17:02	17:57	19:53	24 07:55 (1)	20:47	24 07:01 (4)	21:35
3	08:32	08:00	07:03	06:49	07:31 (1)	05:42	06:38 (4)	04:57
	16:13	17:04	17:58	19:55	24 07:55 (1)	20:49	22 07:00 (4)	21:36
4	08:32	07:58	07:01	06:47	07:31 (1)	05:41	06:39 (4)	04:56
	16:14	17:06	18:00	19:57	22 07:53 (1)	20:50	20 06:59 (4)	21:37
5	08:32	07:57	06:58	06:45	07:32 (1)	05:39	06:40 (4)	04:55
	16:15	17:08	18:02	19:59	20 07:52 (1)	20:52	17 06:57 (4)	21:38
6	08:31	07:55	06:56	06:42	07:05 (3)	05:37	06:41 (4)	04:55
	16:16	17:10	18:04	20:00	24 07:50 (1)	20:54	14 06:55 (4)	21:39
7	08:31	07:53	06:54	06:40	07:03 (3)	05:35	06:44 (4)	04:54
	16:18	17:12	18:06	20:02	25 07:48 (1)	20:56	9 06:53 (4)	21:40
8	08:30	07:51	06:51	06:37	07:01 (3)	05:33		04:53
	16:19	17:14	18:08	20:04	20 07:44 (1)	20:57		21:41
9	08:30	07:49	06:49		07:13 (2)	06:35		04:53
	16:20	17:16	18:10	9 07:22 (2)	20:06	18 07:16 (3)	20:59	21:42
10	08:29	07:48	06:47		07:10 (2)	06:33		04:52
	16:22	17:18	18:11	13 07:23 (2)	20:08	20 07:17 (3)	21:01	21:43
11	08:29	07:46	06:44		07:08 (2)	06:30		04:52
	16:23	17:20	18:13	17 07:25 (2)	20:09	20 07:17 (3)	21:03	21:44
12	08:28	07:44	06:42		07:07 (2)	06:28		04:52
	16:25	17:22	18:15	18 07:25 (2)	20:11	20 07:17 (3)	21:04	21:44
13	08:27	07:42	06:40		07:05 (2)	06:26		04:51
	16:26	17:24	18:17	20 07:25 (2)	20:13	20 07:16 (3)	21:06	21:45
14	08:26	07:40	06:37		07:05 (2)	06:23		04:51
	16:28	17:26	18:19	21 07:26 (2)	20:15	20 07:16 (3)	21:08	21:46
15	08:25	07:38	06:35		07:04 (2)	06:21		04:51
	16:30	17:28	18:21	21 07:25 (2)	20:17	20 07:16 (3)	21:09	21:46
16	08:24	07:36	06:32		07:05 (2)	06:19	7 05:49 (9)	21:47
	16:31	17:30	18:23	20 07:25 (2)	20:18	18 07:15 (3)	21:11	21:47
17	08:23	07:34	06:30		07:04 (2)	06:17	11 05:58 (9)	21:47
	16:33	17:32	18:24	19 07:23 (2)	20:20	27 07:13 (3)	21:12	21:47
18	08:22	07:32	06:28		07:05 (2)	06:14	13 05:59 (9)	21:47
	16:35	17:34	18:26	17 07:22 (2)	20:22	28 07:11 (3)	21:14	21:48
19	08:21	07:29	06:25		07:06 (2)	06:12	15 06:00 (9)	21:48
	16:36	17:35	18:28	15 07:21 (2)	20:24	27 07:08 (3)	21:16	21:48
20	08:20	07:27	06:23		07:07 (2)	06:10	16 06:00 (9)	21:48
	16:38	17:37	18:30	12 07:19 (2)	20:26	23 07:03 (4)	21:17	21:48
21	08:19	07:25	06:20		07:12 (2)	06:08	17 06:01 (9)	21:48
	16:40	17:39	18:32	2 07:14 (2)	20:27	25 07:04 (4)	21:19	21:49
22	08:18	07:23	06:18		07:14 (2)	06:06	18 06:02 (9)	21:49
	16:42	17:41	18:33		20:29	26 07:04 (4)	21:20	21:49
23	08:17	07:21	06:16		06:44 (1)	06:03	18 06:01 (9)	21:49
	16:43	17:43	18:35	5 06:49 (1)	20:31	27 07:05 (4)	21:22	21:49
24	08:15	07:19	06:13		06:39 (1)	06:01	19 06:02 (9)	21:49
	16:45	17:45	18:37	13 06:52 (1)	20:33	28 07:05 (4)	21:23	21:49
25	08:14	07:16	06:11		06:37 (1)	05:59	20 06:03 (8)	21:49
	16:47	17:47	18:39	17 06:54 (1)	20:35	28 07:04 (4)	21:24	21:49
26	08:13	07:14	06:08		06:36 (1)	05:57	19 06:03 (8)	21:49
	16:49	17:49	18:41	20 06:56 (1)	20:36	28 07:04 (4)	21:26	21:49
27	08:11	07:12	06:06		06:34 (1)	05:55	21 06:04 (8)	21:49
	16:50	17:51	18:42	22 06:56 (1)	20:38	29 07:04 (4)	21:27	21:49
28	08:10	07:10	06:04		06:33 (1)	05:53	21 06:04 (8)	21:49
	16:53	17:53	18:44	24 06:57 (1)	20:40	28 07:03 (4)	21:29	21:49
29	08:08		07:01		07:32 (1)	05:51	22 06:05 (8)	21:49
	16:55		19:46	24 07:56 (1)	20:42	28 07:04 (4)	21:30	21:49
30	08:07		06:59		07:31 (1)	05:49	22 06:05 (8)	21:49
	16:57		19:48	26 07:57 (1)	20:43	26 07:03 (4)	21:31	21:48
31	08:05		06:56		07:31 (1)		22 06:05 (8)	21:48
	16:58		19:50	26 07:57 (1)			05:00	05:42 (8)
Sonnenscheinstunden	253	275	367	418	491	506		
astr.max.mögl.Beschattung			381	718	435	680		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.69	0.72	0.72	0.73		
Gesamte Reduktion			0.18	0.26	0.30	0.27		
Met.wahrsch.Beschattung			70	183	129	183		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EP - IO146
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:49 (8)	05:34		06:26	06:56 (3)	07:18		07:45 (2)	07:14	08:08	
	21:48	06:12 (8)	21:14		20:09	07:16 (3)	18:57	20	08:05 (2)	16:48	16:05	
2	04:56	05:49 (8)	05:35		06:28	06:56 (3)	07:20		07:46 (2)	07:16	08:09	
	21:48	06:12 (8)	21:12		20:07	07:16 (3)	18:55	18	08:04 (2)	16:46	16:05	
3	04:56	05:50 (8)	05:37		06:30	06:56 (3)	07:21		07:47 (2)	07:18	08:11	
	21:47	06:13 (8)	21:11		20:05	07:14 (3)	18:52	15	08:02 (2)	16:44	16:04	
4	04:57	05:49 (8)	05:38		06:31	06:58 (3)	07:23		07:49 (2)	07:20	08:12	
	21:47	06:12 (8)	21:09		20:02	07:41 (1)	18:50	11	08:00 (2)	16:42	16:03	
5	04:58	05:49 (8)	05:40		06:33	07:00 (3)	07:25		07:51 (2)	07:22	08:14	
	21:46	06:13 (8)	21:07		20:00	07:45 (1)	18:48	6	07:57 (2)	16:41	16:03	
6	04:59	05:50 (8)	05:42	06:53 (4)	06:35	07:01 (3)	07:27			07:24	08:15	
	21:46	06:13 (8)	21:05	11	07:04 (4)	19:58	25	07:46 (1)	18:45	16:39	16:02	
7	05:00	05:50 (8)	05:43	06:51 (4)	06:36	07:27 (1)	07:28			07:26	08:16	
	21:45	06:13 (8)	21:03	15	07:06 (4)	19:55	20	07:47 (1)	18:43	16:37	16:02	
8	05:01	05:50 (8)	05:45	06:49 (4)	06:38	07:26 (1)	07:30			07:28	08:18	
	21:45	06:14 (8)	21:01	18	07:07 (4)	19:53	22	07:48 (1)	18:41	16:35	16:01	
9	05:02	05:50 (8)	05:47	06:48 (4)	06:40	07:25 (1)	07:32			07:30	08:19	
	21:44	06:14 (8)	20:59	21	07:09 (4)	19:50	23	07:48 (1)	18:38	16:33	16:01	
10	05:03	05:50 (8)	05:48	06:46 (4)	06:42	07:24 (1)	07:34			07:31	08:20	
	21:43	06:14 (8)	20:57	23	07:09 (4)	19:48	25	07:49 (1)	18:36	16:32	16:01	
11	05:04	05:51 (8)	05:50	06:46 (4)	06:43	07:24 (1)	07:36			07:33	08:21	
	21:42	06:14 (8)	20:55	24	07:10 (4)	19:46	25	07:49 (1)	18:34	16:30	16:01	
12	05:05	05:51 (8)	05:52	06:45 (4)	06:45	07:23 (1)	07:37			07:35	08:22	
	21:41	06:14 (8)	20:53	26	07:11 (4)	19:43	25	07:48 (1)	18:31	16:28	16:00	
13	05:06	05:51 (8)	05:54	06:44 (4)	06:47	07:23 (1)	07:39			07:37	08:23	
	21:40	06:14 (8)	20:51	27	07:11 (4)	19:41	25	07:48 (1)	18:29	16:27	16:00	
14	05:07	05:51 (8)	05:55	06:44 (4)	06:48	07:23 (1)	07:41			07:39	08:24	
	21:39	06:14 (8)	20:49	27	07:11 (4)	19:38	25	07:48 (1)	18:27	16:25	16:00	
15	05:09	05:51 (8)	05:57	06:43 (4)	06:50	07:22 (1)	07:43			07:41	08:25	
	21:38	06:13 (8)	20:47	28	07:11 (4)	19:36	24	07:46 (1)	18:24	16:24	16:00	
16	05:10	05:52 (8)	05:59	06:43 (4)	06:52	07:23 (1)	07:45			07:43	08:26	
	21:37	06:13 (8)	20:45	28	07:11 (4)	19:33	22	07:45 (1)	18:22	16:22	16:00	
17	05:11	05:53 (8)	06:00	06:43 (4)	06:54	07:24 (1)	07:46			07:44	08:27	
	21:36	06:14 (8)	20:43	28	07:11 (4)	19:31	20	07:44 (1)	18:20	16:21	16:01	
18	05:13	05:53 (9)	06:02	06:42 (4)	06:55	07:24 (1)	07:48			07:46	08:28	
	21:35	06:13 (8)	20:41	29	07:11 (4)	19:29	18	07:42 (1)	18:18	16:19	16:01	
19	05:14	05:53 (9)	06:04	06:43 (4)	06:57	07:26 (1)	07:50			07:48	08:28	
	21:34	06:12 (9)	20:39	27	07:10 (4)	19:26	14	07:40 (1)	18:15	16:18	16:01	
20	05:15	05:53 (9)	06:05	06:42 (4)	06:59	07:29 (1)	07:52			07:50	08:29	
	21:32	06:12 (8)	20:37	27	07:09 (4)	19:24	8	07:37 (1)	18:13	16:17	16:01	
21	05:17	05:54 (9)	06:07	06:43 (4)	07:00		07:54			07:51	08:30	
	21:31	06:12 (9)	20:34	26	07:09 (4)	19:21		18:11		16:15	16:02	
22	05:18	05:54 (9)	06:09	06:44 (4)	07:02		07:56			07:53	08:30	
	21:30	06:12 (9)	20:32	24	07:08 (4)	19:19		18:09		16:14	16:02	
23	05:20	05:54 (9)	06:11	06:44 (4)	07:04	07:53 (2)	07:58			07:55	08:31	
	21:28	06:11 (9)	20:30	22	07:06 (4)	19:16	9	08:02 (2)	18:07	16:13	16:03	
24	05:21	05:55 (9)	06:12	06:45 (4)	07:06	07:50 (2)	07:59			07:57	08:31	
	21:27	06:11 (9)	20:28	27	07:12 (3)	19:14	13	08:03 (2)	18:05	16:12	16:03	
25	05:23	05:55 (9)	06:14	06:47 (4)	07:07	07:48 (2)	07:01			07:58	08:32	
	21:25	06:10 (9)	20:25	28	07:15 (3)	19:12	17	08:05 (2)	17:02	16:11	16:04	
26	05:24	05:56 (9)	06:16	06:49 (4)	07:09	07:47 (2)	07:03			08:00	08:32	
	21:24	06:10 (9)	20:23	27	07:16 (3)	19:09	19	08:06 (2)	17:00	16:10	16:05	
27	05:26	05:57 (9)	06:18	06:59 (3)	07:11	07:46 (2)	07:05			08:02	08:32	
	21:22	06:09 (9)	20:21	18	07:17 (3)	19:07	20	08:06 (2)	16:58	16:09	16:06	
28	05:27	05:59 (9)	06:19	06:57 (3)	07:13	07:45 (2)	07:07			08:03	08:32	
	21:21	06:08 (9)	20:19	19	07:16 (3)	19:04	20	08:05 (2)	16:56	16:08	16:06	
29	05:29	06:00 (9)	06:21	06:57 (3)	07:14	07:45 (2)	07:09			08:05	08:32	
	21:19	06:06 (9)	20:16	20	07:17 (3)	19:02	20	08:05 (2)	16:54	16:07	16:07	
30	05:30		06:23	06:57 (3)	07:16	07:45 (2)	07:11			08:06	08:32	
	21:18		20:14	20	07:17 (3)	19:00	20	08:05 (2)	16:52	16:06	16:08	
31	05:32		06:24	06:56 (3)			07:13				08:32	
	21:16		20:12	20	07:16 (3)		16:50				16:09	
Sonnenscheinstunden	508		458		382		330			262	237	
astr.max.mögl.Beschattung	573		610		562		70					
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96					
Reduktion Windrichtung	0.73		0.72		0.70		0.68					
Gesamte Reduktion	0.26		0.29		0.23		0.19					
Met.wahrsch.Beschattung	151		177		132		13					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EQ - IO147

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	07:28 (1)	05:46	06:32 (4)	04:59	05:39 (8)	
	16:10	17:00	17:55	19:51	26 07:54 (1)	20:45	29 07:01 (4)	21:34	22 06:01 (8)	
2	08:32	08:02	07:05	06:52	07:28 (1)	05:44	06:33 (4)	04:58	05:39 (8)	
	16:12	17:02	17:57	19:53	26 07:54 (1)	20:47	27 07:00 (4)	21:35	23 06:02 (8)	
3	08:32	08:00	07:03	06:49	07:29 (1)	05:42	06:33 (4)	04:57	05:39 (8)	
	16:13	17:04	17:58	19:55	25 07:54 (1)	20:49	26 06:59 (4)	21:36	23 06:02 (8)	
4	08:32	07:58	07:01	06:47	07:28 (1)	05:41	06:33 (4)	04:56	05:39 (8)	
	16:14	17:06	18:00	19:57	25 07:53 (1)	20:50	26 06:59 (4)	21:37	23 06:02 (8)	
5	08:32	07:57	06:58	06:45	07:29 (1)	05:39	06:33 (4)	04:55	05:39 (8)	
	16:15	17:08	18:02	19:59	23 07:52 (1)	20:52	24 06:57 (4)	21:38	24 06:03 (8)	
6	08:31	07:55	06:56	06:42	07:29 (1)	05:37	06:34 (4)	04:55	05:39 (8)	
	16:16	17:10	18:04	20:00	21 07:50 (1)	20:54	22 06:56 (4)	21:39	23 06:02 (8)	
7	08:31	07:53	06:54	06:40	07:03 (3)	05:35	06:36 (4)	04:54	05:40 (8)	
	16:18	17:12	18:06	20:02	26 07:49 (1)	20:56	20 06:56 (4)	21:40	23 06:03 (8)	
8	08:30	07:51	06:51	06:37	07:01 (3)	05:33	06:37 (4)	04:53	05:39 (8)	
	16:19	17:14	18:08	20:04	26 07:47 (1)	20:57	17 06:54 (4)	21:41	24 06:03 (8)	
9	08:30	07:49	06:49	06:35	07:13 (2)	06:35	06:58 (3)	05:31	05:40 (8)	
	16:20	17:16	18:10	6 07:19 (2)	20:06	26 07:44 (1)	14 06:52 (4)	21:42	24 06:04 (8)	
10	08:29	07:48	06:47	07:10 (2)	06:33	06:56 (3)	05:29	06:41 (4)	05:39 (8)	
	16:22	17:18	18:11	11 07:21 (2)	20:08	18 07:14 (3)	9 06:50 (4)	21:43	24 06:03 (8)	
11	08:29	07:46	06:44	07:08 (2)	06:30	06:55 (3)	05:27	04:52	05:40 (8)	
	16:23	17:20	18:13	15 07:23 (2)	20:09	20 07:15 (3)	21:03	21:44	24 06:04 (8)	
12	08:28	07:44	06:42	07:06 (2)	06:28	06:55 (3)	05:26	04:52	05:40 (8)	
	16:25	17:22	18:15	18 07:24 (2)	20:11	20 07:15 (3)	21:04	21:44	24 06:04 (8)	
13	08:27	07:42	06:40	07:04 (2)	06:26	06:54 (3)	05:24	04:51	05:41 (8)	
	16:26	17:24	18:17	20 07:24 (2)	20:13	21 07:15 (3)	21:06	21:45	24 06:05 (8)	
14	08:26	07:40	06:37	07:04 (2)	06:23	06:53 (3)	05:22	04:51	05:40 (8)	
	16:28	17:26	18:19	21 07:25 (2)	20:15	22 07:15 (3)	21:08	21:46	24 06:04 (8)	
15	08:25	07:38	06:35	07:03 (2)	06:21	06:54 (3)	05:21	04:51	05:40 (8)	
	16:30	17:28	18:21	21 07:24 (2)	20:17	20 07:14 (3)	21:09	21:46	24 06:04 (8)	
16	08:24	07:36	06:32	07:03 (2)	06:19	06:54 (3)	05:19	04:51	05:41 (8)	
	16:31	17:30	18:23	21 07:24 (2)	20:18	20 07:14 (3)	21:11	21:47	24 06:05 (8)	
17	08:23	07:34	06:30	07:03 (2)	06:17	06:53 (3)	05:17	05:47 (9)	04:50	05:41 (8)
	16:33	17:32	18:24	20 07:23 (2)	20:20	19 07:12 (3)	21:12	5 05:52 (9)	04:47	24 06:05 (8)
18	08:22	07:32	06:28	07:03 (2)	06:14	06:47 (4)	05:16	05:45 (9)	04:50	05:41 (8)
	16:35	17:34	18:26	19 07:22 (2)	20:22	20 07:11 (3)	21:14	9 05:54 (9)	04:48	24 06:05 (8)
19	08:21	07:29	06:25	07:04 (2)	06:12	06:42 (4)	05:14	05:43 (9)	04:50	05:41 (8)
	16:36	17:35	18:28	18 07:22 (2)	20:24	27 07:10 (3)	21:16	12 05:55 (9)	04:48	24 06:05 (8)
20	08:20	07:27	06:23	07:05 (2)	06:10	06:40 (4)	05:13	05:42 (9)	04:51	05:42 (8)
	16:38	17:37	18:30	14 07:19 (2)	20:26	28 07:08 (3)	21:17	14 05:56 (9)	04:48	24 06:06 (8)
21	08:19	07:25	06:20	07:07 (2)	06:08	06:38 (4)	05:12	05:42 (9)	04:51	05:42 (8)
	16:40	17:39	18:32	10 07:17 (2)	20:27	21 06:59 (4)	21:19	15 05:57 (9)	04:49	24 06:06 (8)
22	08:18	07:23	06:18	07:03 (2)	06:06	06:37 (4)	05:10	05:41 (9)	04:51	05:42 (8)
	16:42	17:41	18:33	20:29	23 07:00 (4)	21:20	16 05:57 (9)	21:49	24 06:06 (8)	
23	08:17	07:21	06:16	06:03	06:36 (4)	05:09	05:41 (9)	04:51	05:42 (8)	
	16:43	17:43	18:35	20:31	24 07:00 (4)	21:22	17 05:58 (9)	21:49	24 06:06 (8)	
24	08:15	07:19	06:13	06:01	06:35 (4)	05:07	05:40 (9)	04:51	05:43 (8)	
	16:45	17:45	18:37	20:33	26 07:01 (4)	21:23	18 05:58 (9)	21:49	24 06:07 (8)	
25	08:14	07:16	06:11	06:38 (1)	05:59	06:33 (4)	05:06	05:40 (9)	04:52	05:43 (8)
	16:47	17:47	18:39	12 06:50 (1)	20:35	27 07:00 (4)	21:24	19 05:59 (9)	21:49	24 06:07 (8)
26	08:13	07:14	06:08	06:35 (1)	05:57	06:33 (4)	05:05	05:40 (9)	04:52	05:43 (8)
	16:49	17:49	18:41	17 06:52 (1)	20:36	28 07:01 (4)	21:26	19 05:59 (9)	21:49	24 06:07 (8)
27	08:11	07:12	06:06	06:33 (1)	05:55	06:32 (4)	05:04	05:41 (9)	04:53	05:43 (8)
	16:51	17:51	18:42	20 06:53 (1)	20:38	29 07:01 (4)	21:27	18 05:59 (9)	21:49	24 06:07 (8)
28	08:10	07:10	06:04	06:32 (1)	05:53	06:32 (4)	05:03	05:40 (8)	04:53	05:43 (8)
	16:53	17:53	18:44	22 06:54 (1)	20:40	29 07:01 (4)	21:29	19 05:59 (9)	21:49	24 06:07 (8)
29	08:08	07:01	06:01	07:30 (1)	05:51	06:33 (4)	05:02	05:40 (8)	04:54	05:44 (8)
	16:55	17:55	18:46	24 07:54 (1)	20:42	28 07:01 (4)	21:30	19 05:59 (9)	21:49	24 06:08 (8)
30	08:07	06:59	07:30 (1)	05:49	06:32 (4)	05:00	05:40 (8)	04:54	05:43 (8)	
	16:57	17:57	18:48	25 07:55 (1)	20:43	29 07:01 (4)	21:31	20 06:00 (8)	21:48	24 06:07 (8)
31	08:05	06:56	07:29 (1)	05:49	06:32 (4)	05:00	05:40 (8)	04:54	05:43 (8)	
	16:58	17:58	18:49	26 07:55 (1)	20:44	29 07:01 (4)	21:32	21 06:00 (8)	21:48	24 06:07 (8)
Sonnenscheinstunden	253	275	367	418	491	506	713	713	0.39	
astr.max.mögl.Beschattung			360	723	455	0.43	0.39	0.96	0.72	
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39	0.96	0.27	191	
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Reduktion Windrichtung			0.69	0.72	0.72	0.72	0.72	0.72	0.72	
Gesamte Reduktion			0.18	0.26	0.30	0.30	0.27	0.27	0.27	
Met.wahrsch.Beschattung			66	185	135	135	191	191	191	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EQ - IO147

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:44 (8)	05:34		06:26	06:54 (3)	07:18		07:44 (2)	07:14	08:08		
	21:48	06:08 (8)	21:14		20:09	07:14 (3)	18:57	19	08:03 (2)	16:48	16:05		
2	04:56	05:44 (8)	05:35	06:54 (4)	06:28	06:55 (3)	07:20		07:46 (2)	07:16	08:09		
	21:48	06:08 (8)	21:12	3	06:57 (4)	20:07	18	07:13 (3)	18:55	16	08:02 (2)	16:46	16:05
3	04:56	05:45 (8)	05:37	06:49 (4)	06:30	06:56 (3)	07:21		07:47 (2)	07:18	08:11		
	21:47	06:09 (8)	21:11	12	07:01 (4)	20:05	26	07:42 (1)	18:52	13	08:00 (2)	16:44	16:04
4	04:57	05:44 (8)	05:38	06:48 (4)	06:31	06:58 (3)	07:23		07:49 (2)	07:20	08:12		
	21:47	06:08 (8)	21:09	15	07:03 (4)	20:02	27	07:44 (1)	18:50	9	07:58 (2)	16:42	16:03
5	04:58	05:45 (8)	05:40	06:46 (4)	06:33	07:00 (3)	07:25		07:22	07:22	08:14		
	21:46	06:09 (8)	21:07	19	07:05 (4)	20:00	26	07:46 (1)	18:48		16:41	16:03	
6	04:59	05:45 (8)	05:42	06:45 (4)	06:35	07:25 (1)	07:27		07:24	07:24	08:15		
	21:46	06:09 (8)	21:05	21	07:06 (4)	19:58	21	07:46 (1)	18:45		16:39	16:02	
7	05:00	05:46 (8)	05:43	06:44 (4)	06:36	07:24 (1)	07:28		07:26	07:26	08:16		
	21:45	06:09 (8)	21:03	23	07:07 (4)	19:55	23	07:47 (1)	18:43		16:37	16:02	
8	05:01	05:46 (8)	05:45	06:43 (4)	06:38	07:23 (1)	07:30		07:28	07:28	08:18		
	21:45	06:09 (8)	21:01	24	07:07 (4)	19:53	25	07:48 (1)	18:41		16:35	16:01	
9	05:02	05:46 (8)	05:47	06:42 (4)	06:40	07:22 (1)	07:32		07:30	07:30	08:19		
	21:44	06:09 (8)	20:59	26	07:08 (4)	19:50	25	07:47 (1)	18:38		16:33	16:01	
10	05:03	05:47 (8)	05:48	06:41 (4)	06:42	07:22 (1)	07:34		07:31	07:31	08:20		
	21:43	06:09 (8)	20:57	27	07:08 (4)	19:48	25	07:47 (1)	18:36		16:32	16:01	
11	05:04	05:47 (8)	05:50	06:41 (4)	06:43	07:22 (1)	07:36		07:33	07:33	08:21		
	21:42	06:09 (8)	20:55	28	07:09 (4)	19:46	26	07:48 (1)	18:34		16:30	16:01	
12	05:05	05:47 (8)	05:52	06:41 (4)	06:45	07:21 (1)	07:37		07:35	07:35	08:22		
	21:41	06:09 (8)	20:53	28	07:09 (4)	19:43	25	07:46 (1)	18:31		16:28	16:00	
13	05:06	05:48 (8)	05:54	06:40 (4)	06:47	07:21 (1)	07:39		07:37	07:37	08:23		
	21:40	06:09 (8)	20:51	29	07:09 (4)	19:41	25	07:46 (1)	18:29		16:27	16:00	
14	05:07	05:48 (8)	05:55	06:40 (4)	06:48	07:21 (1)	07:41		07:39	07:39	08:24		
	21:39	06:08 (8)	20:49	29	07:09 (4)	19:38	25	07:46 (1)	18:27		16:25	16:00	
15	05:09	05:49 (9)	05:57	06:39 (4)	06:50	07:21 (1)	07:43		07:41	07:41	08:25		
	21:38	06:08 (8)	20:47	29	07:08 (4)	19:36	23	07:44 (1)	18:24		16:24	16:00	
16	05:10	05:49 (9)	05:59	06:40 (4)	06:52	07:22 (1)	07:45		07:43	07:43	08:26		
	21:37	06:08 (8)	20:45	28	07:08 (4)	19:33	21	07:43 (1)	18:22		16:22	16:00	
17	05:11	05:50 (9)	06:00	06:40 (4)	06:54	07:24 (1)	07:46		07:44	07:44	08:27		
	21:36	06:09 (9)	20:43	28	07:08 (4)	19:31	17	07:41 (1)	18:20		16:21	16:01	
18	05:13	05:50 (9)	06:02	06:40 (4)	06:55	07:24 (1)	07:48		07:46	07:46	08:28		
	21:35	06:08 (8)	20:41	27	07:07 (4)	19:29	14	07:38 (1)	18:18		16:19	16:01	
19	05:14	05:50 (9)	06:04	06:41 (4)	06:57	07:28 (1)	07:50		07:48	07:48	08:28		
	21:34	06:08 (8)	20:39	26	07:07 (4)	19:26	6	07:34 (1)	18:15		16:18	16:01	
20	05:15	05:50 (9)	06:05	06:40 (4)	06:59		07:52		07:50	07:50	08:29		
	21:32	06:08 (8)	20:37	25	07:05 (4)	19:24		18:13		16:17	16:01		
21	05:17	05:51 (9)	06:07	06:42 (4)	07:00		07:54		07:51	07:51	08:30		
	21:31	06:08 (8)	20:34	22	07:04 (4)	19:21		18:11		16:15	16:02		
22	05:18	05:51 (9)	06:09	06:43 (4)	07:02		07:56		07:53	07:53	08:30		
	21:30	06:07 (8)	20:32	24	07:09 (3)	19:19	9	08:01 (2)	18:09		16:14	16:02	
23	05:20	05:52 (9)	06:11	06:44 (4)	07:04		07:50 (2)	07:58		07:55	08:31		
	21:28	06:06 (9)	20:30	27	07:12 (3)	19:16	14	08:04 (2)	18:07		16:13	16:03	
24	05:21	05:53 (9)	06:12	06:46 (4)	07:06		07:47 (2)	07:59		07:57	08:31		
	21:27	06:06 (9)	20:28	27	07:14 (3)	19:14	17	08:04 (2)	18:05		16:12	16:03	
25	05:23	05:54 (9)	06:14	06:58 (3)	07:07		07:46 (2)	07:01		07:58	08:32		
	21:25	06:05 (9)	20:25	17	07:15 (3)	19:12	19	08:05 (2)	17:02		16:11	16:04	
26	05:24	05:56 (9)	06:16	06:56 (3)	07:09		07:45 (2)	07:03		08:00	08:32		
	21:24	8	06:04 (9)	20:23	19	07:15 (3)	19:09	20	08:05 (2)	17:00	16:10	16:05	
27	05:26		06:18	06:56 (3)	07:11		07:45 (2)	07:05		08:02	08:32		
	21:22		20:21	20	07:16 (3)	19:07	21	08:06 (2)	16:58		16:09	16:05	
28	05:27		06:19	06:54 (3)	07:13		07:44 (2)	07:07		08:03	08:32		
	21:21		20:19	21	07:15 (3)	19:04	21	08:05 (2)	16:56		16:08	16:06	
29	05:29		06:21	06:54 (3)	07:14		07:44 (2)	07:09		08:05	08:32		
	21:19		20:16	21	07:15 (3)	19:02	21	08:05 (2)	16:54		16:07	16:07	
30	05:30		06:23	06:54 (3)	07:16		07:44 (2)	07:11		08:06	08:32		
	21:18		20:14	21	07:15 (3)	19:00	20	08:04 (2)	16:52		16:06	16:08	
31	05:32		06:24	06:54 (3)				07:13			08:32		
	21:16		20:12	20	07:14 (3)			16:50			16:09		
	Sonnenscheinstunden	508	458		382		330		262		237		
	astr.max.mögl.Beschattung	510	686		580		57						
	Red.Sonnenscheinwahrsch.	0.38	0.42		0.35		0.29						
	Reduktion Betriebsdauer	0.96	0.96		0.96		0.96						
	Reduktion Windrichtung	0.72	0.72		0.70		0.68						
	Gesamte Reduktion	0.26	0.29		0.23		0.19						
	Met.wahrsch.Beschattung	134	200		136		11						

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: ER - IO148

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:29 (1)	05:46	06:31 (4)	04:59
	16:10	17:00	17:55	19:51	26 07:55 (1)	20:45	30 07:01 (4)	21:34
2	08:32	08:02	07:05	06:52	07:29 (1)	05:44	06:31 (4)	04:58
	16:12	17:02	17:57	19:53	26 07:55 (1)	20:47	29 07:00 (4)	21:35
3	08:32	08:00	07:03	06:49	07:29 (1)	05:42	06:31 (4)	04:57
	16:13	17:04	17:58	19:55	26 07:55 (1)	20:49	29 07:00 (4)	21:36
4	08:32	07:58	07:01	06:47	07:28 (1)	05:41	06:32 (4)	04:56
	16:14	17:06	18:00	19:57	25 07:53 (1)	20:50	27 06:59 (4)	21:37
5	08:32	07:57	06:58	06:45	07:29 (1)	05:39	06:32 (4)	04:55
	16:15	17:08	18:02	19:59	24 07:53 (1)	20:52	26 06:58 (4)	21:38
6	08:31	07:55	06:56	06:42	07:29 (1)	05:37	06:32 (4)	04:55
	16:16	17:10	18:04	20:00	22 07:51 (1)	20:54	25 06:57 (4)	21:39
7	08:31	07:53	06:54	06:40	07:03 (3)	05:35	06:34 (4)	04:54
	16:18	17:12	18:06	20:02	25 07:50 (1)	20:56	23 06:57 (4)	21:40
8	08:30	07:51	06:51	06:37	07:01 (3)	05:33	06:34 (4)	04:53
	16:19	17:14	18:08	20:04	28 07:48 (1)	20:57	21 06:55 (4)	21:41
9	08:30	07:49	06:49	06:35	07:13 (2)	05:31	06:35 (4)	04:53
	16:20	17:16	18:10	8 07:21 (2)	20:06	28 07:45 (1)	20:59	19 06:54 (4)
10	08:29	07:48	06:47	07:10 (2)	06:33	06:56 (3)	05:29	06:37 (4)
	16:22	17:18	18:11	12 07:22 (2)	20:08	22 07:41 (1)	21:01	16 06:53 (4)
11	08:29	07:46	06:44	07:08 (2)	06:30	06:55 (3)	05:27	06:39 (4)
	16:23	17:20	18:13	16 07:24 (2)	20:09	20 07:15 (3)	21:03	11 06:50 (4)
12	08:28	07:44	06:42	07:06 (2)	06:28	06:55 (3)	05:26	06:43 (4)
	16:25	17:22	18:15	19 07:25 (2)	20:11	20 07:15 (3)	21:04	2 06:45 (4)
13	08:27	07:42	06:40	07:05 (2)	06:26	06:53 (3)	05:24	04:51
	16:26	17:24	18:17	20 07:25 (2)	20:13	21 07:14 (3)	21:06	21:45
14	08:26	07:40	06:37	07:05 (2)	06:23	06:53 (3)	05:22	04:51
	16:28	17:26	18:19	21 07:26 (2)	20:15	22 07:15 (3)	21:08	21:46
15	08:25	07:38	06:35	07:04 (2)	06:21	06:53 (3)	05:21	04:51
	16:30	17:28	18:21	21 07:25 (2)	20:17	21 07:14 (3)	21:09	21:46
16	08:24	07:36	06:32	07:04 (2)	06:19	06:53 (3)	05:19	04:51
	16:31	17:30	18:23	21 07:25 (2)	20:18	21 07:14 (3)	21:11	21:47
17	08:23	07:34	06:30	07:03 (2)	06:17	06:53 (3)	05:17	04:50
	16:33	17:32	18:24	21 07:24 (2)	20:20	19 07:12 (3)	21:12	21:47
18	08:22	07:32	06:28	07:04 (2)	06:14	06:54 (3)	05:16	05:46 (9)
	16:35	17:34	18:26	19 07:23 (2)	20:22	18 07:12 (3)	21:14	4 05:50 (9)
19	08:21	07:29	06:25	07:05 (2)	06:12	06:44 (4)	05:14	05:43 (9)
	16:36	17:35	18:28	17 07:22 (2)	20:24	23 07:10 (3)	21:16	9 05:52 (9)
20	08:20	07:27	06:23	07:05 (2)	06:10	06:40 (4)	05:13	05:42 (9)
	16:38	17:37	18:30	15 07:20 (2)	20:26	28 07:09 (3)	21:17	12 05:54 (9)
21	08:19	07:25	06:20	07:08 (2)	06:08	06:38 (4)	05:12	05:41 (9)
	16:40	17:39	18:32	10 07:18 (2)	20:27	26 07:06 (3)	21:19	14 05:55 (9)
22	08:18	07:23	06:18	06:05	06:05	06:37 (4)	05:10	05:40 (9)
	16:42	17:41	18:33	20:29	22 06:59 (4)	21:20	15 05:55 (9)	21:49
23	08:17	07:21	06:16	06:03	06:03	06:35 (4)	05:09	05:40 (9)
	16:43	17:43	18:35	20:31	25 07:00 (4)	21:22	16 05:56 (9)	21:49
24	08:15	07:19	06:13	06:01	06:01	06:34 (4)	05:07	05:40 (9)
	16:45	17:45	18:37	20:33	26 07:00 (4)	21:23	17 05:57 (9)	21:49
25	08:14	07:16	06:11	06:38 (1)	05:59	06:33 (4)	05:06	05:39 (9)
	16:47	17:47	18:39	12 06:50 (1)	20:35	27 07:00 (4)	21:24	18 05:57 (9)
26	08:13	07:14	06:08	06:36 (1)	05:57	06:32 (4)	05:05	05:39 (9)
	16:49	17:49	18:41	17 06:53 (1)	20:36	28 07:00 (4)	21:26	19 05:58 (9)
27	08:11	07:12	06:06	06:33 (1)	05:55	06:31 (4)	05:04	05:39 (9)
	16:51	17:51	18:42	20 06:53 (1)	20:38	29 07:00 (4)	21:27	19 05:58 (9)
28	08:10	07:10	06:04	06:32 (1)	05:53	06:31 (4)	05:03	05:39 (9)
	16:53	17:53	18:44	23 06:55 (1)	20:40	29 07:00 (4)	21:29	19 05:58 (9)
29	08:08	07:01	07:31 (1)	05:51	06:31 (4)	05:02	05:39 (9)	04:54
	16:55	19:46	24 07:55 (1)	20:42	29 07:00 (4)	21:30	19 05:58 (9)	21:49
30	08:07	06:59	07:30 (1)	05:49	06:32 (4)	05:00	05:39 (9)	04:54
	16:57	19:48	25 07:55 (1)	20:43	29 07:01 (4)	21:31	19 05:58 (9)	21:48
31	08:05	06:56	07:30 (1)	05:47	04:59	05:38 (8)	21:32	20 05:58 (9)
	16:58	19:50	26 07:56 (1)	05:47	04:59	05:38 (8)	21:32	20 05:58 (9)
Sonnenscheinstunden	253	275	367	418	491	506	714	
astr.max.mögl.Beschattung			0.28	0.28	0.37	0.43	0.39	
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96	0.96	
Reduktion Betriebsdauer			0.69	0.69	0.72	0.72	0.72	
Reduktion Windrichtung			0.18	0.26	0.30	0.27	0.27	
Gesamte Reduktion			0.18	0.26	0.30	0.27	0.27	
Met.wahrsch.Beschattung			67	188	142	192		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: ER - IO148

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:42 (8)	05:34	06:51 (4)	06:26	06:54 (3)	07:18	07:45 (2)	07:14	08:08		
	21:48	06:06 (8)	21:14	06:58 (4)	20:09	07:14 (3)	18:57	19	08:04 (2)	16:48	16:05	
2	04:56	05:43 (8)	05:35	06:49 (4)	06:28	06:55 (3)	07:20	07:46 (2)	07:16	08:09		
	21:48	06:07 (8)	21:12	07:02 (4)	20:07	07:40 (1)	18:55	17	08:03 (2)	16:46	16:05	
3	04:56	05:43 (8)	05:37	06:46 (4)	06:30	06:56 (3)	07:21	07:47 (2)	07:18	08:11		
	21:47	06:07 (8)	21:11	07:03 (4)	20:05	07:43 (1)	18:52	14	08:01 (2)	16:44	16:04	
4	04:57	05:43 (8)	05:38	06:45 (4)	06:31	06:58 (3)	07:23	07:49 (2)	07:20	08:12		
	21:47	06:07 (8)	21:09	07:05 (4)	20:02	07:45 (1)	18:50	10	07:59 (2)	16:42	16:03	
5	04:58	05:43 (8)	05:40	06:44 (4)	06:33	07:00 (3)	07:25	07:52 (2)	07:22	08:14		
	21:46	06:07 (8)	21:07	07:06 (4)	20:00	07:47 (1)	18:48	2	07:54 (2)	16:41	16:03	
6	04:59	05:44 (8)	05:42	06:43 (4)	06:35	07:25 (1)	07:27		07:24	08:15		
	21:46	06:07 (8)	21:05	07:07 (4)	19:58	07:47 (1)	18:45		16:39	16:02		
7	05:00	05:44 (8)	05:43	06:42 (4)	06:36	07:24 (1)	07:28		07:26	08:16		
	21:45	06:07 (8)	21:03	07:08 (4)	19:55	07:48 (1)	18:43		16:37	16:02		
8	05:01	05:45 (8)	05:45	06:41 (4)	06:38	07:23 (1)	07:30		07:28	08:18		
	21:45	06:07 (8)	21:01	07:08 (4)	19:53	07:49 (1)	18:41		16:35	16:01		
9	05:02	05:45 (8)	05:47	06:41 (4)	06:40	07:22 (1)	07:32		07:30	08:19		
	21:44	06:07 (8)	20:59	07:09 (4)	19:50	07:48 (1)	18:38		16:33	16:01		
10	05:03	05:46 (8)	05:48	06:40 (4)	06:42	07:22 (1)	07:34		07:31	08:20		
	21:43	06:07 (8)	20:57	07:08 (4)	19:48	07:48 (1)	18:36		16:32	16:01		
11	05:04	05:46 (8)	05:50	06:40 (4)	06:43	07:22 (1)	07:36		07:33	08:21		
	21:42	06:07 (9)	20:55	07:09 (4)	19:46	07:48 (1)	18:34		16:30	16:01		
12	05:05	05:47 (8)	05:52	06:40 (4)	06:45	07:21 (1)	07:37		07:35	08:22		
	21:41	06:07 (9)	20:53	07:09 (4)	19:43	07:47 (1)	18:31		16:28	16:00		
13	05:06	05:47 (8)	05:54	06:39 (4)	06:47	07:21 (1)	07:39		07:37	08:23		
	21:40	06:07 (9)	20:51	07:09 (4)	19:41	07:47 (1)	18:29		16:27	16:00		
14	05:07	05:48 (9)	05:55	06:39 (4)	06:48	07:22 (1)	07:41		07:39	08:24		
	21:39	06:07 (9)	20:49	07:09 (4)	19:38	07:46 (1)	18:27		16:25	16:00		
15	05:09	05:48 (9)	05:57	06:39 (4)	06:50	07:22 (1)	07:43		07:41	08:25		
	21:38	06:07 (9)	20:47	07:08 (4)	19:36	07:44 (1)	18:24		16:24	16:00		
16	05:10	05:48 (9)	05:59	06:39 (4)	06:52	07:23 (1)	07:45		07:43	08:26		
	21:37	06:07 (9)	20:45	07:08 (4)	19:33	07:43 (1)	18:22		16:22	16:00		
17	05:11	05:49 (9)	06:00	06:40 (4)	06:54	07:24 (1)	07:46		07:44	08:27		
	21:36	06:07 (9)	20:43	07:08 (4)	19:31	07:42 (1)	18:20		16:21	16:01		
18	05:13	05:49 (9)	06:02	06:39 (4)	06:55	07:25 (1)	07:48		07:46	08:28		
	21:35	06:07 (9)	20:41	07:06 (4)	19:29	07:38 (1)	18:18		16:19	16:01		
19	05:14	05:49 (9)	06:04	06:40 (4)	06:57	07:29 (1)	07:50		07:48	08:28		
	21:34	06:07 (9)	20:39	07:06 (4)	19:26	07:34 (1)	18:15		16:18	16:01		
20	05:15	05:49 (9)	06:05	06:40 (4)	06:59		07:52		07:50	08:29		
	21:32	06:06 (9)	20:37	07:04 (4)	19:24		18:13		16:17	16:01		
21	05:17	05:50 (9)	06:07	06:42 (4)	07:00		07:54		07:51	08:30		
	21:31	06:06 (9)	20:34	07:03 (4)	19:21		18:11		16:15	16:02		
22	05:18	05:51 (9)	06:09	06:43 (4)	07:02	07:53 (2)	07:56		07:53	08:30		
	21:30	06:05 (9)	20:32	07:11 (3)	19:19	9	08:02 (2)	18:09	16:14	16:02		
23	05:20	05:51 (9)	06:11	06:44 (4)	07:04	07:50 (2)	07:58		07:55	08:31		
	21:28	06:04 (9)	20:30	07:13 (3)	19:16	14	08:04 (2)	18:07	16:13	16:03		
24	05:21	05:53 (9)	06:12	06:48 (4)	07:06	07:48 (2)	07:59		07:57	08:31		
	21:27	06:04 (9)	20:28	07:14 (3)	19:14	17	08:05 (2)	18:05	16:12	16:03		
25	05:23	05:54 (9)	06:14	06:57 (3)	07:07	07:47 (2)	07:01		07:58	08:32		
	21:25	06:02 (9)	20:25	07:15 (3)	19:12	19	08:06 (2)	17:02	16:11	16:04		
26	05:24		06:16	06:56 (3)	07:09	07:46 (2)	07:03		08:00	08:32		
	21:24		20:23	07:15 (3)	19:09	20	08:06 (2)	17:00	16:10	16:05		
27	05:26		06:18	06:55 (3)	07:11	07:46 (2)	07:05		08:02	08:32		
	21:22		20:21	07:16 (3)	19:07	21	08:07 (2)	16:58	16:09	16:05		
28	05:27		06:19	06:54 (3)	07:13	07:44 (2)	07:07		08:03	08:32		
	21:21		20:19	07:15 (3)	19:04	22	08:06 (2)	16:56	16:08	16:06		
29	05:29		06:21	06:54 (3)	07:14	07:44 (2)	07:09		08:05	08:32		
	21:19		20:16	07:15 (3)	19:02	21	08:05 (2)	16:54	16:07	16:07		
30	05:30		06:23	06:54 (3)	07:16	07:45 (2)	07:11		08:06	08:32		
	21:18		20:14	07:15 (3)	19:00	20	08:05 (2)	16:52	16:06	16:08		
31	05:32		06:24	06:54 (3)			07:13			08:32		
	21:16		20:12	07:14 (3)			16:50			16:09		
Sonnenscheinstunden	508		458		382		330		262	237		
astr.max.mögl.Beschattung	482		733		591		62					
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96					
Reduktion Windrichtung	0.72		0.72		0.70		0.68					
Gesamte Reduktion	0.26		0.29		0.23		0.19					
Met.wahrsch.Beschattung	126		213		138		12					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: ES - IO149

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:08	06:54	07:27 (1) 05:46	06:29 (4) 04:59
	16:10	17:00	17:55	19:51	27 07:54 (1) 20:45	30 06:59 (4) 21:34
2	08:32	08:02	07:05	06:52	07:27 (1) 05:44	06:29 (4) 04:58
	16:12	17:02	17:57	19:53	27 07:54 (1) 20:47	30 06:59 (4) 21:35
3	08:32	08:00	07:03	06:49	07:27 (1) 05:42	06:28 (4) 04:57
	16:13	17:04	17:58	19:55	27 07:54 (1) 20:49	30 06:58 (4) 21:36
4	08:32	07:58	07:01	06:47	07:26 (1) 05:41	06:28 (4) 04:56
	16:14	17:06	18:00	19:57	27 07:53 (1) 20:50	30 06:58 (4) 21:37
5	08:32	07:57	06:58	06:45	07:27 (1) 05:39	06:28 (4) 04:55
	16:15	17:08	18:02	19:59	25 07:52 (1) 20:52	29 06:57 (4) 21:38
6	08:31	07:55	06:56	06:42	07:26 (1) 05:37	06:29 (4) 04:55
	16:16	17:10	18:04	20:00	25 07:51 (1) 20:54	27 06:56 (4) 21:39
7	08:31	07:53	06:54	06:40	07:27 (1) 05:35	06:30 (4) 04:54
	16:18	17:12	18:06	20:02	23 07:50 (1) 20:56	26 06:56 (4) 21:40
8	08:30	07:51	06:51	06:37	07:01 (3) 05:33	06:30 (4) 04:53
	16:19	17:14	18:08	20:04	28 07:49 (1) 20:57	25 06:55 (4) 21:41
9	08:30	07:49	06:49	06:35	07:14 (2) 05:31	06:30 (4) 04:53
	16:20	17:16	18:10	3 07:17 (2) 20:06	30 07:47 (1) 20:59	24 06:54 (4) 21:42
10	08:29	07:48	06:47	07:10 (2) 06:33	06:56 (3) 05:29	06:32 (4) 04:52
	16:22	17:18	18:11	11 07:21 (2) 20:08	28 07:44 (1) 21:01	22 06:54 (4) 21:43
11	08:29	07:46	06:44	07:08 (2) 06:30	06:54 (3) 05:27	06:33 (4) 04:52
	16:23	17:20	18:13	15 07:23 (2) 20:09	26 07:41 (1) 21:03	19 06:52 (4) 21:44
12	08:28	07:44	06:42	07:05 (2) 06:28	06:53 (3) 05:26	06:34 (4) 04:52
	16:25	17:22	18:15	18 07:23 (2) 20:11	20 07:13 (3) 21:04	16 06:50 (4) 21:44
13	08:27	07:42	06:40	07:04 (2) 06:26	06:52 (3) 05:24	06:36 (4) 04:51
	16:26	17:24	18:17	20 07:24 (2) 20:13	21 07:13 (3) 21:06	13 06:49 (4) 21:45
14	08:26	07:40	06:37	07:04 (2) 06:23	06:52 (3) 05:22	06:39 (4) 04:51
	16:28	17:26	18:19	21 07:25 (2) 20:15	21 07:13 (3) 21:08	6 06:45 (4) 21:46
15	08:25	07:38	06:35	07:03 (2) 06:21	06:52 (3) 05:21	06:41 (4) 04:51
	16:30	17:28	18:21	21 07:24 (2) 20:17	21 07:13 (3) 21:09	21:46 24 06:00 (8)
16	08:24	07:36	06:32	07:03 (2) 06:19	06:52 (3) 05:19	06:41 (4) 04:51
	16:31	17:30	18:23	21 07:24 (2) 20:18	21 07:13 (3) 21:11	21:47 24 06:00 (8)
17	08:23	07:34	06:30	07:02 (2) 06:17	06:51 (3) 05:17	06:41 (4) 04:51
	16:33	17:32	18:24	21 07:23 (2) 20:20	21 07:12 (3) 21:12	21:47 24 06:00 (8)
18	08:22	07:32	06:28	07:03 (2) 06:14	06:51 (3) 05:16	06:41 (4) 04:51
	16:35	17:34	18:26	20 07:23 (2) 20:22	20 07:11 (3) 21:14	21:48 24 06:00 (8)
19	08:21	07:29	06:25	07:03 (2) 06:12	06:52 (3) 05:14	06:41 (4) 04:51
	16:36	17:35	18:28	19 07:22 (2) 20:24	18 07:10 (3) 21:16	21:48 24 06:01 (8)
20	08:20	07:27	06:23	07:04 (2) 06:10	06:45 (4) 05:13	06:41 (4) 04:51
	16:38	17:37	18:30	16 07:20 (2) 20:26	17 07:09 (3) 21:17	5 05:48 (9) 21:48
21	08:19	07:25	06:20	07:05 (2) 06:08	06:39 (4) 05:12	06:41 (4) 04:51
	16:40	17:39	18:32	14 07:19 (2) 20:27	26 07:07 (3) 21:19	10 05:51 (9) 21:49
22	08:18	07:23	06:18	07:07 (2) 06:05	06:37 (4) 05:10	06:41 (4) 04:51
	16:42	17:41	18:33	9 07:16 (2) 20:29	25 07:05 (3) 21:20	12 05:51 (9) 21:49
23	08:17	07:21	06:16	06:03	06:35 (4) 05:09	06:41 (4) 04:51
	16:43	17:43	18:35	20:31	21 06:56 (4) 21:22	14 05:53 (9) 21:49
24	08:15	07:19	06:13	06:01	06:33 (4) 05:07	06:41 (4) 04:51
	16:45	17:45	18:37	20:33	24 06:57 (4) 21:23	16 05:54 (9) 21:49
25	08:14	07:16	06:11	06:41 (1) 05:59	06:31 (4) 05:06	06:41 (4) 04:51
	16:47	17:47	18:39	4 06:45 (1) 20:35	26 06:57 (4) 21:24	16 05:54 (9) 21:49
26	08:13	07:14	06:08	06:36 (1) 05:57	06:30 (4) 05:05	06:41 (4) 04:51
	16:49	17:49	18:41	14 06:50 (1) 20:36	27 06:57 (4) 21:26	17 05:55 (9) 21:49
27	08:11	07:12	06:06	06:33 (1) 05:55	06:30 (4) 05:04	06:41 (4) 04:51
	16:51	17:51	18:42	18 06:51 (1) 20:38	28 06:58 (4) 21:27	18 05:55 (9) 21:49
28	08:10	07:10	06:04	06:32 (1) 05:53	06:29 (4) 05:03	06:41 (4) 04:51
	16:53	17:53	18:44	21 06:53 (1) 20:40	29 06:58 (4) 21:29	19 05:56 (9) 21:49
29	08:08	07:01	07:30 (1) 05:51	06:29 (4) 05:02	06:37 (9) 04:54	06:41 (4) 04:51
	16:55	19:46	23 07:53 (1) 20:42	29 06:58 (4) 21:30	19 05:56 (9) 21:49	24 06:03 (8)
30	08:07	06:59	07:29 (1) 05:49	06:29 (4) 05:00	06:37 (9) 04:54	06:41 (4) 04:51
	16:57	19:48	25 07:54 (1) 20:43	30 06:59 (4) 21:31	19 05:56 (9) 21:48	23 06:02 (8)
31	08:05	06:56	07:29 (1) 05:49	06:29 (4) 05:00	06:37 (9) 04:54	06:41 (4) 04:51
	16:58	19:50	25 07:54 (1) 20:43	30 06:59 (4) 21:31	19 05:56 (9) 21:48	23 06:02 (8)
Sonnenscheinstunden	253	275	367	418	491	506
astr. max.mögl. Beschattung			359	738	511	685
Red. Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.69	0.72	0.72	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.27
Met. wahrsch. Beschattung			66	189	152	183

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: ES - IO149

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:40 (8)	05:34	06:44 (4)	06:26	06:53 (3)	07:18	07:45 (2)	07:14	08:08		
	21:48	06:03 (8)	21:14	07:01 (4)	20:09	07:40 (1)	18:57	08:03 (2)	16:48	16:05		
2	04:56	05:40 (8)	05:35	06:43 (4)	06:28	06:55 (3)	07:20	07:46 (2)	07:16	08:09		
	21:48	06:03 (8)	21:12	07:03 (4)	20:07	07:43 (1)	18:55	08:02 (2)	16:46	16:05		
3	04:56	05:41 (8)	05:37	06:41 (4)	06:30	06:56 (3)	07:21	07:47 (2)	07:18	08:11		
	21:47	06:04 (8)	21:11	07:03 (4)	20:05	07:45 (1)	18:52	07:59 (2)	16:44	16:04		
4	04:57	05:41 (8)	05:38	06:41 (4)	06:31	06:58 (3)	07:23	07:49 (2)	07:20	08:12		
	21:47	06:03 (8)	21:09	07:05 (4)	20:02	07:46 (1)	18:50	07:57 (2)	16:42	16:03		
5	04:58	05:41 (8)	05:40	06:40 (4)	06:33	07:24 (1)	07:25		07:22	08:14		
	21:46	06:03 (9)	21:07	07:06 (4)	20:00	07:47 (1)	18:48		16:41	16:03		
6	04:59	05:42 (8)	05:42	06:39 (4)	06:35	07:23 (1)	07:27		07:24	08:15		
	21:46	06:03 (9)	21:05	07:06 (4)	19:57	07:47 (1)	18:45		16:39	16:02		
7	05:00	05:42 (8)	05:43	06:39 (4)	06:36	07:22 (1)	07:28		07:26	08:16		
	21:45	06:04 (9)	21:03	07:07 (4)	19:55	07:47 (1)	18:43		16:37	16:02		
8	05:01	05:43 (8)	05:45	06:38 (4)	06:38	07:22 (1)	07:30		07:28	08:18		
	21:45	06:04 (9)	21:01	07:07 (4)	19:53	07:48 (1)	18:41		16:35	16:01		
9	05:02	05:44 (8)	05:47	06:38 (4)	06:40	07:20 (1)	07:32		07:30	08:19		
	21:44	06:04 (9)	20:59	07:07 (4)	19:50	07:47 (1)	18:38		16:33	16:01		
10	05:03	05:44 (8)	05:48	06:37 (4)	06:42	07:20 (1)	07:34		07:31	08:20		
	21:43	06:04 (9)	20:57	07:07 (4)	19:48	07:47 (1)	18:36		16:32	16:01		
11	05:04	05:45 (9)	05:50	06:37 (4)	06:43	07:20 (1)	07:36		07:33	08:21		
	21:42	06:04 (9)	20:55	07:07 (4)	19:46	07:47 (1)	18:34		16:30	16:01		
12	05:05	05:45 (9)	05:52	06:37 (4)	06:45	07:20 (1)	07:37		07:35	08:22		
	21:41	06:05 (9)	20:53	07:07 (4)	19:43	07:46 (1)	18:31		16:28	16:00		
13	05:06	05:45 (9)	05:54	06:37 (4)	06:47	07:20 (1)	07:39		07:37	08:23		
	21:40	06:05 (9)	20:51	07:06 (4)	19:41	07:45 (1)	18:29		16:27	16:00		
14	05:07	05:46 (9)	05:55	06:37 (4)	06:48	07:21 (1)	07:41		07:39	08:24		
	21:39	06:04 (9)	20:49	07:06 (4)	19:38	07:44 (1)	18:27		16:25	16:00		
15	05:09	05:46 (9)	05:57	06:37 (4)	06:50	07:21 (1)	07:43		07:41	08:25		
	21:38	06:04 (9)	20:47	07:05 (4)	19:36	07:42 (1)	18:24		16:24	16:00		
16	05:10	05:46 (9)	05:59	06:37 (4)	06:52	07:22 (1)	07:45		07:43	08:26		
	21:37	06:04 (9)	20:45	07:05 (4)	19:33	07:41 (1)	18:22		16:22	16:00		
17	05:11	05:47 (9)	06:00	06:38 (4)	06:54	07:24 (1)	07:46		07:44	08:27		
	21:36	06:05 (9)	20:43	07:05 (4)	19:31	07:39 (1)	18:20		16:21	16:01		
18	05:13	05:47 (9)	06:02	06:38 (4)	06:55	07:27 (1)	07:48		07:46	08:28		
	21:35	06:04 (9)	20:41	07:03 (4)	19:29	07:34 (1)	18:18		16:19	16:01		
19	05:14	05:48 (9)	06:04	06:39 (4)	06:57		07:50		07:48	08:28		
	21:34	06:03 (9)	20:39	07:02 (4)	19:26		18:15		16:18	16:01		
20	05:15	05:48 (9)	06:05	06:40 (4)	06:59		07:52		07:50	08:29		
	21:32	06:03 (9)	20:37	07:00 (4)	19:24		18:13		16:17	16:01		
21	05:17	05:50 (9)	06:07	06:42 (4)	07:00	07:54 (2)	07:54		07:51	08:30		
	21:31	06:03 (9)	20:34	07:10 (3)	19:21	6	08:00 (2)	18:11	16:15	16:02		
22	05:18	05:50 (9)	06:09	06:44 (4)	07:02	07:50 (2)	07:56		07:53	08:30		
	21:30	06:01 (9)	20:32	07:12 (3)	19:19	13	08:03 (2)	18:09	16:14	16:02		
23	05:20	05:51 (9)	06:11	06:56 (3)	07:04	07:49 (2)	07:58		07:55	08:31		
	21:28	8	05:59 (9)	06:11	07:13 (3)	19:16	16	08:05 (2)	18:07	16:13	16:03	
24	05:21		06:12	06:56 (3)	07:06	07:46 (2)	07:59		07:57	08:31		
	21:27		20:28	07:14 (3)	19:14	19	08:05 (2)	18:05	16:12	16:03		
25	05:23		06:14	06:55 (3)	07:07	07:46 (2)	07:01		07:58	08:32		
	21:25		20:25	07:15 (3)	19:12	19	08:05 (2)	17:02	16:11	16:04		
26	05:24		06:16	06:54 (3)	07:09	07:45 (2)	07:03		08:00	08:32		
	21:24		20:23	07:14 (3)	19:09	21	08:06 (2)	17:00	16:10	16:05		
27	05:26		06:18	06:53 (3)	07:11	07:45 (2)	07:05		08:02	08:32		
	21:22		20:21	07:15 (3)	19:07	21	08:06 (2)	16:58	16:09	16:05		
28	05:27		06:19	06:52 (3)	07:13	07:44 (2)	07:07		08:03	08:32		
	21:21		20:19	07:14 (3)	19:04	21	08:05 (2)	16:56	16:08	16:06		
29	05:29		06:21	06:53 (3)	07:14	07:44 (2)	07:09		08:05	08:32		
	21:19		20:16	07:14 (3)	19:02	21	08:05 (2)	16:54	16:07	16:07		
30	05:30		06:23	06:53 (3)	07:16	07:44 (2)	07:11		08:06	08:32		
	21:18	10	06:57 (4)	20:14	21	07:14 (3)	19:00	20	08:04 (2)	16:52	16:08	
31	05:32		06:46 (4)	06:24	06:52 (3)		07:13			08:32		
	21:16	14	07:00 (4)	20:12	20	07:12 (3)		16:50		16:09		
	Sonnenscheinstunden		508		458		382		330		262	237
	astr.max.mögl.Beschattung		451		752		603		54			
	Red.Sonnenscheinwahrsch.		0.38		0.42		0.35		0.29			
	Reduktion Betriebsdauer		0.96		0.96		0.96		0.96			
	Reduktion Windrichtung		0.72		0.72		0.70		0.68			
	Gesamte Reduktion		0.26		0.29		0.23		0.19			
	Met.wahrsch.Beschattung		118		219		141		10			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: ET - IO150

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:23 (1)	05:46	06:23 (4)	04:59
	16:10	17:00	17:55	19:51	23 07:46 (1)	20:45	29 06:52 (4)	21:34
2	08:32	08:02	07:05	06:52	07:22 (1)	05:44	06:23 (4)	04:58
	16:12	17:02	17:57	19:53	24 07:46 (1)	20:47	29 06:52 (4)	21:35
3	08:32	08:00	07:03	06:49	07:21 (1)	05:42	06:22 (4)	04:57
	16:13	17:04	17:58	19:55	26 07:47 (1)	20:49	30 06:52 (4)	21:36
4	08:32	07:58	07:01	06:47	07:20 (1)	05:41	06:22 (4)	04:56
	16:14	17:06	18:00	19:57	26 07:46 (1)	20:50	29 06:51 (4)	21:37
5	08:32	07:57	06:58	06:45	07:20 (1)	05:39	06:22 (4)	04:55
	16:15	17:08	18:02	19:59	27 07:47 (1)	20:52	29 06:51 (4)	21:38
6	08:31	07:55	06:56	06:42	07:19 (1)	05:37	06:22 (4)	04:55
	16:16	17:10	18:04	20:00	27 07:46 (1)	20:54	29 06:51 (4)	21:39
7	08:31	07:53	06:54	06:40	07:19 (1)	05:35	06:22 (4)	04:54
	16:18	17:12	18:06	20:02	26 07:45 (1)	20:56	29 06:51 (4)	21:40
8	08:30	07:51	06:51	06:37	07:20 (1)	05:33	06:22 (4)	04:53
	16:19	17:14	18:08	20:04	25 07:45 (1)	20:57	28 06:50 (4)	21:41
9	08:30	07:49	06:49	06:35	07:19 (1)	05:31	06:22 (4)	04:53
	16:20	17:16	18:10	20:06	24 07:43 (1)	20:59	28 06:50 (4)	21:42
10	08:29	07:48	06:47	06:33	06:56 (3)	05:29	06:23 (4)	04:52
	16:22	17:18	18:11	20:08	27 07:42 (1)	21:01	27 06:50 (4)	21:43
11	08:29	07:46	06:44	06:30	06:54 (3)	05:27	06:24 (4)	04:52
	16:23	17:20	18:13	20:09	30 07:41 (1)	21:03	25 06:49 (4)	21:44
12	08:28	07:44	06:42	07:05 (2)	06:28	06:52 (3)	05:26	06:24 (4)
	16:25	17:22	18:15	8 07:13 (2)	20:11	31 07:40 (1)	21:04	24 06:48 (4)
13	08:27	07:42	06:40	07:03 (2)	06:26	06:49 (3)	05:24	06:25 (4)
	16:26	17:24	18:17	13 07:16 (2)	20:13	30 07:37 (1)	21:06	22 06:47 (4)
14	08:26	07:40	06:37	07:01 (2)	06:23	06:48 (3)	05:22	06:26 (4)
	16:28	17:26	18:19	17 07:18 (2)	20:15	23 07:32 (1)	21:08	20 06:46 (4)
15	08:25	07:38	06:35	06:59 (2)	06:21	06:47 (3)	05:21	06:27 (4)
	16:30	17:28	18:21	19 07:18 (2)	20:17	21 07:08 (3)	21:09	18 06:45 (4)
16	08:24	07:36	06:32	06:58 (2)	06:19	06:47 (3)	05:19	06:28 (4)
	16:31	17:30	18:23	20 07:18 (2)	20:18	21 07:08 (3)	21:11	15 06:43 (4)
17	08:23	07:34	06:30	06:57 (2)	06:17	06:46 (3)	05:17	06:31 (4)
	16:33	17:32	18:24	21 07:18 (2)	20:20	21 07:07 (3)	21:12	10 06:41 (4)
18	08:22	07:32	06:28	06:57 (2)	06:14	06:46 (3)	05:16	04:50
	16:35	17:34	18:26	21 07:18 (2)	20:22	21 07:07 (3)	21:14	21:48
19	08:21	07:29	06:25	06:57 (2)	06:12	06:46 (3)	05:14	04:50
	16:36	17:35	18:28	21 07:18 (2)	20:24	21 07:07 (3)	21:16	21:48
20	08:20	07:27	06:23	06:56 (2)	06:10	06:46 (3)	05:13	04:51
	16:38	17:37	18:30	21 07:17 (2)	20:26	20 07:06 (3)	21:17	21:48
21	08:19	07:25	06:20	06:57 (2)	06:08	06:47 (3)	05:12	04:51
	16:40	17:39	18:32	20 07:17 (2)	20:27	18 07:05 (3)	21:19	21:49
22	08:18	07:23	06:18	06:57 (2)	06:06	06:48 (3)	05:10	04:51
	16:42	17:41	18:33	18 07:15 (2)	20:29	16 07:04 (3)	21:20	21:49
23	08:17	07:21	06:16	06:59 (2)	06:03	06:37 (4)	05:09	05:38 (9)
	16:43	17:43	18:35	14 07:13 (2)	20:31	18 07:03 (3)	21:22	8 05:46 (9)
24	08:15	07:19	06:13	07:00 (2)	06:01	06:32 (4)	05:07	05:37 (9)
	16:45	17:45	18:37	10 07:10 (2)	20:33	22 07:00 (3)	21:23	10 05:47 (9)
25	08:14	07:16	06:11	05:59	06:29 (4)	05:06	05:36 (9)	04:52
	16:47	17:47	18:39	20:35	17 06:46 (4)	21:24	13 05:49 (9)	21:49
26	08:13	07:14	06:08	05:57	06:27 (4)	05:05	05:35 (9)	04:52
	16:49	17:49	18:41	20:36	21 06:48 (4)	21:26	14 05:49 (9)	21:49
27	08:11	07:12	06:06	05:55	06:26 (4)	05:04	05:35 (9)	04:53
	16:51	17:51	18:42	20:38	23 06:49 (4)	21:27	15 05:50 (9)	21:49
28	08:10	07:10	06:04	06:33 (1)	05:53	06:25 (4)	05:03	05:34 (9)
	16:53	17:53	18:44	6 06:39 (1)	20:40	25 06:50 (4)	21:29	17 05:51 (9)
29	08:08	07:01	06:01	07:28 (1)	05:51	06:25 (4)	05:02	05:34 (9)
	16:55	19:46	14 07:42 (1)	20:42	26 06:51 (4)	21:30	17 05:51 (9)	21:49
30	08:07	06:59	07:26 (1)	05:49	06:24 (4)	05:00	05:34 (9)	04:54
	16:57	19:48	18 07:44 (1)	20:43	27 06:51 (4)	21:31	17 05:51 (9)	21:48
31	08:05	06:56	07:25 (1)	05:47	05:00	05:34 (9)	04:54	04:54
	16:58	19:50	21 07:46 (1)	20:44	21:32	18 05:52 (9)	21:49	21:49
Sonnenscheinstunden	253	275	367	418	491	506	636	0.39
astr.max.mögl.Beschattung			0.28	0.37	0.43	0.39	0.39	0.39
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96	0.96	0.96
Reduktion Betriebsdauer			0.69	0.72	0.72	0.72	0.72	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.27	0.27	0.27
Met.wahrsch.Beschattung			52	181	164	170	170	170

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: ET - IO150

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55 21:48	05:36 (8) 21:14	06:34 (4) 20:09	06:53 (3) 18:57	07:44 (2) 16:48	07:14 16:05
2	04:56 21:48	05:37 (8) 21:12	06:34 (4) 20:07	06:55 (3) 18:55	07:47 (2) 16:46	07:16 16:05
3	04:56 21:47	05:38 (8) 21:11	06:33 (4) 20:05	07:17 (1) 18:52	07:50 (2) 16:44	07:18 16:04
4	04:57 21:47	05:38 (8) 21:09	06:33 (4) 20:02	07:17 (1) 18:50	07:47 (2) 16:42	07:20 16:03
5	04:58 21:46	05:38 (8) 21:07	06:33 (4) 20:00	07:16 (1) 18:48	07:42 (1) 16:41	07:22 16:03
6	04:59 21:46	05:39 (8) 21:05	06:32 (4) 19:58	07:15 (1) 18:45	07:42 (1) 16:39	07:24 16:02
7	05:00 21:45	05:39 (8) 21:03	06:32 (4) 19:55	07:15 (1) 18:43	07:42 (1) 16:37	07:26 16:02
8	05:01 21:45	05:41 (9) 21:01	06:31 (4) 19:53	07:15 (1) 18:41	07:42 (1) 16:35	07:28 16:01
9	05:02 21:44	05:41 (9) 20:59	06:32 (4) 19:50	07:15 (1) 18:38	07:42 (1) 16:33	07:30 16:01
10	05:03 21:43	05:42 (9) 20:57	06:31 (4) 19:48	07:15 (1) 18:36	07:41 (1) 16:32	07:31 16:01
11	05:04 21:42	05:42 (9) 20:55	06:31 (4) 19:46	07:16 (1) 18:34	07:41 (1) 16:30	07:32 16:01
12	05:05 21:41	05:42 (9) 20:53	06:32 (4) 19:43	07:16 (1) 18:31	07:41 (1) 16:28	07:33 16:00
13	05:06 21:40	05:42 (9) 20:51	06:32 (4) 19:41	07:17 (1) 18:29	07:41 (1) 16:27	07:34 16:00
14	05:07 21:39	05:43 (9) 20:49	06:33 (4) 19:38	07:19 (1) 18:27	07:41 (1) 16:25	07:35 16:00
15	05:09 21:38	05:43 (9) 20:47	06:33 (4) 19:36	07:21 (1) 18:24	07:41 (1) 16:24	07:36 16:00
16	05:10 21:37	05:43 (9) 20:45	06:34 (4) 19:33	07:29 (1) 18:22	07:43 16:22	07:37 16:00
17	05:11 21:36	05:45 (9) 20:43	06:35 (4) 19:31	07:46 18:20	07:44 16:21	07:38 16:01
18	05:13 21:35	05:45 (9) 20:41	06:36 (4) 19:29	07:48 18:18	07:46 16:19	07:46 16:01
19	05:14 21:34	05:46 (9) 20:39	06:39 (4) 19:26	07:48 (2) 18:15	07:48 16:18	07:48 16:01
20	05:15 21:32	05:47 (9) 20:37	06:53 (3) 19:24	07:57 (2) 18:13	07:50 16:17	07:50 16:01
21	05:17 21:31	05:49 (9) 20:34	07:08 (3) 19:21	08:00 (2) 18:11	08:00 (2) 16:15	07:51 16:02
22	05:18 21:30	05:55 (9) 20:32	07:09 (3) 19:19	07:43 (2) 18:09	07:43 (2) 16:14	07:53 16:02
23	05:20 21:28	06:11 20:30	07:10 (3) 19:17	08:01 (2) 18:07	07:41 (2) 16:12	07:55 16:03
24	05:21 21:27	06:12 20:28	07:10 (3) 19:14	07:42 (2) 18:05	07:40 (2) 16:11	07:57 16:03
25	05:23 21:25	06:14 20:25	07:10 (3) 19:12	08:01 (2) 18:03	07:40 (2) 16:10	07:58 16:04
26	05:24 21:24	06:43 (4) 20:23	07:11 (3) 19:09	08:01 (2) 18:01	07:39 (2) 16:09	08:00 16:05
27	05:26 21:22	06:50 (4) 20:21	07:10 (3) 19:07	08:01 (2) 18:00	07:40 (2) 16:08	08:02 16:06
28	05:27 21:21	06:39 (4) 20:19	06:48 (3) 19:04	07:39 (2) 17:58	07:39 (2) 16:07	08:03 16:06
29	05:29 21:19	06:55 (4) 20:16	07:09 (3) 19:02	07:59 (2) 17:57	07:59 (2) 16:06	08:05 16:07
30	05:30 21:18	06:37 (4) 20:14	06:49 (3) 19:00	07:40 (2) 17:55	07:42 (2) 16:05	08:06 16:08
31	05:32 21:16	06:57 (4) 20:12	07:38 (1) 19:00	07:56 (2) 17:54	07:42 (2) 16:04	08:06 16:09
	Sonnenscheinstunden 508	458	382	330	262	237
	astr.max.mögl.Beschattung 460	753	565	330	262	237
	Red.Sonnenscheinwahrsch. 0.38	0.42	0.35	0.29	0.29	0.29
	Reduktion Betriebsdauer 0.96	0.96	0.96	0.96	0.96	0.96
	Reduktion Windrichtung 0.72	0.72	0.70	0.69	0.69	0.69
	Gesamte Reduktion 0.26	0.29	0.23	0.19	0.19	0.19
	Met.wahrsch.Beschattung 120	220	133	2	2	2

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattende	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EU - IO151

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:25 (1)	05:46	06:26 (4)	04:59
	16:10	17:00	17:55	19:51	26 07:51 (1)	20:45	30 06:56 (4)	21:34
2	08:32	08:02	07:05	06:52	07:25 (1)	05:44	06:26 (4)	04:58
	16:12	17:02	17:57	19:53	27 07:52 (1)	20:47	30 06:56 (4)	21:35
3	08:32	08:00	07:03	06:49	07:25 (1)	05:42	06:25 (4)	04:57
	16:13	17:04	17:58	19:55	27 07:52 (1)	20:49	30 06:55 (4)	21:36
4	08:32	07:58	07:01	06:47	07:24 (1)	05:41	06:25 (4)	04:56
	16:14	17:06	18:00	19:57	27 07:51 (1)	20:50	30 06:55 (4)	21:37
5	08:32	07:57	06:58	06:45	07:24 (1)	05:39	06:25 (4)	04:55
	16:15	17:08	18:02	19:59	27 07:51 (1)	20:52	30 06:55 (4)	21:38
6	08:31	07:55	06:56	06:42	07:23 (1)	05:37	06:25 (4)	04:55
	16:16	17:10	18:04	20:00	27 07:50 (1)	20:54	29 06:54 (4)	21:39
7	08:31	07:53	06:54	06:40	07:24 (1)	05:35	06:26 (4)	04:54
	16:18	17:12	18:06	20:02	25 07:49 (1)	20:56	29 06:55 (4)	21:40
8	08:30	07:51	06:51	06:37	07:25 (1)	05:33	06:26 (4)	04:53
	16:19	17:14	18:08	20:04	23 07:48 (1)	20:57	28 06:54 (4)	21:41
9	08:30	07:49	06:49	06:35	06:59 (3)	05:31	06:26 (4)	04:53
	16:20	17:16	18:10	20:06	27 07:46 (1)	20:59	27 06:53 (4)	21:42
10	08:29	07:48	06:47	07:11 (2)	06:33	06:56 (3)	05:29	06:27 (4)
	16:22	17:18	18:11	5 07:16 (2)	20:08	30 07:45 (1)	21:01	26 06:53 (4)
11	08:29	07:46	06:44	07:08 (2)	06:30	06:54 (3)	05:27	06:27 (4)
	16:23	17:20	18:13	12 07:20 (2)	20:09	31 07:43 (1)	21:03	25 06:52 (4)
12	08:28	07:44	06:42	07:05 (2)	06:28	06:52 (3)	05:26	06:28 (4)
	16:25	17:22	18:15	16 07:21 (2)	20:11	29 07:41 (1)	21:04	22 06:50 (4)
13	08:27	07:42	06:40	07:03 (2)	06:26	06:50 (3)	05:24	06:29 (4)
	16:26	17:24	18:17	19 07:22 (2)	20:13	20 07:10 (3)	21:06	21 06:50 (4)
14	08:26	07:40	06:37	07:03 (2)	06:23	06:50 (3)	05:22	06:30 (4)
	16:28	17:26	18:19	20 07:23 (2)	20:15	21 07:11 (3)	21:08	18 06:48 (4)
15	08:25	07:38	06:35	07:01 (2)	06:21	06:50 (3)	05:21	06:32 (4)
	16:30	17:28	18:21	22 07:23 (2)	20:17	21 07:11 (3)	21:09	15 06:47 (4)
16	08:24	07:36	06:32	07:01 (2)	06:19	06:49 (3)	05:19	06:33 (4)
	16:31	17:30	18:23	22 07:23 (2)	20:18	22 07:11 (3)	21:11	12 06:45 (4)
17	08:23	07:34	06:30	07:00 (2)	06:17	06:48 (3)	05:17	06:37 (4)
	16:33	17:32	18:24	22 07:22 (2)	20:20	22 07:10 (3)	21:12	5 06:42 (4)
18	08:22	07:32	06:28	07:01 (2)	06:14	06:49 (3)	05:16	04:50
	16:35	17:34	18:26	21 07:22 (2)	20:22	21 07:10 (3)	21:14	21:48
19	08:21	07:29	06:25	07:01 (2)	06:12	06:49 (3)	05:14	04:50
	16:36	17:35	18:28	21 07:22 (2)	20:24	20 07:09 (3)	21:16	21:48
20	08:20	07:27	06:23	07:01 (2)	06:10	06:49 (3)	05:13	04:51
	16:38	17:37	18:30	19 07:20 (2)	20:26	19 07:08 (3)	21:17	21:48
21	08:19	07:25	06:20	07:02 (2)	06:08	06:50 (3)	05:12	04:51
	16:40	17:39	18:32	17 07:19 (2)	20:27	17 07:07 (3)	21:19	21:49
22	08:18	07:23	06:18	07:03 (2)	06:05	06:39 (4)	05:10	06:33 (4)
	16:42	17:41	18:33	14 07:17 (2)	20:29	21 07:06 (3)	21:20	5 05:45 (9)
23	08:17	07:21	06:16	07:06 (2)	06:03	06:35 (4)	05:09	05:38 (9)
	16:43	17:43	18:35	8 07:14 (2)	20:31	25 07:04 (3)	21:22	10 05:48 (9)
24	08:15	07:19	06:13	06:01	06:33 (4)	05:07	05:37 (9)	04:51
	16:45	17:45	18:37	20:33	18 06:51 (4)	21:23	12 05:49 (9)	21:49
25	08:14	07:16	06:11	05:59	06:30 (4)	05:06	05:37 (9)	04:52
	16:47	17:47	18:39	20:35	22 06:52 (4)	21:24	13 05:50 (9)	21:49
26	08:13	07:14	06:08	05:57	06:29 (4)	05:05	05:36 (9)	04:52
	16:49	17:49	18:41	20:36	24 06:53 (4)	21:26	15 05:51 (9)	21:49
27	08:11	07:12	06:06	06:34 (1)	05:55	06:28 (4)	05:04	05:36 (9)
	16:50	17:51	18:42	12 06:46 (1)	20:38	06:53 (4)	21:27	16 05:52 (9)
28	08:10	07:10	06:04	06:32 (1)	05:53	06:27 (4)	05:03	05:35 (9)
	16:53	17:53	18:44	16 06:48 (1)	20:40	27 06:54 (4)	21:29	17 05:52 (9)
29	08:08	07:01	06:42	07:29 (1)	05:51	06:26 (4)	05:02	05:35 (9)
	16:55	19:46	20 07:49 (1)	20:42	28 06:54 (4)	21:30	18 05:53 (9)	21:49
30	08:07	06:59	07:28 (1)	05:49	06:26 (4)	05:00	05:35 (9)	04:54
	16:57	19:48	22 07:50 (1)	20:43	30 06:56 (4)	21:31	18 05:53 (9)	21:48
31	08:05	06:56	07:27 (1)	05:47	04:59	05:35 (9)	04:53	04:53
	16:58	19:50	24 07:51 (1)	20:44	21:32	18 05:53 (9)	04:53	04:53
Sonnenscheinstunden	253	275	367	418	491	506	642	642
astr.max.mögl.Beschattung			332	729	549	43	0.39	0.39
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.96	0.96	0.96
Reduktion Betriebsdauer			0.69	0.72	0.72	0.72	0.72	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.27	0.27	0.27
Met.wahrsch.Beschattung			61	186	163	172	172	172

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EU - IO151

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:38 (8)	05:34	06:38 (4)	06:26	06:53 (3)	07:18	07:44 (2)	07:14	08:08		
	21:48	05:59 (9)	21:14	07:01 (4)	20:09	07:42 (1)	18:57	08:01 (2)	16:48	16:05		
2	04:56	05:38 (8)	05:35	06:37 (4)	06:28	06:55 (3)	07:20	07:46 (2)	07:16	08:09		
	21:48	06:00 (9)	21:12	07:02 (4)	20:07	07:44 (1)	18:55	07:59 (2)	16:46	16:05		
3	04:56	05:39 (8)	05:37	06:36 (4)	06:30	06:57 (3)	07:21	07:47 (2)	07:18	08:11		
	21:47	06:01 (9)	21:11	07:03 (4)	20:05	07:44 (1)	18:52	07:56 (2)	16:44	16:04		
4	04:57	05:39 (8)	05:38	06:36 (4)	06:31	07:22 (1)	07:23	07:22 (1)	07:23	08:12		
	21:47	06:00 (9)	21:09	07:03 (4)	20:02	07:45 (1)	18:50	07:45 (1)	18:36	16:02		
5	04:58	05:40 (8)	05:40	06:36 (4)	06:33	07:21 (1)	07:25	07:21 (1)	07:25	08:14		
	21:46	06:01 (9)	21:07	07:04 (4)	20:00	07:46 (1)	18:48	07:46 (1)	18:43	16:03		
6	04:59	05:40 (8)	05:42	06:35 (4)	06:35	07:19 (1)	07:27	07:19 (1)	07:27	08:15		
	21:46	06:01 (9)	21:05	07:04 (4)	19:57	07:46 (1)	18:45	07:46 (1)	18:45	16:02		
7	05:00	05:41 (8)	05:43	06:35 (4)	06:36	07:19 (1)	07:28	07:19 (1)	07:28	08:16		
	21:45	06:01 (9)	21:03	07:05 (4)	19:55	07:46 (1)	18:43	07:46 (1)	18:43	16:02		
8	05:01	05:42 (9)	05:45	06:34 (4)	06:38	07:19 (1)	07:30	07:19 (1)	07:30	08:18		
	21:45	06:01 (9)	21:01	07:04 (4)	19:53	07:46 (1)	18:41	07:46 (1)	18:41	16:01		
9	05:02	05:42 (9)	05:47	06:34 (4)	06:40	07:18 (1)	07:32	07:18 (1)	07:32	08:19		
	21:44	06:02 (9)	20:59	07:05 (4)	19:50	07:45 (1)	18:38	07:45 (1)	18:38	16:01		
10	05:03	05:43 (9)	05:48	06:34 (4)	06:42	07:18 (1)	07:34	07:18 (1)	07:34	08:20		
	21:43	06:02 (9)	20:57	07:04 (4)	19:48	07:45 (1)	18:36	07:45 (1)	18:36	16:01		
11	05:04	05:43 (9)	05:50	06:34 (4)	06:43	07:19 (1)	07:36	07:19 (1)	07:36	08:21		
	21:42	06:02 (9)	20:55	07:04 (4)	19:46	07:44 (1)	18:34	07:44 (1)	18:34	16:01		
12	05:05	05:43 (9)	05:52	06:35 (4)	06:45	07:18 (1)	07:37	07:18 (1)	07:37	08:22		
	21:41	06:02 (9)	20:53	07:04 (4)	19:43	07:43 (1)	18:31	07:43 (1)	18:31	16:00		
13	05:06	05:43 (9)	05:54	06:34 (4)	06:47	07:19 (1)	07:39	07:19 (1)	07:39	08:23		
	21:40	06:02 (9)	20:51	07:03 (4)	19:41	07:42 (1)	18:29	07:42 (1)	18:29	16:00		
14	05:07	05:43 (9)	05:55	06:35 (4)	06:48	07:20 (1)	07:41	07:20 (1)	07:41	08:24		
	21:39	06:01 (9)	20:49	07:03 (4)	19:38	07:41 (1)	18:27	07:41 (1)	18:27	16:00		
15	05:09	05:44 (9)	05:57	06:35 (4)	06:50	07:21 (1)	07:43	07:21 (1)	07:43	08:25		
	21:38	06:01 (9)	20:47	07:01 (4)	19:36	07:38 (1)	18:24	07:38 (1)	18:24	16:00		
16	05:10	05:44 (9)	05:59	06:36 (4)	06:52	07:23 (1)	07:45	07:23 (1)	07:45	08:26		
	21:37	06:01 (9)	20:45	07:01 (4)	19:33	07:36 (1)	18:22	07:36 (1)	18:22	16:00		
17	05:11	05:45 (9)	06:00	06:37 (4)	06:54	07:28 (1)	07:46	07:28 (1)	07:46	08:27		
	21:36	06:01 (9)	20:43	07:00 (4)	19:31	07:31 (1)	18:20	07:31 (1)	18:20	16:01		
18	05:13	05:46 (9)	06:02	06:37 (4)	06:55		07:48		07:48	08:28		
	21:35	06:00 (9)	20:41	06:58 (4)	19:29		18:18		18:18	16:01		
19	05:14	05:47 (9)	06:04	06:39 (4)	06:57		07:50		07:50	08:28		
	21:34	05:59 (9)	20:39	07:06 (3)	19:26		18:15		18:15	16:01		
20	05:15	05:47 (9)	06:05	06:40 (4)	06:59	07:53 (2)	07:52		07:50	08:29		
	21:32	05:58 (9)	20:37	07:09 (3)	19:24	6	07:59 (2)	18:13		16:17	16:01	
21	05:17	05:50 (9)	06:07	06:45 (4)	07:00		07:49 (2)	07:54		07:51	08:30	
	21:31	05:57 (9)	20:34	07:11 (3)	19:21	13	08:02 (2)	18:11		16:15	16:02	
22	05:18		06:09	06:55 (3)	07:02		07:47 (2)	07:56		07:53	08:30	
	21:30		20:32	07:12 (3)	19:19	16	08:03 (2)	18:09		16:14	16:02	
23	05:20		06:11	06:53 (3)	07:04		07:46 (2)	07:58		07:55	08:31	
	21:28		20:30	07:12 (3)	19:16	18	08:04 (2)	18:07		16:13	16:03	
24	05:21		06:12	06:53 (3)	07:06		07:44 (2)	07:59		07:57	08:31	
	21:27		20:28	07:13 (3)	19:14	20	08:04 (2)	18:05		16:12	16:03	
25	05:23		06:14	06:52 (3)	07:07		07:43 (2)	07:01		07:58	08:31	
	21:25		20:25	07:13 (3)	19:12	22	08:05 (2)	17:02		16:11	16:04	
26	05:24		06:16	06:51 (3)	07:09		07:43 (2)	07:03		08:00	08:32	
	21:24		20:23	07:13 (3)	19:09	22	08:05 (2)	17:00		16:10	16:05	
27	05:26	8	06:46 (4)	06:18	06:51 (3)	07:11	07:43 (2)	07:05		08:02	08:32	
	21:22		06:54 (4)	20:21	22	07:13 (3)	19:07	22	08:05 (2)	16:58	16:05	
28	05:27		06:43 (4)	06:19	22	06:50 (3)	07:13	07:42 (2)	07:07	08:03	08:32	
	21:21	13	06:56 (4)	20:19	22	07:12 (3)	19:04	21	08:03 (2)	16:56	16:06	
29	05:29		06:41 (4)	06:21	21	06:51 (3)	07:14	07:42 (2)	07:09	08:05	08:32	
	21:19	17	06:58 (4)	20:16	21	07:12 (3)	19:02	21	08:03 (2)	16:54	16:07	
30	05:30		06:40 (4)	06:23	20	06:51 (3)	07:16	07:43 (2)	07:11	08:06	08:32	
	21:18	19	06:59 (4)	20:14	20	07:11 (3)	19:00	19	08:02 (2)	16:52	16:08	
31	05:32		06:39 (4)	06:24	29	06:51 (3)			07:13		08:32	
	21:16	22	07:01 (4)	20:12	29	07:40 (1)			16:50		16:09	
Sonnenscheinstunden	508		458		382		330		262	237		
astr.max.mögl.Beschattung	454		769		598		39					
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96					
Reduktion Windrichtung	0.72		0.72		0.70		0.68					
Gesamte Reduktion	0.26		0.29		0.23		0.19					
Met.wahrsch.Beschattung	119		225		140		7					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EV - IO152

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:24 (1)	05:46	06:24 (4)	04:59
	16:10	17:00	17:55	19:51	25 07:49 (1)	20:45	29 06:53 (4)	21:34
2	08:32	08:02	07:05	06:52	07:24 (1)	05:44	06:23 (4)	04:58
	16:12	17:02	17:57	19:53	26 07:50 (1)	20:47	30 06:53 (4)	21:35
3	08:32	08:00	07:03	06:49	07:23 (1)	05:42	06:23 (4)	04:57
	16:13	17:04	17:58	19:55	27 07:50 (1)	20:49	30 06:53 (4)	21:36
4	08:32	07:58	07:01	06:47	07:22 (1)	05:41	06:22 (4)	04:56
	16:14	17:06	18:00	19:57	27 07:49 (1)	20:50	31 06:53 (4)	21:37
5	08:32	07:57	06:58	06:45	07:22 (1)	05:39	06:22 (4)	04:55
	16:15	17:08	18:02	19:59	28 07:50 (1)	20:52	31 06:53 (4)	21:38
6	08:31	07:55	06:56	06:42	07:21 (1)	05:37	06:22 (4)	04:55
	16:16	17:10	18:04	20:00	27 07:48 (1)	20:54	30 06:52 (4)	21:39
7	08:31	07:53	06:54	06:40	07:22 (1)	05:35	06:22 (4)	04:54
	16:18	17:12	18:06	20:02	26 07:48 (1)	20:56	31 06:53 (4)	21:40
8	08:30	07:51	06:51	06:37	07:22 (1)	05:33	06:22 (4)	04:53
	16:19	17:14	18:08	20:04	26 07:48 (1)	20:57	30 06:52 (4)	21:41
9	08:30	07:49	06:49	06:35	07:22 (1)	05:31	06:22 (4)	04:53
	16:20	17:16	18:10	20:06	24 07:46 (1)	20:59	30 06:52 (4)	21:42
10	08:29	07:48	06:47	06:33	06:57 (3)	05:29	06:23 (4)	04:52
	16:22	17:18	18:11	20:08	28 07:45 (1)	21:01	29 06:52 (4)	21:43
11	08:29	07:46	06:44	06:30	06:54 (3)	05:27	06:23 (4)	04:52
	16:23	17:20	18:13	9 07:17 (2)	20:09	32 07:44 (1)	21:03	28 06:51 (4)
12	08:28	07:44	06:42	07:05 (2)	06:28	06:52 (3)	05:26	06:23 (4)
	16:25	17:22	18:15	14 07:19 (2)	20:11	33 07:42 (1)	21:04	27 06:50 (4)
13	08:27	07:42	06:40	07:03 (2)	06:26	06:50 (3)	05:24	06:25 (4)
	16:26	17:24	18:17	17 07:20 (2)	20:13	31 07:39 (1)	21:06	25 06:50 (4)
14	08:26	07:40	06:37	07:02 (2)	06:23	06:49 (3)	05:22	06:25 (4)
	16:28	17:26	18:19	20 07:22 (2)	20:15	23 07:34 (1)	21:08	23 06:48 (4)
15	08:25	07:38	06:35	07:01 (2)	06:21	06:48 (3)	05:21	06:26 (4)
	16:30	17:28	18:21	20 07:21 (2)	20:17	21 07:09 (3)	21:09	22 06:48 (4)
16	08:24	07:36	06:32	07:00 (2)	06:19	06:48 (3)	05:19	06:27 (4)
	16:31	17:30	18:23	22 07:22 (2)	20:18	21 07:09 (3)	21:11	19 06:46 (4)
17	08:23	07:34	06:30	06:59 (2)	06:17	06:47 (3)	05:17	06:28 (4)
	16:33	17:32	18:24	22 07:21 (2)	20:20	22 07:09 (3)	21:12	18 06:46 (4)
18	08:22	07:32	06:28	06:59 (2)	06:14	06:47 (3)	05:16	06:30 (4)
	16:35	17:34	18:26	22 07:21 (2)	20:22	21 07:08 (3)	21:14	14 06:44 (4)
19	08:21	07:29	06:25	07:00 (2)	06:12	06:47 (3)	05:14	06:32 (4)
	16:36	17:35	18:28	21 07:21 (2)	20:24	21 07:08 (3)	21:16	9 06:41 (4)
20	08:20	07:27	06:23	06:59 (2)	06:10	06:47 (3)	05:13	04:51
	16:38	17:37	18:30	21 07:20 (2)	20:26	21 07:08 (3)	21:17	21:48
21	08:19	07:25	06:20	07:00 (2)	06:08	06:48 (3)	05:12	04:51
	16:40	17:39	18:32	19 07:19 (2)	20:27	19 07:07 (3)	21:19	21:49
22	08:18	07:23	06:18	07:01 (2)	06:05	06:48 (3)	05:10	04:51
	16:42	17:41	18:33	16 07:17 (2)	20:29	18 07:06 (3)	21:20	21:49
23	08:17	07:21	06:16	07:02 (2)	06:03	06:50 (3)	05:09	04:51
	16:43	17:43	18:35	13 07:15 (2)	20:31	14 07:04 (3)	21:22	21:49
24	08:15	07:19	06:13	07:05 (2)	06:01	06:34 (4)	05:07	05:39 (9)
	16:45	17:45	18:37	6 07:11 (2)	20:33	22 07:02 (3)	21:23	4 05:43 (9)
25	08:14	07:16	06:11	05:59	06:30 (4)	05:06	05:37 (9)	04:52
	16:47	17:47	18:39	20:35	21 06:58 (3)	21:24	9 05:46 (9)	21:49
26	08:13	07:14	06:08	05:57	06:28 (4)	05:05	05:36 (9)	04:52
	16:49	17:49	18:41	20:36	20 06:48 (4)	21:26	11 05:47 (9)	21:49
27	08:11	07:12	06:06	05:55	06:27 (4)	05:04	05:35 (9)	04:53
	16:51	17:51	18:42	20:38	23 06:50 (4)	21:27	13 05:48 (9)	21:49
28	08:10	07:10	06:04	06:32 (1)	05:53	06:26 (4)	05:03	05:34 (9)
	16:53	17:53	18:44	12 06:44 (1)	20:40	24 06:50 (4)	21:29	15 05:49 (9)
29	08:08	07:01	06:29	05:51	06:25 (4)	05:02	05:34 (9)	04:54
	16:55	19:46	17 07:46 (1)	20:42	26 06:51 (4)	21:30	15 05:49 (9)	21:49
30	08:07	06:59	07:27 (1)	05:49	06:25 (4)	05:00	05:33 (9)	04:54
	16:57	19:48	21 07:48 (1)	20:43	28 06:53 (4)	21:31	17 05:50 (9)	21:48
31	08:05	06:56	07:26 (1)	05:47	04:59	05:33 (9)	04:51	05:33 (9)
	16:58	19:50	23 07:49 (1)	20:44	21:32	17 05:50 (9)	04:51	05:33 (9)
Sonnenscheinstunden	253	275	367	418	491	506	632	
astr.max.mögl.Beschattung			0.28	0.37	0.43	0.39	0.39	
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96	0.96	
Reduktion Betriebsdauer			0.69	0.72	0.72	0.72	0.72	
Gesamte Reduktion			0.18	0.26	0.30	0.27	0.27	
Met.wahrsch.Beschattung			58	185	174	169		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EV - IO152

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:36 (8)	05:34	06:34 (4)	06:26	06:53 (3)	07:18	07:44 (2)	07:14	08:08		
	21:48	05:58 (9)	21:14	07:00 (4)	20:09	07:43 (1)	18:57	07:59 (2)	16:48	16:05		
2	04:56	05:37 (8)	05:35	06:33 (4)	06:28	06:56 (3)	07:20	07:46 (2)	07:16	08:09		
	21:48	05:58 (9)	21:12	07:01 (4)	20:07	07:44 (1)	18:55	07:57 (2)	16:46	16:05		
3	04:56	05:38 (8)	05:37	06:32 (4)	06:30	07:20 (1)	07:21	07:49 (2)	07:18	08:11		
	21:47	05:59 (9)	21:11	07:01 (4)	20:05	07:44 (1)	18:52	07:51 (2)	16:44	16:04		
4	04:57	05:38 (8)	05:38	06:33 (4)	06:31	07:19 (1)	07:23	07:45 (1)	18:50	16:42	16:03	
	21:47	05:58 (9)	21:09	07:02 (4)	20:02	07:45 (1)	18:50	07:49 (2)	16:42	16:03		
5	04:58	05:39 (9)	05:40	06:33 (4)	06:33	07:19 (1)	07:25	07:45 (1)	18:48	16:41	16:03	
	21:46	05:58 (9)	21:07	07:03 (4)	20:00	07:45 (1)	18:48	07:45 (1)	18:48	16:41	16:03	
6	04:59	05:39 (9)	05:42	06:32 (4)	06:35	07:17 (1)	07:27	07:45 (1)	18:45	16:39	16:02	
	21:46	05:59 (9)	21:05	07:02 (4)	19:57	07:17 (1)	07:28	07:45 (1)	18:45	16:39	16:02	
7	05:00	05:40 (9)	05:43	06:32 (4)	06:36	07:17 (1)	07:28	07:45 (1)	18:43	16:37	16:02	
	21:45	05:59 (9)	21:03	07:03 (4)	19:55	07:17 (1)	07:30	07:45 (1)	18:41	16:35	16:01	
8	05:01	05:40 (9)	05:45	06:31 (4)	06:38	07:17 (1)	07:30	07:45 (1)	18:41	16:35	16:01	
	21:45	05:59 (9)	21:01	07:02 (4)	19:53	07:17 (1)	07:32	07:45 (1)	18:39	16:33	16:01	
9	05:02	05:40 (9)	05:47	06:32 (4)	06:40	07:17 (1)	07:32	07:43 (1)	18:38	16:31	16:01	
	21:44	05:59 (9)	20:59	07:02 (4)	19:50	07:17 (1)	07:34	07:43 (1)	18:36	16:29	16:00	
10	05:03	05:41 (9)	05:48	06:31 (4)	06:42	07:17 (1)	07:34	07:43 (1)	18:36	16:29	16:00	
	21:43	05:59 (9)	20:57	07:01 (4)	19:48	07:17 (1)	07:36	07:43 (1)	18:34	16:27	16:00	
11	05:04	05:41 (9)	05:50	06:32 (4)	06:43	07:18 (1)	07:36	07:43 (1)	18:34	16:27	16:00	
	21:42	05:59 (9)	20:55	07:01 (4)	19:46	07:18 (1)	07:36	07:43 (1)	18:34	16:27	16:00	
12	05:05	05:41 (9)	05:52	06:33 (4)	06:45	07:17 (1)	07:37	07:43 (1)	18:33	16:26	16:00	
	21:41	05:59 (9)	20:53	07:01 (4)	19:43	07:18 (1)	07:39	07:43 (1)	18:33	16:26	16:00	
13	05:06	05:42 (9)	05:54	06:32 (4)	06:47	07:18 (1)	07:39	07:43 (1)	18:33	16:26	16:00	
	21:40	05:59 (9)	20:51	07:00 (4)	19:41	07:18 (1)	07:39	07:43 (1)	18:33	16:26	16:00	
14	05:07	05:42 (9)	05:55	06:33 (4)	06:48	07:20 (1)	07:41	07:43 (1)	18:33	16:26	16:00	
	21:39	05:58 (9)	20:49	06:59 (4)	19:38	07:20 (1)	07:41	07:43 (1)	18:33	16:26	16:00	
15	05:09	05:42 (9)	05:57	06:33 (4)	06:50	07:21 (1)	07:43	07:43 (1)	18:33	16:26	16:00	
	21:38	05:58 (9)	20:47	06:58 (4)	19:36	07:21 (1)	07:43	07:43 (1)	18:33	16:26	16:00	
16	05:10	05:43 (9)	05:59	06:35 (4)	06:52	07:26 (1)	07:45	07:43 (1)	18:33	16:26	16:00	
	21:37	05:57 (9)	20:45	06:57 (4)	19:33	07:30 (1)	07:45	07:43 (1)	18:33	16:26	16:00	
17	05:11	05:45 (9)	06:00	06:36 (4)	06:54	07:30 (1)	07:45	07:43 (1)	18:33	16:26	16:00	
	21:36	05:57 (9)	20:43	06:56 (4)	19:31	07:30 (1)	07:45	07:43 (1)	18:33	16:26	16:00	
18	05:13	05:46 (9)	06:02	06:38 (4)	06:55	07:31 (1)	07:46	07:43 (1)	18:33	16:26	16:00	
	21:35	05:56 (9)	20:41	07:05 (3)	19:29	07:31 (1)	07:46	07:43 (1)	18:33	16:26	16:00	
19	05:14	05:47 (9)	06:04	06:41 (4)	06:57	07:32 (1)	07:46	07:43 (1)	18:33	16:26	16:00	
	21:34	05:54 (9)	20:39	07:08 (3)	19:26	07:32 (1)	07:46	07:43 (1)	18:33	16:26	16:00	
20	05:15	06:05	06:54 (3)	06:59	07:50 (2)	07:52	07:50 (2)	07:52	07:50 (2)	07:52	07:50 (2)	16:01
	21:32	06:07	20:37	07:09 (3)	19:24	07:50 (2)	07:52	07:50 (2)	07:52	07:50 (2)	16:01	16:01
21	05:17	06:07	06:53 (3)	07:00	07:47 (2)	07:54	07:47 (2)	07:54	07:47 (2)	07:54	07:47 (2)	16:01
	21:31	06:09	20:34	07:11 (3)	19:21	07:47 (2)	07:54	07:47 (2)	07:54	07:47 (2)	16:01	16:01
22	05:18	06:09	06:52 (3)	07:02	07:45 (2)	07:56	07:45 (2)	07:56	07:45 (2)	07:56	07:45 (2)	16:01
	21:30	06:11	20:32	07:12 (3)	19:19	07:45 (2)	07:56	07:45 (2)	07:56	07:45 (2)	16:01	16:01
23	05:20	06:11	06:51 (3)	07:04	07:44 (2)	07:58	07:44 (2)	07:58	07:44 (2)	07:58	07:44 (2)	16:01
	21:28	06:13	20:30	07:11 (3)	19:16	07:44 (2)	07:58	07:44 (2)	07:58	07:44 (2)	16:01	16:01
24	05:21	06:45 (4)	06:12	06:50 (3)	07:06	07:43 (2)	07:59	07:43 (2)	07:59	07:43 (2)	16:01	16:01
	21:27	06:50 (4)	20:28	07:12 (3)	19:14	07:43 (2)	07:59	07:43 (2)	07:59	07:43 (2)	16:01	16:01
25	05:23	06:41 (4)	06:14	06:50 (3)	07:07	07:42 (2)	07:01	07:42 (2)	07:01	16:12	16:03	16:03
	21:25	06:53 (4)	20:25	07:12 (3)	19:12	07:42 (2)	07:01	07:42 (2)	07:01	16:12	16:03	16:03
26	05:24	06:40 (4)	06:16	06:49 (3)	07:09	07:42 (2)	07:03	07:42 (2)	07:03	16:11	16:04	16:04
	21:24	06:55 (4)	20:23	07:11 (3)	19:09	07:42 (2)	07:03	07:42 (2)	07:03	16:11	16:04	16:04
27	05:26	06:38 (4)	06:18	06:50 (3)	07:11	08:04 (2)	17:00	08:04 (2)	17:00	16:10	16:05	16:05
	21:22	06:56 (4)	20:21	07:11 (3)	19:07	08:04 (2)	17:00	08:04 (2)	17:00	16:10	16:05	16:05
28	05:27	06:37 (4)	06:19	06:49 (3)	07:13	07:41 (2)	07:07	07:41 (2)	07:07	16:08	16:06	16:06
	21:21	06:57 (4)	20:19	07:10 (3)	19:04	07:41 (2)	07:07	07:41 (2)	07:07	16:08	16:06	16:06
29	05:29	06:36 (4)	06:21	06:50 (3)	07:14	08:02 (2)	16:56	08:02 (2)	16:56	16:08	16:06	16:06
	21:19	06:59 (4)	20:16	07:36 (1)	19:02	08:02 (2)	16:54	08:02 (2)	16:54	16:07	16:07	16:07
30	05:30	06:35 (4)	06:23	06:51 (3)	07:16	07:43 (2)	07:11	07:43 (2)	07:11	16:06	16:08	16:08
	21:18	06:59 (4)	20:14	07:40 (1)	19:00	08:01 (2)	16:52	08:01 (2)	16:52	16:06	16:08	16:08
31	05:32	06:35 (4)	06:24	06:51 (3)	07:13	07:43 (2)	07:11	07:43 (2)	07:11	16:06	16:08	16:08
	21:16	07:00 (4)	20:12	07:41 (1)	19:00	07:43 (2)	07:11	07:43 (2)	07:11	16:06	16:08	16:08
Sonnenscheinstunden	508	458	382	330	262	237						
astr.max.mögl.Beschattung	468	784	588	28								
Red.Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29								
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96								
Reduktion Windrichtung	0.72	0.72	0.70	0.68								
Gesamte Reduktion	0.26	0.29	0.23	0.19								
Met.wahrsch.Beschattung	122	229	138	5								

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EW - IO153

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	06:54	07:22 (1)	05:46	06:21 (4)	04:59	
	16:10	17:00	17:55	19:51	20	07:42 (1)	20:45	27	
2	08:32	08:02	07:05	06:52	07:21 (1)	05:44	06:20 (4)	04:58	
	16:12	17:02	17:57	19:53	22	07:43 (1)	20:47	28	
3	08:32	08:00	07:03	06:49	07:20 (1)	05:42	06:20 (4)	04:57	
	16:13	17:04	17:58	19:55	24	07:44 (1)	20:49	28	
4	08:32	07:58	07:01	06:47	07:18 (1)	05:41	06:19 (4)	04:56	
	16:14	17:06	18:00	19:57	26	07:44 (1)	20:50	29	
5	08:32	07:57	06:58	06:45	07:18 (1)	05:39	06:19 (4)	04:55	
	16:15	17:08	18:02	19:59	26	07:44 (1)	20:52	29	
6	08:31	07:55	06:56	06:42	07:17 (1)	05:37	06:18 (4)	04:55	
	16:16	17:10	18:04	20:00	26	07:43 (1)	20:54	30	
7	08:31	07:53	06:54	06:40	07:17 (1)	05:35	06:19 (4)	04:54	
	16:18	17:12	18:06	20:02	26	07:43 (1)	20:56	30	
8	08:30	07:51	06:51	06:37	07:17 (1)	05:33	06:19 (4)	04:53	
	16:19	17:14	18:08	20:04	26	07:43 (1)	20:57	29	
9	08:30	07:49	06:49	06:35	07:16 (1)	05:31	06:18 (4)	04:53	
	16:20	17:16	18:10	20:06	26	07:42 (1)	20:59	29	
10	08:29	07:48	06:47	06:33	07:17 (1)	05:29	06:19 (4)	04:52	
	16:22	17:18	18:11	20:08	24	07:41 (1)	21:01	29	
11	08:29	07:46	06:44	06:30	06:56 (3)	05:27	06:19 (4)	04:52	
	16:23	17:20	18:13	20:09	25	07:41 (1)	21:03	28	
12	08:28	07:44	06:42	06:28	06:52 (3)	05:26	06:19 (4)	04:52	
	16:25	17:22	18:15	20:11	32	07:40 (1)	21:04	27	
13	08:27	07:42	06:40	06:26	06:49 (3)	05:24	06:20 (4)	04:51	
	16:26	17:24	18:17	9 07:12 (2)	20:13	33	07:37 (1)	21:06	26
14	08:26	07:40	06:37	06:23	07:01 (2)	06:23	06:20 (4)	04:51	
	16:28	17:26	18:19	13 07:14 (2)	20:15	32	07:35 (1)	21:08	25
15	08:25	07:38	06:35	06:21	06:58 (2)	06:21	06:46 (3)	05:21	23
	16:30	17:28	18:21	17 07:15 (2)	20:17	29	07:33 (1)	21:09	23
16	08:24	07:36	06:32	06:19	06:57 (2)	06:19	06:45 (3)	05:19	21
	16:31	17:30	18:23	19 07:16 (2)	20:18	21	07:06 (3)	21:11	21
17	08:23	07:34	06:30	06:17	06:55 (2)	06:17	06:44 (3)	05:17	20
	16:33	17:32	18:24	21 07:16 (2)	20:20	21	07:05 (3)	21:12	20
18	08:22	07:32	06:28	06:14	06:55 (2)	06:14	06:44 (3)	05:16	17
	16:35	17:34	18:26	21 07:16 (2)	20:22	21	07:05 (3)	21:14	17
19	08:21	07:29	06:25	06:12	06:55 (2)	06:12	06:43 (3)	05:14	14
	16:36	17:35	18:28	22 07:17 (2)	20:24	22	07:05 (3)	21:16	14
20	08:20	07:27	06:23	06:10	06:54 (2)	06:10	06:44 (3)	05:13	10
	16:38	17:37	18:30	22 07:16 (2)	20:26	21	07:05 (3)	21:17	10
21	08:19	07:25	06:20	06:08	06:55 (2)	06:08	06:44 (3)	05:12	7
	16:40	17:39	18:32	21 07:16 (2)	20:27	20	07:04 (3)	21:19	7
22	08:18	07:23	06:18	06:06	06:54 (2)	06:06	06:44 (3)	05:10	5
	16:42	17:41	18:33	20 07:14 (2)	20:29	19	07:03 (3)	21:20	5
23	08:17	07:21	06:16	06:03	06:55 (2)	06:03	06:45 (3)	05:09	4
	16:43	17:43	18:35	18 07:13 (2)	20:31	17	07:02 (3)	21:22	4
24	08:15	07:19	06:13	06:01	06:56 (2)	06:01	06:46 (3)	05:07	3
	16:45	17:45	18:37	15 07:11 (2)	20:33	15	07:01 (3)	21:23	3
25	08:14	07:16	06:11	05:59	06:58 (2)	05:59	06:31 (4)	05:06	2
	16:47	17:47	18:39	11 07:09 (2)	20:35	18	06:58 (3)	21:24	2
26	08:13	07:14	06:08	05:57	06:27 (4)	05:05	05:35 (9)	04:52	1
	16:49	17:49	18:41	20:36	19	06:55 (3)	21:26	10	
27	08:11	07:12	06:06	05:55	06:25 (4)	05:04	05:45 (9)	04:53	9
	16:51	17:51	18:42	20:38	18	06:43 (4)	21:27	12	
28	08:10	07:10	06:04	05:53	06:24 (4)	05:03	05:33 (9)	04:53	8
	16:53	17:53	18:44	20:40	21	06:45 (4)	21:29	14	
29	08:08	07:01	05:51	05:51	06:23 (4)	05:02	05:33 (9)	04:54	7
	16:55	19:46	20:42	24 06:47 (4)	21:30	15	05:48 (9)	21:49	6
30	08:07	06:59	07:26 (1)	05:49	06:22 (4)	05:00	05:32 (9)	04:54	5
	16:57	19:48	13 07:39 (1)	20:43	25	06:47 (4)	21:31	16	
31	08:05	06:56	07:24 (1)	05:47	05:00	05:00	05:32 (9)	04:54	4
	16:58	19:50	17 07:41 (1)	20:43	16	06:47 (4)	21:32	16	
Sonnenscheinstunden	253	275	367	418	491	506	619	619	
astr.max.mögl.Beschattung			0.28	0.37	0.43	0.39	0.39	0.39	
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96	0.96	0.96	
Reduktion Betriebsdauer			0.69	0.72	0.72	0.72	0.72	0.72	
Gesamte Reduktion			0.18	0.26	0.30	0.27	0.27	0.27	
Met.wahrsch.Beschattung			47	179	175	165	165	165	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EW - IO153

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:35 (8)	05:34		06:29 (4)	06:26	07:16 (1)	07:18	07:45 (2)	07:14	08:08		
	21	05:56 (9)	21:14	28	06:57 (4)	20:09	24	07:40 (1)	18:57	4	07:49 (2)	16:48	16:05
2	04:56	05:36 (8)	05:35		06:29 (4)	06:28		07:16 (1)	07:20		07:16	08:09	
	20	05:56 (9)	21:12	29	06:58 (4)	20:07	24	07:40 (1)	18:55		16:46	16:05	
3	04:56	05:37 (8)	05:37		06:29 (4)	06:30		07:14 (1)	07:21		07:18	08:11	
	20	05:57 (9)	21:11	28	06:57 (4)	20:05	26	07:40 (1)	18:52		16:44	16:04	
4	04:57	05:37 (9)	05:38		06:29 (4)	06:31		07:14 (1)	07:23		07:20	08:12	
	19	05:56 (9)	21:09	29	06:58 (4)	20:02	26	07:40 (1)	18:50		16:42	16:03	
5	04:58	05:38 (9)	05:40		06:29 (4)	06:33		07:14 (1)	07:25		07:22	08:14	
	19	05:57 (9)	21:07	30	06:59 (4)	20:00	26	07:40 (1)	18:48		16:41	16:03	
6	04:59	05:38 (9)	05:42		06:28 (4)	06:35		07:13 (1)	07:27		07:24	08:15	
	19	05:57 (9)	21:05	30	06:58 (4)	19:57	26	07:39 (1)	18:45		16:39	16:02	
7	05:00	05:38 (9)	05:43		06:29 (4)	06:36		07:13 (1)	07:28		07:26	08:16	
	19	05:57 (9)	21:03	29	06:58 (4)	19:55	26	07:39 (1)	18:43		16:37	16:02	
8	05:01	05:39 (9)	05:45		06:28 (4)	06:38		07:13 (1)	07:30		07:28	08:18	
	18	05:57 (9)	21:01	30	06:58 (4)	19:53	26	07:39 (1)	18:41		16:35	16:01	
9	05:02	05:39 (9)	05:47		06:29 (4)	06:40		07:13 (1)	07:32		07:30	08:19	
	18	05:57 (9)	20:59	29	06:58 (4)	19:50	24	07:37 (1)	18:38		16:33	16:01	
10	05:03	05:39 (9)	05:48		06:28 (4)	06:42		07:14 (1)	07:34		07:31	08:20	
	18	05:57 (9)	20:57	29	06:57 (4)	19:48	22	07:36 (1)	18:36		16:32	16:01	
11	05:04	05:40 (9)	05:50		06:29 (4)	06:43		07:15 (1)	07:36		07:33	08:21	
	17	05:57 (9)	20:55	27	06:56 (4)	19:46	20	07:35 (1)	18:34		16:30	16:01	
12	05:05	05:40 (9)	05:52		06:30 (4)	06:45		07:15 (1)	07:37		07:35	08:22	
	17	05:57 (9)	20:53	26	06:56 (4)	19:43	18	07:33 (1)	18:31		16:28	16:00	
13	05:06	05:40 (9)	05:54		06:30 (4)	06:47		07:17 (1)	07:39		07:37	08:23	
	17	05:57 (9)	20:51	25	06:55 (4)	19:41	13	07:30 (1)	18:29		16:27	16:00	
14	05:07	05:41 (9)	05:55		06:31 (4)	06:48		07:22 (1)	07:41		07:39	08:24	
	15	05:56 (9)	20:49	23	06:54 (4)	19:38	4	07:26 (1)	18:27		16:25	16:00	
15	05:09	05:41 (9)	05:57		06:31 (4)	06:50			07:43		07:41	08:25	
	15	05:56 (9)	20:47	21	06:52 (4)	19:36			18:24		16:24	16:00	
16	05:10	05:42 (9)	05:59		06:33 (4)	06:52			07:45		07:42	08:26	
	13	05:55 (9)	20:45	17	06:50 (4)	19:33			18:22		16:22	16:00	
17	05:11	05:44 (9)	06:00		06:36 (4)	06:54			07:46		07:44	08:27	
	11	05:55 (9)	20:43	19	07:03 (3)	19:31			18:20		16:21	16:01	
18	05:13	05:45 (9)	06:02		06:39 (4)	06:55		07:46 (2)	07:48		07:46	08:28	
	9	05:54 (9)	20:41	16	07:05 (3)	19:29	10	07:56 (2)	18:18		16:19	16:01	
19	05:14	05:47 (9)	06:04		06:52 (3)	06:57		07:44 (2)	07:50		07:48	08:28	
	4	05:51 (9)	20:39	15	07:07 (3)	19:26	14	07:58 (2)	18:15		16:18	16:01	
20	05:15		06:05		06:50 (3)	06:59		07:42 (2)	07:52		07:50	08:29	
	21:32		20:37	17	07:07 (3)	19:24	17	07:59 (2)	18:13		16:17	16:01	
21	05:17		06:07		06:49 (3)	07:00		07:40 (2)	07:54		07:51	08:30	
	21:31		20:34	19	07:08 (3)	19:21	19	07:59 (2)	18:11		16:15	16:02	
22	05:18		06:09		06:49 (3)	07:02		07:40 (2)	07:56		07:53	08:30	
	21:30		20:32	20	07:09 (3)	19:19	20	08:00 (2)	18:09		16:14	16:02	
23	05:20	06:40 (4)	06:11		06:47 (3)	07:04		07:39 (2)	07:58		07:55	08:31	
	6	06:46 (4)	20:30	21	07:08 (3)	19:16	21	08:00 (2)	18:07		16:13	16:03	
24	05:21	06:38 (4)	06:12		06:47 (3)	07:06		07:38 (2)	07:59		07:57	08:31	
	11	06:49 (4)	20:28	22	07:09 (3)	19:14	21	07:59 (2)	18:05		16:12	16:03	
25	05:23	06:36 (4)	06:14		06:47 (3)	07:07		07:38 (2)	07:01		07:58	08:31	
	15	06:51 (4)	20:25	22	07:09 (3)	19:12	21	07:59 (2)	17:02		16:11	16:04	
26	05:24	06:35 (4)	06:16		06:47 (3)	07:09		07:38 (2)	07:03		08:00	08:32	
	18	06:53 (4)	20:23	21	07:08 (3)	19:09	21	07:59 (2)	17:00		16:10	16:05	
27	05:26	06:33 (4)	06:18		06:47 (3)	07:11		07:38 (2)	07:05		08:02	08:32	
	20	06:53 (4)	20:21	20	07:07 (3)	19:07	20	07:58 (2)	16:58		16:09	16:06	
28	05:27	06:33 (4)	06:19		06:47 (3)	07:13		07:38 (2)	07:07		08:03	08:32	
	22	06:55 (4)	20:19	30	07:34 (1)	19:04	18	07:56 (2)	16:56		16:08	16:06	
29	05:29	06:32 (4)	06:21		06:48 (3)	07:14		07:40 (2)	07:09		08:05	08:32	
	23	06:55 (4)	20:16	32	07:36 (1)	19:02	15	07:55 (2)	16:54		16:07	16:07	
30	05:30	06:31 (4)	06:23		06:50 (3)	07:16		07:42 (2)	07:11		08:06	08:32	
	25	06:56 (4)	20:14	33	07:38 (1)	19:00	11	07:53 (2)	16:52		16:06	16:08	
31	05:32	06:30 (4)	06:24		06:51 (3)				07:13			08:32	
	27	06:57 (4)	20:12	32	07:39 (1)				16:50			16:09	
	Sonnenscheinstunden	508	458		382			330		262	237		
	astr.max.mögl.Beschattung	476		769		533			4				
	Red.Sonnenscheinwahrsch.	0.38		0.42		0.35			0.29				
	Reduktion Betriebsdauer	0.96		0.96		0.96			0.96				
	Reduktion Windrichtung	0.72		0.72		0.70			0.69				
	Gesamte Reduktion	0.26		0.29		0.23			0.19				
	Met.wahrsch.Beschattung	124		225		125			1				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EX - IO154

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:32	08:03	07:08	06:54	07:22 (1)	05:46	06:21 (4)	04:59
	16:10	17:00	17:55	19:51	19	07:41 (1)	20:45	25
2	08:32	08:02	07:05	06:52	07:21 (1)	05:44	06:20 (4)	04:58
	16:12	17:02	17:57	19:53	22	07:43 (1)	20:47	26
3	08:32	08:00	07:03	06:49	07:20 (1)	05:42	06:19 (4)	04:57
	16:13	17:04	17:58	19:55	24	07:44 (1)	20:49	28
4	08:32	07:58	07:01	06:47	07:18 (1)	05:41	06:18 (4)	04:56
	16:14	17:06	18:00	19:57	25	07:43 (1)	20:50	29
5	08:32	07:57	06:58	06:45	07:18 (1)	05:39	06:17 (4)	04:55
	16:15	17:08	18:02	19:59	26	07:44 (1)	20:52	30
6	08:31	07:55	06:56	06:42	07:16 (1)	05:37	06:17 (4)	04:55
	16:16	17:10	18:04	20:00	27	07:43 (1)	20:54	30
7	08:31	07:53	06:54	06:40	07:16 (1)	05:35	06:17 (4)	04:54
	16:18	17:12	18:06	20:02	27	07:43 (1)	20:56	31
8	08:30	07:51	06:51	06:37	07:16 (1)	05:33	06:17 (4)	04:53
	16:19	17:14	18:08	20:04	27	07:43 (1)	20:57	30
9	08:30	07:49	06:49	06:35	07:16 (1)	05:31	06:17 (4)	04:53
	16:20	17:16	18:10	20:06	26	07:42 (1)	20:59	30
10	08:29	07:48	06:47	06:33	07:16 (1)	05:29	06:18 (4)	04:52
	16:22	17:18	18:11	20:08	26	07:42 (1)	21:01	29
11	08:29	07:46	06:44	06:30	07:16 (1)	05:27	06:17 (4)	04:52
	16:23	17:20	18:13	20:09	25	07:41 (1)	21:03	30
12	08:28	07:44	06:42	06:28	06:52 (3)	05:26	06:17 (4)	04:52
	16:25	17:22	18:15	20:11	31	07:40 (1)	21:04	29
13	08:27	07:42	06:40	06:26	06:49 (3)	05:24	06:18 (4)	04:51
	16:26	17:24	18:17	9	07:12 (2)	20:13	34	07:38 (1)
14	08:26	07:40	06:37	06:23	07:01 (2)	06:23	06:47 (3)	05:22
	16:28	17:26	18:19	14	07:15 (2)	20:15	34	07:37 (1)
15	08:25	07:38	06:35	06:21	06:58 (2)	06:21	06:46 (3)	05:21
	16:30	17:28	18:21	17	07:15 (2)	20:17	33	07:35 (1)
16	08:24	07:36	06:32	06:19	06:57 (2)	06:19	06:45 (3)	05:19
	16:31	17:30	18:23	20	07:17 (2)	20:18	27	07:31 (1)
17	08:23	07:34	06:30	06:17	06:56 (2)	06:17	06:43 (3)	05:17
	16:33	17:32	18:24	20	07:16 (2)	20:20	21	07:04 (3)
18	08:22	07:32	06:28	06:14	06:55 (2)	06:14	06:43 (3)	05:16
	16:35	17:34	18:26	22	07:17 (2)	20:22	21	07:04 (3)
19	08:21	07:29	06:25	06:12	06:55 (2)	06:12	06:43 (3)	05:14
	16:36	17:35	18:28	22	07:17 (2)	20:24	22	07:05 (3)
20	08:20	07:27	06:23	06:10	06:55 (2)	06:10	06:43 (3)	05:13
	16:38	17:37	18:30	21	07:16 (2)	20:26	21	07:04 (3)
21	08:19	07:25	06:20	06:08	06:55 (2)	06:08	06:43 (3)	05:12
	16:40	17:39	18:32	21	07:16 (2)	20:27	21	07:04 (3)
22	08:18	07:23	06:18	06:05	06:55 (2)	06:05	06:43 (3)	05:10
	16:42	17:41	18:33	20	07:15 (2)	20:29	20	07:03 (3)
23	08:17	07:21	06:16	06:03	06:56 (2)	06:03	06:44 (3)	05:09
	16:43	17:43	18:35	18	07:14 (2)	20:31	19	07:03 (3)
24	08:15	07:19	06:13	06:01	06:56 (2)	06:01	06:45 (3)	05:07
	16:45	17:45	18:37	16	07:12 (2)	20:33	16	07:01 (3)
25	08:14	07:16	06:11	05:59	06:58 (2)	05:59	06:45 (3)	05:06
	16:47	17:47	18:39	12	07:10 (2)	20:35	14	06:59 (3)
26	08:13	07:14	06:08	05:57	07:01 (2)	05:57	06:30 (4)	05:05
	16:49	17:49	18:41	5	07:06 (2)	20:36	18	06:57 (3)
27	08:11	07:12	06:06	05:55	06:56 (4)	05:04	06:26 (4)	05:04
	16:50	17:51	18:42	20:38	06:52 (3)	21:27	8	05:42 (9)
28	08:10	07:10	06:04	05:53	06:24 (4)	05:03	05:33 (9)	04:53
	16:53	17:53	18:44	20:40	18	06:42 (4)	21:29	11
29	08:08	07:01	05:51	05:51	06:22 (4)	05:02	05:32 (9)	04:54
	16:55	19:46	20:42	21	06:43 (4)	21:30	13	05:45 (9)
30	08:07	06:59	07:28 (1)	05:49	06:22 (4)	05:00	05:32 (9)	04:54
	16:57	19:48	9	07:37 (1)	20:43	23	06:45 (4)	21:31
31	08:05	06:56	07:25 (1)	05:47	04:59	05:31 (9)	21:32	15
	16:58	19:50	15	07:40 (1)	21:32	15	05:46 (9)	
Sonnenscheinstunden	253	275	367	418	491	506		
astr.max.mögl.Beschattung			261	703	628	592		
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39		
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96		
Reduktion Windrichtung			0.69	0.72	0.72	0.72		
Gesamte Reduktion			0.18	0.26	0.30	0.27		
Met.wahrsch.Beschattung			48	180	187	158		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EX - IO154

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:35 (9)	05:34	06:27 (4)	06:26	07:15 (1)	07:18	07:46 (2)	07:14	08:08		
	21:48	19 05:54 (9)	21:14	29 06:56 (4)	20:09	25 07:40 (1)	18:57	3 07:49 (2)	16:48	16:05		
2	04:56	05:36 (9)	05:35	06:28 (4)	06:28	07:15 (1)	07:20		07:16	08:09		
	21:48	19 05:55 (9)	21:12	29 06:57 (4)	20:07	26 07:41 (1)	18:55		16:46	16:05		
3	04:56	05:36 (9)	05:37	06:27 (4)	06:30	07:14 (1)	07:21		07:18	08:11		
	21:47	19 05:55 (9)	21:11	30 06:57 (4)	20:05	26 07:40 (1)	18:52		16:44	16:04		
4	04:57	05:36 (9)	05:38	06:27 (4)	06:31	07:13 (1)	07:23		07:20	08:12		
	21:47	19 05:55 (9)	21:09	30 06:57 (4)	20:02	27 07:40 (1)	18:50		16:42	16:03		
5	04:58	05:36 (9)	05:40	06:28 (4)	06:33	07:13 (1)	07:25		07:22	08:14		
	21:46	19 05:55 (9)	21:07	30 06:58 (4)	20:00	28 07:41 (1)	18:48		16:41	16:03		
6	04:59	05:37 (9)	05:42	06:27 (4)	06:35	07:12 (1)	07:27		07:24	08:15		
	21:46	18 05:55 (9)	21:05	30 06:57 (4)	19:57	27 07:39 (1)	18:45		16:39	16:02		
7	05:00	05:37 (9)	05:43	06:27 (4)	06:36	07:13 (1)	07:28		07:26	08:16		
	21:45	18 05:55 (9)	21:03	30 06:57 (4)	19:55	26 07:39 (1)	18:43		16:37	16:02		
8	05:01	05:37 (9)	05:45	06:27 (4)	06:38	07:13 (1)	07:30		07:28	08:18		
	21:45	18 05:55 (9)	21:01	29 06:56 (4)	19:53	26 07:39 (1)	18:41		16:35	16:01		
9	05:02	05:38 (9)	05:47	06:28 (4)	06:40	07:13 (1)	07:32		07:30	08:19		
	21:44	17 05:55 (9)	20:59	28 06:56 (4)	19:50	24 07:37 (1)	18:38		16:33	16:01		
10	05:03	05:38 (9)	05:48	06:27 (4)	06:42	07:14 (1)	07:34		07:31	08:20		
	21:43	17 05:55 (9)	20:57	28 06:55 (4)	19:48	22 07:36 (1)	18:36		16:32	16:01		
11	05:04	05:39 (9)	05:50	06:28 (4)	06:43	07:15 (1)	07:36		07:33	08:21		
	21:42	16 05:55 (9)	20:55	27 06:55 (4)	19:46	20 07:35 (1)	18:34		16:30	16:01		
12	05:05	05:39 (9)	05:52	06:29 (4)	06:45	07:16 (1)	07:37		07:35	08:22		
	21:41	16 05:55 (9)	20:53	25 06:54 (4)	19:43	16 07:32 (1)	18:31		16:28	16:00		
13	05:06	05:40 (9)	05:54	06:30 (4)	06:47	07:18 (1)	07:39		07:37	08:23		
	21:40	14 05:54 (9)	20:51	23 06:53 (4)	19:41	11 07:29 (1)	18:29		16:27	16:00		
14	05:07	05:40 (9)	05:55	06:31 (4)	06:48	07:41	07:41		07:39	08:24		
	21:39	13 05:53 (9)	20:49	21 06:52 (4)	19:38		18:27		16:25	16:00		
15	05:09	05:41 (9)	05:57	06:32 (4)	06:50	07:43	07:43		07:41	08:25		
	21:38	12 05:53 (9)	20:47	17 06:49 (4)	19:36		18:24		16:24	16:00		
16	05:10	05:42 (9)	05:59	06:34 (4)	06:52	07:45	07:45		07:42	08:26		
	21:37	10 05:52 (9)	20:45	18 07:02 (3)	19:33		18:22		16:22	16:00		
17	05:11	05:45 (9)	06:00	06:39 (4)	06:54	07:46	07:46		07:44	08:27		
	21:36	6 05:51 (9)	20:43	15 07:05 (3)	19:31		18:20		16:21	16:01		
18	05:13		06:02	06:51 (3)	06:55	07:46 (2)	07:48		07:46	08:28		
	21:35		20:41	15 07:06 (3)	19:29	11 07:57 (2)	18:18		16:19	16:01		
19	05:14		06:04	06:50 (3)	06:57	07:44 (2)	07:50		07:48	08:28		
	21:34		20:39	17 07:07 (3)	19:26	15 07:59 (2)	18:15		16:18	16:01		
20	05:15		06:05	06:48 (3)	06:59	07:42 (2)	07:52		07:50	08:29		
	21:32		20:37	19 07:07 (3)	19:24	18 08:00 (2)	18:13		16:17	16:01		
21	05:17		06:07	06:48 (3)	07:00	07:40 (2)	07:54		07:51	08:30		
	21:31	8 06:46 (4)	20:34	20 07:08 (3)	19:21	20 08:00 (2)	18:11		16:15	16:02		
22	05:18		06:09	06:48 (3)	07:02	07:40 (2)	07:56		07:53	08:30		
	21:30	12 06:48 (4)	20:32	21 07:09 (3)	19:19	21 08:01 (2)	18:09		16:14	16:02		
23	05:20		06:11	06:46 (3)	07:04	07:39 (2)	07:58		07:55	08:31		
	21:28	16 06:50 (4)	20:30	22 07:08 (3)	19:16	22 08:01 (2)	18:07		16:13	16:03		
24	05:21		06:12	06:46 (3)	07:06	07:38 (2)	07:59		07:57	08:31		
	21:27	19 06:52 (4)	20:28	22 07:08 (3)	19:14	22 08:00 (2)	18:05		16:12	16:03		
25	05:23		06:14	06:47 (3)	07:07	07:38 (2)	07:01		07:58	08:31		
	21:25	20 06:52 (4)	20:25	21 07:08 (3)	19:12	22 08:00 (2)	17:02		16:11	16:04		
26	05:24		06:16	06:46 (3)	07:09	07:38 (2)	07:03		08:00	08:32		
	21:24	22 06:54 (4)	20:23	21 07:07 (3)	19:09	21 07:59 (2)	17:00		16:10	16:05		
27	05:26		06:18	06:47 (3)	07:11	07:39 (2)	07:05		08:02	08:32		
	21:22	24 06:54 (4)	20:21	29 07:34 (1)	19:07	20 07:59 (2)	16:58		16:09	16:05		
28	05:27		06:19	06:47 (3)	07:13	07:38 (2)	07:07		08:03	08:32		
	21:21	26 06:55 (4)	20:19	33 07:36 (1)	19:04	19 07:57 (2)	16:56		16:08	16:06		
29	05:29		06:21	06:48 (3)	07:14	07:40 (2)	07:09		08:05	08:32		
	21:19	27 06:56 (4)	20:16	35 07:38 (1)	19:02	15 07:55 (2)	16:54		16:07	16:07		
30	05:30		06:23	06:50 (3)	07:16	07:42 (2)	07:11		08:06	08:32		
	21:18	28 06:56 (4)	20:14	33 07:39 (1)	19:00	11 07:53 (2)	16:52		16:06	16:08		
31	05:32		06:24	06:51 (3)			07:13			08:32		
	21:16	29 06:57 (4)	20:12	31 07:39 (1)			16:50			16:09		
Sonnenscheinstunden		508		458		382		330		262		237
astr.max.mögl.Beschattung		501		778		541						
Red.Sonnenscheinwahrsch.		0.38		0.42		0.35				0.29		
Reduktion Betriebsdauer		0.96		0.96		0.96				0.96		
Reduktion Windrichtung		0.72		0.72		0.70				0.69		
Gesamte Reduktion		0.26		0.29		0.23				0.19		
Met.wahrsch.Beschattung		131		228		127				1		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EY - IO155

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	06:54	07:24 (1)	05:46	06:23 (4)	04:59	05:31 (9)
	16:10	17:00	17:55	19:51	23 07:47 (1)	20:45	27 06:50 (4)	21:34	17 05:48 (9)
2	08:32	08:02	07:05	06:52	07:23 (1)	05:44	06:22 (4)	04:58	05:32 (9)
	16:12	17:02	17:57	19:53	25 07:48 (1)	20:47	28 06:50 (4)	21:35	17 05:49 (9)
3	08:32	08:00	07:03	06:49	07:23 (1)	05:42	06:21 (4)	04:57	05:31 (9)
	16:13	17:04	17:58	19:55	26 07:49 (1)	20:49	30 06:51 (4)	21:36	18 05:49 (9)
4	08:32	07:58	07:01	06:47	07:21 (1)	05:41	06:20 (4)	04:56	05:31 (9)
	16:14	17:06	18:00	19:57	27 07:48 (1)	20:50	31 06:51 (4)	21:37	18 05:49 (9)
5	08:32	07:57	06:58	06:45	07:21 (1)	05:39	06:20 (4)	04:55	05:32 (9)
	16:15	17:08	18:02	19:59	28 07:49 (1)	20:52	31 06:51 (4)	21:38	18 05:50 (9)
6	08:31	07:55	06:56	06:42	07:20 (1)	05:37	06:19 (4)	04:55	05:31 (9)
	16:16	17:10	18:04	20:00	28 07:48 (1)	20:54	32 06:51 (4)	21:39	19 05:50 (9)
7	08:31	07:53	06:54	06:40	07:20 (1)	05:35	06:20 (4)	04:54	05:32 (9)
	16:18	17:12	18:06	20:02	28 07:48 (1)	20:56	31 06:51 (4)	21:40	19 05:51 (9)
8	08:30	07:51	06:51	06:37	07:20 (1)	05:33	06:20 (4)	04:53	05:31 (9)
	16:19	17:14	18:08	20:04	27 07:47 (1)	20:57	31 06:51 (4)	21:41	19 05:50 (9)
9	08:30	07:49	06:49	06:35	07:20 (1)	05:31	06:19 (4)	04:53	05:32 (9)
	16:20	17:16	18:10	20:06	26 07:46 (1)	20:59	31 06:50 (4)	21:42	19 05:51 (9)
10	08:29	07:48	06:47	06:33	07:20 (1)	05:29	06:20 (4)	04:52	05:31 (9)
	16:22	17:18	18:11	20:08	25 07:45 (1)	21:01	31 06:51 (4)	21:43	20 05:51 (9)
11	08:29	07:46	06:44	06:30	07:09 (2)	06:30	06:55 (3)	05:27	06:20 (4)
	16:23	17:20	18:13	6 07:15 (2)	20:09	30 07:44 (1)	21:03	30 06:50 (4)	21:44
12	08:28	07:44	06:42	07:05 (2)	06:28	06:52 (3)	05:26	06:20 (4)	04:52
	16:25	17:22	18:15	12 07:17 (2)	20:11	34 07:43 (1)	21:04	29 06:49 (4)	21:44
13	08:27	07:42	06:40	07:03 (2)	06:26	06:49 (3)	05:24	06:21 (4)	04:51
	16:26	17:24	18:17	16 07:19 (2)	20:13	35 07:41 (1)	21:06	28 06:49 (4)	21:45
14	08:26	07:40	06:37	07:02 (2)	06:23	06:48 (3)	05:22	06:21 (4)	04:51
	16:28	17:26	18:19	19 07:21 (2)	20:15	32 07:38 (1)	21:08	27 06:48 (4)	21:46
15	08:25	07:38	06:35	07:00 (2)	06:21	06:47 (3)	05:21	06:22 (4)	04:51
	16:30	17:28	18:21	21 07:21 (2)	20:17	26 07:34 (1)	21:09	26 06:46 (4)	21:46
16	08:24	07:36	06:32	07:00 (2)	06:19	06:47 (3)	05:19	06:22 (4)	04:51
	16:31	17:30	18:23	21 07:21 (2)	20:18	21 07:08 (3)	21:11	25 06:47 (4)	21:47
17	08:23	07:34	06:30	06:59 (2)	06:17	06:45 (3)	05:17	06:24 (4)	04:50
	16:33	17:32	18:24	22 07:21 (2)	20:20	22 07:07 (3)	21:12	22 06:46 (4)	21:47
18	08:22	07:32	06:28	06:59 (2)	06:14	06:45 (3)	05:16	06:25 (4)	04:50
	16:35	17:34	18:26	22 07:21 (2)	20:22	22 07:07 (3)	21:14	21 06:46 (4)	21:48
19	08:21	07:29	06:25	06:59 (2)	06:12	06:45 (3)	05:14	06:25 (4)	04:50
	16:36	17:35	18:28	22 07:21 (2)	20:24	22 07:07 (3)	21:16	19 06:44 (4)	21:48
20	08:20	07:27	06:23	06:59 (2)	06:10	06:45 (3)	05:13	06:27 (4)	04:51
	16:38	17:37	18:30	21 07:20 (2)	20:26	22 07:07 (3)	21:17	16 06:43 (4)	21:48
21	08:19	07:25	06:20	06:59 (2)	06:08	06:46 (3)	05:12	06:29 (4)	04:51
	16:40	17:39	18:32	20 07:19 (2)	20:27	20 07:06 (3)	21:19	13 06:42 (4)	21:49
22	08:18	07:23	06:18	06:59 (2)	06:05	06:46 (3)	05:10	06:31 (4)	04:51
	16:42	17:41	18:33	18 07:17 (2)	20:29	20 07:06 (3)	21:20	8 06:39 (4)	21:49
23	08:17	07:21	06:16	07:01 (2)	06:03	06:47 (3)	05:09	06:45 (4)	04:51
	16:43	17:43	18:35	15 07:16 (2)	20:31	18 07:05 (3)	21:22	21:49	21 05:54 (9)
24	08:15	07:19	06:13	07:02 (2)	06:01	06:48 (3)	05:07	04:51	05:34 (8)
	16:45	17:45	18:37	11 07:13 (2)	20:33	15 07:03 (3)	21:23	21:49	21 05:55 (9)
25	08:14	07:16	06:11	05:59	06:33 (4)	05:06	06:33 (4)	04:52	05:34 (8)
	16:47	17:47	18:39	20:35	18 07:00 (3)	21:24	21:49	20 05:54 (9)	
26	08:13	07:14	06:08	05:57	06:29 (4)	05:05	05:37 (9)	04:52	05:34 (8)
	16:49	17:49	18:41	20:36	20 06:57 (3)	21:26	4 05:41 (9)	21:49	20 05:54 (9)
27	08:11	07:12	06:06	05:55	06:27 (4)	05:04	05:35 (9)	04:53	05:35 (9)
	16:51	17:51	18:42	20:38	19 06:46 (4)	21:27	9 05:44 (9)	21:49	20 05:55 (9)
28	08:10	07:10	06:04	06:35 (1)	05:53	06:25 (4)	05:03	05:34 (9)	04:53
	16:53	17:53	18:44	5 06:40 (1)	20:40	22 06:47 (4)	21:29	11 05:45 (9)	21:49
29	08:08	07:01	06:30 (1)	05:51	06:24 (4)	05:02	05:33 (9)	04:54	05:36 (9)
	16:55	19:46	13 07:43 (1)	20:42	24 06:48 (4)	21:30	13 05:46 (9)	21:49	19 05:55 (9)
30	08:07	06:59	07:28 (1)	05:49	06:24 (4)	05:00	05:32 (9)	04:54	05:35 (9)
	16:57	19:48	18 07:46 (1)	20:43	26 06:50 (4)	21:31	15 05:47 (9)	21:48	20 05:55 (9)
31	08:05	06:56	07:26 (1)			04:59	05:32 (9)		
	16:58	19:50	21 07:47 (1)			21:32	15 05:47 (9)		
Sonnenscheinstunden	253	275	367	418	491	506			
astr.max.mögl.Beschattung			303	731	634	588			
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39			
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96			
Reduktion Windrichtung			0.69	0.72	0.72	0.72			
Gesamte Reduktion			0.18	0.26	0.30	0.27			
Met.wahrsch.Beschattung			55	187	189	157			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EY - IO155

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:55	05:36 (9)	05:34		06:30 (4)	06:26	06:54 (3)	07:18		07:44 (2)	07:14	08:08	
	21:48	05:56 (9)	21:14	30	07:00 (4)	20:09	30	07:43 (1)	18:57	14	07:58 (2)	16:48	16:05
2	04:56	05:36 (9)	05:35		06:30 (4)	06:28		07:19 (1)	07:20		07:46 (2)	07:16	08:09
	21:48	05:56 (9)	21:12	31	07:01 (4)	20:07	25	07:44 (1)	18:55	10	07:56 (2)	16:46	16:05
3	04:56	05:37 (9)	05:37		06:30 (4)	06:30		07:18 (1)	07:21			07:18	08:11
	21:47	05:56 (9)	21:11	30	07:00 (4)	20:05	26	07:44 (1)	18:52			16:44	16:04
4	04:57	05:36 (9)	05:38		06:30 (4)	06:31		07:17 (1)	07:23			07:20	08:12
	21:47	05:56 (9)	21:09	31	07:01 (4)	20:02	27	07:44 (1)	18:50			16:42	16:03
5	04:58	05:37 (9)	05:40		06:30 (4)	06:33		07:17 (1)	07:25			07:22	08:14
	21:46	05:56 (9)	21:07	31	07:01 (4)	20:00	28	07:45 (1)	18:48			16:41	16:03
6	04:59	05:37 (9)	05:42		06:30 (4)	06:35		07:16 (1)	07:27			07:24	08:15
	21:46	05:56 (9)	21:05	31	07:01 (4)	19:57	28	07:44 (1)	18:45			16:39	16:02
7	05:00	05:38 (9)	05:43		06:30 (4)	06:36		07:16 (1)	07:28			07:26	08:16
	21:45	05:56 (9)	21:03	31	07:01 (4)	19:55	28	07:44 (1)	18:43			16:37	16:02
8	05:01	05:38 (9)	05:45		06:29 (4)	06:38		07:16 (1)	07:30			07:28	08:18
	21:45	05:56 (9)	21:01	31	07:00 (4)	19:53	28	07:44 (1)	18:41			16:35	16:01
9	05:02	05:39 (9)	05:47		06:30 (4)	06:40		07:16 (1)	07:32			07:30	08:19
	21:44	05:56 (9)	20:59	30	07:00 (4)	19:50	26	07:42 (1)	18:38			16:33	16:01
10	05:03	05:39 (9)	05:48		06:30 (4)	06:42		07:16 (1)	07:34			07:31	08:20
	21:43	05:56 (9)	20:57	29	06:59 (4)	19:48	26	07:42 (1)	18:36			16:32	16:01
11	05:04	05:40 (9)	05:50		06:30 (4)	06:43		07:17 (1)	07:36			07:33	08:21
	21:42	05:56 (9)	20:55	29	06:59 (4)	19:46	24	07:41 (1)	18:34			16:30	16:01
12	05:05	05:40 (9)	05:52		06:31 (4)	06:45		07:17 (1)	07:37			07:35	08:22
	21:41	05:56 (9)	20:53	27	06:58 (4)	19:43	22	07:39 (1)	18:31			16:28	16:00
13	05:06	05:41 (9)	05:54		06:31 (4)	06:47		07:19 (1)	07:39			07:37	08:23
	21:40	05:55 (9)	20:51	26	06:57 (4)	19:41	18	07:37 (1)	18:29			16:27	16:00
14	05:07	05:41 (9)	05:55		06:33 (4)	06:48		07:21 (1)	07:41			07:39	08:24
	21:39	05:55 (9)	20:49	23	06:56 (4)	19:38	14	07:35 (1)	18:27			16:25	16:00
15	05:09	05:42 (9)	05:57		06:33 (4)	06:50		07:23 (1)	07:43			07:41	08:25
	21:38	05:54 (9)	20:47	21	06:54 (4)	19:36	7	07:30 (1)	18:24			16:24	16:00
16	05:10	05:43 (9)	05:59		06:35 (4)	06:52			07:45			07:42	08:26
	21:37	05:53 (9)	20:45	18	06:53 (4)	19:33			18:22			16:22	16:00
17	05:11	05:45 (9)	06:00		06:37 (4)	06:54			07:46			07:44	08:27
	21:36	7 05:52 (9)	20:43	21	07:05 (3)	19:31			18:20			16:21	16:01
18	05:13		06:02		06:41 (4)	06:55			07:48			07:46	08:28
	21:35		20:41	16	07:07 (3)	19:29			18:18			16:19	16:01
19	05:14		06:04		06:53 (3)	06:57		07:50 (2)	07:50			07:48	08:28
	21:34		20:39	16	07:09 (3)	19:26	10	08:00 (2)	18:15			16:18	16:01
20	05:15		06:05		06:51 (3)	06:59		07:48 (2)	07:52			07:50	08:29
	21:32		20:37	18	07:09 (3)	19:24	14	08:02 (2)	18:13			16:17	16:01
21	05:17		06:07		06:51 (3)	07:00		07:45 (2)	07:54			07:51	08:30
	21:31	4 06:47 (4)	20:34	19	07:10 (3)	19:21	18	08:03 (2)	18:11			16:15	16:02
22	05:18		06:09		06:50 (3)	07:02		07:44 (2)	07:56			07:53	08:30
	21:30	10 06:50 (4)	20:32	21	07:11 (3)	19:19	20	08:04 (2)	18:09			16:14	16:02
23	05:20		06:37 (4)	06:11	06:49 (3)	07:04		07:43 (2)	07:58			07:55	08:31
	21:28	15 06:52 (4)	20:30	22	07:11 (3)	19:16	21	08:04 (2)	18:07			16:13	16:03
24	05:21		06:37 (4)	06:12	06:49 (3)	07:06		07:42 (2)	07:59			07:57	08:31
	21:27	17 06:54 (4)	20:28	22	07:11 (3)	19:14	22	08:04 (2)	18:05			16:12	16:03
25	05:23		06:35 (4)	06:14	06:49 (3)	07:07		07:42 (2)	07:01			07:58	08:31
	21:25	20 06:55 (4)	20:25	22	07:11 (3)	19:12	22	08:04 (2)	17:02			16:11	16:04
26	05:24		06:35 (4)	06:16	06:48 (3)	07:09		07:41 (2)	07:03			08:00	08:32
	21:24	22 06:57 (4)	20:23	22	07:10 (3)	19:09	23	08:04 (2)	17:00			16:10	16:05
27	05:26		06:34 (4)	06:18	06:49 (3)	07:11		07:42 (2)	07:05			08:02	08:32
	21:22	23 06:57 (4)	20:21	21	07:10 (3)	19:07	21	08:03 (2)	16:58			16:09	16:05
28	05:27		06:32 (4)	06:19	06:48 (3)	07:13		07:41 (2)	07:07			08:03	08:32
	21:21	26 06:58 (4)	20:19	27	07:36 (1)	19:04	21	08:02 (2)	16:56			16:08	16:06
29	05:29		06:32 (4)	06:21	06:49 (3)	07:14		07:42 (2)	07:09			08:05	08:32
	21:19	27 06:59 (4)	20:16	32	07:39 (1)	19:02	19	08:01 (2)	16:54			16:07	16:07
30	05:30		06:31 (4)	06:23	06:50 (3)	07:16		07:43 (2)	07:11			08:06	08:32
	21:18	28 06:59 (4)	20:14	35	07:42 (1)	19:00	17	08:00 (2)	16:52			16:06	16:08
31	05:32		06:31 (4)	06:24	06:51 (3)				07:13				08:32
	21:16	29 07:00 (4)	20:12	34	07:42 (1)				16:50				16:09
	Sonnenscheinstunden	508	458		382			330			262	237	
	astr.max.mögl.Beschattung	497		797		585			24				
	Red.Sonnenscheinwahrsch.	0.38		0.42		0.35			0.29				
	Reduktion Betriebsdauer	0.96		0.96		0.96			0.96				
	Reduktion Windrichtung	0.72		0.72		0.70			0.68				
	Gesamte Reduktion	0.26		0.29		0.23			0.19				
	Met.wahrsch.Beschattung	130		233		137			5				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattende	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EZ - IO156
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	07:24 (1)	05:46	06:22 (4)	04:59	05:31 (9)	
	16:10	17:00	17:55	19:51	23 07:47 (1)	20:45	27 06:49 (4)	21:34	14 05:45 (9)	
2	08:32	08:02	07:05	06:52	07:23 (1)	05:44	06:21 (4)	04:58	05:31 (9)	
	16:12	17:02	17:57	19:53	25 07:48 (1)	20:47	28 06:49 (4)	21:35	16 05:47 (9)	
3	08:32	08:00	07:03	06:49	07:22 (1)	05:42	06:20 (4)	04:57	05:31 (9)	
	16:13	17:04	17:58	19:55	27 07:49 (1)	20:49	29 06:49 (4)	21:36	16 05:47 (9)	
4	08:32	07:58	07:01	06:47	07:21 (1)	05:41	06:20 (4)	04:56	05:30 (9)	
	16:14	17:06	18:00	19:57	27 07:48 (1)	20:50	30 06:50 (4)	21:37	17 05:47 (9)	
5	08:32	07:57	06:58	06:45	07:21 (1)	05:39	06:19 (4)	04:55	05:31 (9)	
	16:15	17:08	18:02	19:59	28 07:49 (1)	20:52	31 06:50 (4)	21:38	17 05:48 (9)	
6	08:31	07:55	06:56	06:42	07:20 (1)	05:37	06:18 (4)	04:55	05:30 (9)	
	16:16	17:10	18:04	20:00	28 07:48 (1)	20:54	32 06:50 (4)	21:39	18 05:48 (9)	
7	08:31	07:53	06:54	06:40	07:20 (1)	05:35	06:19 (4)	04:54	05:31 (9)	
	16:18	17:12	18:06	20:02	28 07:48 (1)	20:56	31 06:50 (4)	21:40	18 05:49 (9)	
8	08:30	07:51	06:51	06:37	07:20 (1)	05:33	06:19 (4)	04:53	05:30 (9)	
	16:19	17:14	18:08	20:04	28 07:48 (1)	20:57	31 06:50 (4)	21:41	19 05:49 (9)	
9	08:30	07:49	06:49	06:35	07:19 (1)	05:31	06:18 (4)	04:53	05:31 (9)	
	16:20	17:16	18:10	20:06	27 07:46 (1)	20:59	32 06:50 (4)	21:42	19 05:50 (9)	
10	08:29	07:48	06:47	06:33	07:20 (1)	05:29	06:19 (4)	04:52	05:30 (9)	
	16:22	17:18	18:11	20:08	26 07:46 (1)	21:01	31 06:50 (4)	21:43	19 05:49 (9)	
11	08:29	07:46	06:44	06:30	07:10 (2)	05:27	06:19 (4)	04:52	05:30 (9)	
	16:23	17:20	18:13	5 07:15 (2)	20:09	28 07:45 (1)	21:03	31 06:50 (4)	21:44	20 05:50 (9)
12	08:28	07:44	06:42	07:05 (2)	06:28	06:52 (3)	05:26	06:18 (4)	04:52	05:31 (9)
	16:25	17:22	18:15	13 07:18 (2)	20:11	34 07:44 (1)	21:04	31 06:49 (4)	21:44	19 05:50 (9)
13	08:27	07:42	06:40	07:03 (2)	06:26	06:49 (3)	05:24	06:19 (4)	04:51	05:31 (9)
	16:26	17:24	18:17	17 07:20 (2)	20:13	36 07:42 (1)	21:06	30 06:49 (4)	21:45	20 05:51 (9)
14	08:26	07:40	06:37	07:02 (2)	06:23	06:48 (3)	05:22	06:19 (4)	04:51	05:31 (9)
	16:28	17:26	18:19	19 07:21 (2)	20:15	35 07:40 (1)	21:08	29 06:48 (4)	21:46	19 05:50 (9)
15	08:25	07:38	06:35	07:01 (2)	06:21	06:47 (3)	05:21	06:20 (4)	04:51	05:31 (9)
	16:30	17:28	18:21	20 07:21 (2)	20:17	31 07:37 (1)	21:09	28 06:48 (4)	21:46	20 05:51 (9)
16	08:24	07:36	06:32	07:00 (2)	06:19	06:46 (3)	05:19	06:20 (4)	04:51	05:31 (9)
	16:31	17:30	18:23	22 07:22 (2)	20:18	22 07:08 (3)	21:11	27 06:47 (4)	21:47	20 05:51 (9)
17	08:23	07:34	06:30	06:59 (2)	06:17	06:45 (3)	05:17	06:21 (4)	04:50	05:31 (9)
	16:33	17:32	18:24	22 07:21 (2)	20:20	22 07:07 (3)	21:12	26 06:47 (4)	21:47	20 05:51 (9)
18	08:22	07:32	06:28	06:59 (2)	06:14	06:45 (3)	05:16	06:22 (4)	04:50	05:32 (9)
	16:35	17:34	18:26	22 07:21 (2)	20:22	22 07:07 (3)	21:14	25 06:47 (4)	21:48	19 05:51 (9)
19	08:21	07:29	06:25	06:59 (2)	06:12	06:44 (3)	05:14	06:22 (4)	04:50	05:32 (9)
	16:36	17:35	18:28	22 07:21 (2)	20:24	23 07:07 (3)	21:16	23 06:45 (4)	21:48	19 05:51 (9)
20	08:20	07:27	06:23	06:59 (2)	06:10	06:45 (3)	05:13	06:24 (4)	04:51	05:33 (9)
	16:38	17:37	18:30	21 07:20 (2)	20:26	22 07:07 (3)	21:17	20 06:44 (4)	21:48	20 05:53 (9)
21	08:19	07:25	06:20	06:59 (2)	06:08	06:45 (3)	05:12	06:25 (4)	04:51	05:33 (9)
	16:40	17:39	18:32	21 07:20 (2)	20:27	21 07:06 (3)	21:19	19 06:44 (4)	21:49	20 05:53 (9)
22	08:18	07:23	06:18	06:59 (2)	06:05	06:45 (3)	05:10	06:26 (4)	04:51	05:33 (9)
	16:42	17:41	18:33	19 07:18 (2)	20:29	21 07:06 (3)	21:20	16 06:42 (4)	21:49	20 05:53 (9)
23	08:17	07:21	06:16	07:01 (2)	06:03	06:46 (3)	05:09	06:28 (4)	04:51	05:33 (9)
	16:43	17:43	18:35	16 07:17 (2)	20:31	19 07:05 (3)	21:22	12 06:40 (4)	21:49	20 05:53 (9)
24	08:15	07:19	06:13	07:02 (2)	06:01	06:47 (3)	05:07	06:30 (4)	04:51	05:34 (9)
	16:45	17:45	18:37	12 07:14 (2)	20:33	17 07:04 (3)	21:23	8 06:38 (4)	21:49	19 05:53 (9)
25	08:14	07:16	06:11	07:06 (2)	05:59	06:47 (3)	05:06		04:52	05:33 (9)
	16:47	17:47	18:39	3 07:09 (2)	20:35	14 07:01 (3)	21:24		21:49	20 05:53 (9)
26	08:13	07:14	06:08	05:57	06:31 (4)	05:05			04:52	05:33 (9)
	16:49	17:49	18:41	20:36	19 06:59 (3)	21:26			21:49	20 05:53 (9)
27	08:11	07:12	06:06	05:55	06:28 (4)	05:04			04:53	05:34 (9)
	16:51	17:51	18:42	20:38	15 06:43 (4)	21:27			21:49	20 05:54 (9)
28	08:10	07:10	06:04	05:53	06:25 (4)	05:03	05:35 (9)		04:53	05:34 (9)
	16:53	17:53	18:44	20:40	20 06:45 (4)	21:29	7 05:42 (9)		21:49	19 05:53 (9)
29	08:08		07:01	07:30 (1)	05:51	06:24 (4)	05:02	05:33 (9)	04:54	05:34 (9)
	16:55		19:46	12 07:42 (1)	20:42	22 06:46 (4)	21:30	10 05:43 (9)	21:49	20 05:54 (9)
30	08:07		06:59	07:28 (1)	05:49	06:23 (4)	05:00	05:32 (9)	04:54	05:34 (9)
	16:57		19:48	17 07:45 (1)	20:43	25 06:48 (4)	21:31	12 05:44 (9)	21:48	20 05:54 (9)
31	08:05		06:56	07:26 (1)			04:59	05:31 (9)		
	16:58		19:50	21 07:47 (1)			21:32	14 05:45 (9)		
Sonnenscheinstunden	253	275	367	418	491		506			
astr.max.mögl.Beschattung			304	735	670		567			
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43		0.39			
Reduktion Betriebsdauer			0.96	0.96	0.96		0.96			
Reduktion Windrichtung			0.69	0.72	0.72		0.72			
Gesamte Reduktion			0.18	0.26	0.30		0.27			
Met.wahrsch.Beschattung			56	188	200		151			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattenende	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: EZ - IO156
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:35 (9) 05:34	06:29 (4) 06:26	06:55 (3) 07:18	07:44 (2) 07:14	08:08						
	21:48	19 05:54 (9) 21:14	30 06:59 (4) 20:09	29 07:44 (1) 18:57	14 07:58 (2) 16:48	16:05						
2	04:56	05:35 (9) 05:35	06:29 (4) 06:28	07:19 (1) 07:20	07:47 (2) 07:16	08:09						
	21:48	20 05:55 (9) 21:12	31 07:00 (4) 20:07	26 07:45 (1) 18:55	9 07:56 (2) 16:46	16:05						
3	04:56	05:36 (9) 05:37	06:28 (4) 06:30	07:17 (1) 07:21	07:17 (1) 07:21	08:11						
	21:47	19 05:55 (9) 21:11	32 07:00 (4) 20:05	27 07:44 (1) 18:52		16:44	16:04					
4	04:57	05:35 (9) 05:38	06:29 (4) 06:31	07:17 (1) 07:23		07:20	08:12					
	21:47	19 05:54 (9) 21:09	31 07:00 (4) 20:02	28 07:45 (1) 18:50		16:42	16:03					
5	04:58	05:36 (9) 05:40	06:29 (4) 06:33	07:17 (1) 07:25		07:22	08:14					
	21:46	18 05:54 (9) 21:07	32 07:01 (4) 20:00	28 07:45 (1) 18:48		16:41	16:03					
6	04:59	05:36 (9) 05:42	06:28 (4) 06:35	07:16 (1) 07:27		07:24	08:15					
	21:46	19 05:55 (9) 21:05	32 07:00 (4) 19:57	28 07:44 (1) 18:45		16:39	16:02					
7	05:00	05:37 (9) 05:43	06:29 (4) 06:36	07:16 (1) 07:28		07:26	08:16					
	21:45	18 05:55 (9) 21:03	31 07:00 (4) 19:55	28 07:44 (1) 18:43		16:37	16:02					
8	05:01	05:37 (9) 05:45	06:29 (4) 06:38	07:16 (1) 07:30		07:28	08:18					
	21:45	18 05:55 (9) 21:01	30 06:59 (4) 19:53	28 07:44 (1) 18:41		16:35	16:01					
9	05:02	05:38 (9) 05:47	06:29 (4) 06:40	07:16 (1) 07:32		07:30	08:19					
	21:44	17 05:55 (9) 20:59	30 06:59 (4) 19:50	26 07:42 (1) 18:38		16:33	16:01					
10	05:03	05:38 (9) 05:48	06:29 (4) 06:42	07:16 (1) 07:34		07:31	08:20					
	21:43	16 05:54 (9) 20:57	29 06:58 (4) 19:48	25 07:41 (1) 18:36		16:32	16:01					
11	05:04	05:39 (9) 05:50	06:30 (4) 06:43	07:17 (1) 07:36		07:33	08:21					
	21:42	15 05:54 (9) 20:55	27 06:57 (4) 19:46	24 07:41 (1) 18:34		16:30	16:01					
12	05:05	05:40 (9) 05:52	06:31 (4) 06:45	07:17 (1) 07:37		07:35	08:22					
	21:41	14 05:54 (9) 20:53	26 06:57 (4) 19:43	21 07:38 (1) 18:31		16:28	16:00					
13	05:06	05:40 (9) 05:53	06:31 (4) 06:47	07:19 (1) 07:39		07:37	08:23					
	21:40	13 05:53 (9) 20:51	24 06:55 (4) 19:41	18 07:37 (1) 18:29		16:27	16:00					
14	05:07	05:41 (9) 05:55	06:33 (4) 06:48	07:21 (1) 07:41		07:39	08:24					
	21:39	11 05:52 (9) 20:49	21 06:54 (4) 19:38	13 07:34 (1) 18:27		16:25	16:00					
15	05:09	05:42 (9) 05:57	06:33 (4) 06:50	07:26 (1) 07:43		07:41	08:25					
	21:38	9 05:51 (9) 20:47	19 06:52 (4) 19:36	2 07:28 (1) 18:24		16:24	16:00					
16	05:10	05:44 (9) 05:59	06:36 (4) 06:52		07:45	07:42	08:26					
	21:37	5 05:49 (9) 20:45	17 07:03 (3) 19:33		18:22	16:22	16:00					
17	05:11		06:40 (4) 06:54		07:46	07:44	08:27					
	21:36		20:43 17 07:07 (3) 19:31		18:20	16:21	16:01					
18	05:13		06:53 (3) 06:55		07:48	07:46	08:28					
	21:35		20:41 15 07:08 (3) 19:29		18:18	16:19	16:01					
19	05:14	06:42 (4) 06:04	06:52 (3) 06:57	07:50 (2) 07:50		07:48	08:28					
	21:34	3 06:45 (4) 20:39	17 07:09 (3) 19:26	11 08:01 (2) 18:15		16:18	16:01					
20	05:15	06:38 (4) 06:05	06:50 (3) 06:59	07:48 (2) 07:52		07:50	08:29					
	21:32	11 06:49 (4) 20:37	20 07:10 (3) 19:24	15 08:03 (2) 18:13		16:17	16:01					
21	05:17	06:37 (4) 06:07	06:50 (3) 07:00	07:45 (2) 07:54		07:51	08:30					
	21:31	14 06:51 (4) 20:34	20 07:10 (3) 19:21	18 08:03 (2) 18:11		16:15	16:02					
22	05:18	06:36 (4) 06:09	06:49 (3) 07:02	07:44 (2) 07:56		07:53	08:30					
	21:30	17 06:53 (4) 20:32	22 07:11 (3) 19:19	20 08:04 (2) 18:09		16:14	16:02					
23	05:20	06:34 (4) 06:11	06:48 (3) 07:04	07:43 (2) 07:58		07:55	08:31					
	21:28	20 06:54 (4) 20:30	22 07:10 (3) 19:16	22 08:05 (2) 18:07		16:13	16:03					
24	05:21	06:34 (4) 06:12	06:48 (3) 07:06	07:42 (2) 07:59		07:57	08:31					
	21:27	21 06:55 (4) 20:28	23 07:11 (3) 19:14	22 08:04 (2) 18:05		16:12	16:03					
25	05:23	06:33 (4) 06:14	06:48 (3) 07:07	07:42 (2) 07:01		07:58	08:31					
	21:25	23 06:56 (4) 20:25	23 07:11 (3) 19:12	22 08:04 (2) 17:02		16:11	16:04					
26	05:24	06:32 (4) 06:16	06:48 (3) 07:09	07:42 (2) 07:03		08:00	08:32					
	21:24	25 06:57 (4) 20:23	22 07:10 (3) 19:09	22 08:04 (2) 17:00		16:10	16:05					
27	05:26	06:31 (4) 06:18	06:48 (3) 07:11	07:42 (2) 07:05		08:02	08:32					
	21:22	27 06:58 (4) 20:21	21 07:09 (3) 19:07	22 08:04 (2) 16:58		16:09	16:05					
28	05:27	06:30 (4) 06:19	06:48 (3) 07:13	07:41 (2) 07:07		08:03	08:32					
	21:21	28 06:58 (4) 20:19	31 07:38 (1) 19:04	21 08:02 (2) 16:56		16:08	16:06					
29	05:29	06:30 (4) 06:21	06:49 (3) 07:14	07:42 (2) 07:09		08:05	08:32					
	21:19	29 06:59 (4) 20:16	35 07:41 (1) 19:02	19 08:01 (2) 16:54		16:07	16:07					
30	05:30	06:29 (4) 06:23	06:50 (3) 07:16	07:43 (2) 07:11		08:06	08:32					
	21:18	30 06:59 (4) 20:14	35 07:42 (1) 19:00	17 08:00 (2) 16:52		16:06	16:08					
31	05:32	06:30 (4) 06:24	06:51 (3)		07:13		08:32					
	21:16	30 07:00 (4) 20:12	35 07:43 (1)		16:50		16:09					
Sonnenscheinstunden	508		458		382		330		262		237	
astr.max.mögl.Beschattung	528		800		582		23					
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96					
Reduktion Windrichtung	0.72		0.72		0.70		0.68					
Gesamte Reduktion	0.26		0.29		0.23		0.19					
Met.wahrsch.Beschattung	138		234		136		4					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: FA - IO157

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:08	06:54	07:24 (1)	05:46	06:21 (4)	04:59	
	16:10	17:00	17:55	19:51	18 07:42 (1)	20:45	20 06:41 (4)	21:34	
2	08:32	08:02	07:05	06:52	07:22 (1)	05:44	06:19 (4)	04:58	
	16:12	17:02	17:57	19:53	22 07:44 (1)	20:47	24 06:43 (4)	21:35	
3	08:32	08:00	07:03	06:49	07:21 (1)	05:42	06:18 (4)	04:57	
	16:13	17:04	17:58	19:55	24 07:45 (1)	20:49	25 06:43 (4)	21:36	
4	08:32	07:58	07:01	06:47	07:19 (1)	05:41	06:17 (4)	04:56	
	16:14	17:06	18:00	19:57	26 07:45 (1)	20:50	27 06:44 (4)	21:37	
5	08:32	07:57	06:58	06:45	07:19 (1)	05:39	06:16 (4)	04:55	
	16:15	17:08	18:02	19:59	27 07:46 (1)	20:52	28 06:44 (4)	21:38	
6	08:31	07:55	06:56	06:42	07:17 (1)	05:37	06:15 (4)	04:55	
	16:16	17:10	18:04	20:00	28 07:45 (1)	20:54	30 06:45 (4)	21:39	
7	08:31	07:53	06:54	06:40	07:17 (1)	05:35	06:15 (4)	04:54	
	16:18	17:12	18:06	20:02	29 07:46 (1)	20:56	31 06:46 (4)	21:40	
8	08:30	07:51	06:51	06:37	07:17 (1)	05:33	06:15 (4)	04:53	
	16:19	17:14	18:08	20:04	29 07:46 (1)	20:57	31 06:46 (4)	21:41	
9	08:30	07:49	06:49	06:35	07:16 (1)	05:31	06:14 (4)	04:53	
	16:20	17:16	18:10	20:06	29 07:45 (1)	20:59	32 06:46 (4)	21:42	
10	08:29	07:48	06:47	06:33	07:16 (1)	05:29	06:14 (4)	04:52	
	16:22	17:18	18:11	20:08	28 07:44 (1)	21:01	32 06:46 (4)	21:43	
11	08:29	07:46	06:44	06:30	07:16 (1)	05:27	06:14 (4)	04:52	
	16:23	17:20	18:13	20:09	28 07:44 (1)	21:03	32 06:46 (4)	21:44	
12	08:28	07:44	06:42	07:07 (2)	06:28	07:17 (1)	05:26	06:13 (4)	04:52
	16:25	17:22	18:15	6 07:13 (2)	20:11	26 07:43 (1)	21:04	33 06:46 (4)	21:44
13	08:27	07:42	06:40	07:04 (2)	06:26	06:50 (3)	05:24	06:14 (4)	04:51
	16:26	17:24	18:17	12 07:16 (2)	20:13	34 07:42 (1)	21:06	32 06:46 (4)	21:45
14	08:26	07:40	06:37	07:02 (2)	06:23	06:47 (3)	05:22	06:14 (4)	04:51
	16:28	17:26	18:19	16 07:18 (2)	20:15	37 07:41 (1)	21:08	32 06:46 (4)	21:46
15	08:25	07:38	06:35	07:00 (2)	06:21	06:46 (3)	05:21	06:14 (4)	04:51
	16:30	17:28	18:21	19 07:19 (2)	20:17	37 07:39 (1)	21:09	32 06:46 (4)	21:46
16	08:24	07:36	06:32	06:59 (2)	06:19	06:45 (3)	05:19	06:14 (4)	04:51
	16:31	17:30	18:23	21 07:20 (2)	20:18	36 07:37 (1)	21:11	31 06:45 (4)	21:47
17	08:23	07:34	06:30	06:58 (2)	06:17	06:43 (3)	05:17	06:15 (4)	04:50
	16:33	17:32	18:24	22 07:20 (2)	20:20	33 07:34 (1)	21:12	30 06:45 (4)	21:47
18	08:22	07:32	06:28	06:57 (2)	06:14	06:42 (3)	05:16	06:15 (4)	04:50
	16:35	17:34	18:26	23 07:20 (2)	20:22	22 07:04 (3)	21:14	30 06:45 (4)	21:48
19	08:21	07:29	06:25	06:57 (2)	06:12	06:42 (3)	05:14	06:15 (4)	04:50
	16:36	17:35	18:28	23 07:20 (2)	20:24	22 07:04 (3)	21:16	29 06:44 (4)	21:48
20	08:20	07:27	06:23	06:57 (2)	06:10	06:42 (3)	05:13	06:16 (4)	04:51
	16:38	17:37	18:30	22 07:19 (2)	20:26	22 07:04 (3)	21:17	28 06:44 (4)	21:48
21	08:19	07:25	06:20	06:57 (2)	06:08	06:41 (3)	05:12	06:17 (4)	04:51
	16:40	17:39	18:32	22 07:19 (2)	20:27	23 07:04 (3)	21:19	27 06:44 (4)	21:49
22	08:18	07:23	06:18	06:57 (2)	06:05	06:42 (3)	05:10	06:17 (4)	04:51
	16:42	17:41	18:33	21 07:18 (2)	20:29	22 07:04 (3)	21:20	25 06:42 (4)	21:49
23	08:17	07:21	06:16	06:58 (2)	06:03	06:42 (3)	05:09	06:18 (4)	04:51
	16:43	17:43	18:35	19 07:17 (2)	20:31	21 07:03 (3)	21:22	24 06:42 (4)	21:49
24	08:15	07:19	06:13	06:58 (2)	06:01	06:42 (3)	05:07	06:19 (4)	04:51
	16:45	17:45	18:37	17 07:15 (2)	20:33	21 07:03 (3)	21:23	22 06:41 (4)	21:49
25	08:14	07:16	06:11	07:00 (2)	05:59	06:42 (3)	05:06	06:20 (4)	04:52
	16:47	17:47	18:39	13 07:13 (2)	20:35	19 07:01 (3)	21:24	21 06:41 (4)	21:49
26	08:13	07:14	06:08	07:03 (2)	05:57	06:43 (3)	05:05	06:21 (4)	04:52
	16:49	17:49	18:41	7 07:10 (2)	20:36	17 07:00 (3)	21:26	19 06:40 (4)	21:49
27	08:11	07:12	06:06	06:55	05:55	06:44 (3)	05:04	06:22 (4)	04:53
	16:51	17:51	18:42	20:38	14 06:58 (3)	21:27	17 06:39 (4)	21:49	18 05:49 (9)
28	08:10	07:10	06:04	05:53	05:53	06:46 (3)	05:03	06:23 (4)	04:53
	16:53	17:53	18:44	20:40	10 06:56 (3)	21:29	15 06:38 (4)	21:49	18 05:49 (9)
29	08:08	07:01	06:00	05:51	06:25 (4)	05:02	06:25 (4)	04:54	05:31 (9)
	16:55	19:46	19:46	20:42	11 06:36 (4)	21:30	11 06:36 (4)	21:49	18 05:49 (9)
30	08:07	06:59	06:59	07:31 (1)	05:49	06:23 (4)	05:00	06:27 (4)	04:54
	16:57	19:48	19:48	6 07:37 (1)	20:43	17 06:40 (4)	21:31	7 06:34 (4)	21:48
31	08:05	06:56	06:56	07:27 (1)	05:47	04:59	21:32		
	16:58	19:50	19:50	14 07:41 (1)	05:41	491	506		
Sonnenscheinstunden	253	275	367	418	732	777	501		
astr.max.mögl.Beschattung			0.28	0.28	0.37	0.43	0.39		
Red.Sonnenscheinwahrsch.			0.96	0.96	0.96	0.96	0.96		
Reduktion Betriebsdauer			0.69	0.69	0.72	0.73	0.72		
Gesamte Reduktion			0.18	0.26	0.30	0.30	0.27		
Met.wahrsch.Beschattung			52	187	232	133			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: FA - IO157
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:32 (9)	05:34	06:24 (4)	06:26	07:15 (1)	07:18	07:45 (2)	07:14	08:08		
	21:48	05:49 (9)	21:14	06:56 (4)	20:09	28 07:43 (1)	18:57	10 07:55 (2)	16:48	16:05		
2	04:56	05:32 (9)	05:35	06:24 (4)	06:28	07:15 (1)	07:20		07:16	08:09		
	21:48	05:50 (9)	21:12	06:56 (4)	20:07	28 07:43 (1)	18:55		16:46	16:05		
3	04:56	05:33 (9)	05:37	06:24 (4)	06:30	07:14 (1)	07:21		07:18	08:11		
	21:47	05:50 (9)	21:11	06:56 (4)	20:05	29 07:43 (1)	18:52		16:44	16:04		
4	04:57	05:33 (9)	05:38	06:24 (4)	06:31	07:14 (1)	07:23		07:20	08:12		
	21:47	05:49 (9)	21:09	06:56 (4)	20:02	29 07:43 (1)	18:50		16:42	16:03		
5	04:58	05:33 (9)	05:40	06:25 (4)	06:33	07:14 (1)	07:25		07:22	08:14		
	21:46	05:49 (9)	21:07	06:56 (4)	20:00	29 07:43 (1)	18:48		16:41	16:03		
6	04:59	05:34 (9)	05:42	06:25 (4)	06:35	07:13 (1)	07:27		07:24	08:15		
	21:46	05:49 (9)	21:05	06:55 (4)	19:57	28 07:41 (1)	18:45		16:39	16:02		
7	05:00	05:35 (9)	05:43	06:26 (4)	06:36	07:14 (1)	07:28		07:26	08:16		
	21:45	05:49 (9)	21:03	06:55 (4)	19:55	27 07:41 (1)	18:43		16:37	16:02		
8	05:01	05:36 (9)	05:45	06:26 (4)	06:38	07:14 (1)	07:30		07:28	08:18		
	21:45	05:49 (9)	21:01	06:54 (4)	19:53	26 07:40 (1)	18:41		16:35	16:01		
9	05:02	05:36 (9)	05:47	06:27 (4)	06:40	07:14 (1)	07:32		07:30	08:19		
	21:44	05:48 (9)	20:59	06:53 (4)	19:50	24 07:38 (1)	18:38		16:33	16:01		
10	05:03	05:38 (9)	05:48	06:27 (4)	06:42	07:15 (1)	07:34		07:31	08:20		
	21:43	05:47 (9)	20:57	06:52 (4)	19:48	22 07:37 (1)	18:36		16:32	16:01		
11	05:04	05:39 (9)	05:50	06:28 (4)	06:43	07:17 (1)	07:36		07:33	08:21		
	21:42	05:46 (9)	20:55	06:51 (4)	19:46	19 07:36 (1)	18:34		16:30	16:01		
12	05:05	05:41 (9)	05:52	06:30 (4)	06:45	07:18 (1)	07:37		07:35	08:22		
	21:41	05:45 (9)	20:53	06:49 (4)	19:43	15 07:33 (1)	18:31		16:28	16:00		
13	05:06	06:37 (4)	05:53	06:31 (4)	06:47	07:21 (1)	07:39		07:37	08:23		
	21:40	06:41 (4)	20:51	06:47 (4)	19:41	8 07:29 (1)	18:29		16:27	16:00		
14	05:07	06:34 (4)	05:55	06:35 (4)	06:48	07:41			07:39	08:24		
	21:39	06:44 (4)	20:49	07:01 (3)	19:38				16:25	16:00		
15	05:09	06:32 (4)	05:57	06:53 (3)	06:50	07:43			07:41	08:25		
	21:38	06:46 (4)	20:47	11 07:04 (3)	19:36				16:24	16:00		
16	05:10	06:31 (4)	05:59	06:51 (3)	06:52	07:45			07:42	08:26		
	21:37	06:47 (4)	20:45	15 07:06 (3)	19:33				16:22	16:00		
17	05:11	06:31 (4)	06:00	06:50 (3)	06:54	07:53 (2)	07:46		07:44	08:27		
	21:36	06:49 (4)	20:43	18 07:08 (3)	19:31	4 07:57 (2)	18:20		16:21	16:01		
18	05:13	06:30 (4)	06:02	06:48 (3)	06:55	07:48 (2)	07:48		07:46	08:28		
	21:35	06:50 (4)	20:41	20 07:08 (3)	19:29	12 08:00 (2)	18:18		16:19	16:01		
19	05:14	06:29 (4)	06:04	06:48 (3)	06:57	07:46 (2)	07:50		07:48	08:28		
	21:34	06:51 (4)	20:39	21 07:09 (3)	19:26	16 08:02 (2)	18:15		16:18	16:01		
20	05:15	06:28 (4)	06:05	06:46 (3)	06:59	07:44 (2)	07:52		07:50	08:29		
	21:32	06:51 (4)	20:37	22 07:08 (3)	19:24	19 08:03 (2)	18:13		16:17	16:01		
21	05:17	06:28 (4)	06:07	06:46 (3)	07:00	07:42 (2)	07:54		07:51	08:30		
	21:31	06:53 (4)	20:34	23 07:09 (3)	19:21	21 08:03 (2)	18:11		16:15	16:02		
22	05:18	06:27 (4)	06:09	06:46 (3)	07:02	07:42 (2)	07:56		07:53	08:30		
	21:30	06:53 (4)	20:32	23 07:09 (3)	19:19	22 08:04 (2)	18:09		16:14	16:02		
23	05:20	06:26 (4)	06:11	06:45 (3)	07:04	07:41 (2)	07:58		07:55	08:31		
	21:28	06:53 (4)	20:30	23 07:08 (3)	19:16	23 08:04 (2)	18:07		16:13	16:03		
24	05:21	06:26 (4)	06:12	06:46 (3)	07:06	07:40 (2)	07:59		07:57	08:31		
	21:27	06:55 (4)	20:28	22 07:08 (3)	19:14	23 08:03 (2)	18:05		16:12	16:03		
25	05:23	06:25 (4)	06:14	06:46 (3)	07:07	07:40 (2)	07:01		07:58	08:31		
	21:25	06:55 (4)	20:25	25 07:33 (1)	19:12	23 08:03 (2)	17:02		16:11	16:04		
26	05:24	06:26 (4)	06:16	06:46 (3)	07:09	07:40 (2)	07:03		08:00	08:32		
	21:24	06:56 (4)	20:23	33 07:37 (1)	19:09	22 08:02 (2)	17:00		16:10	16:05		
27	05:26	06:25 (4)	06:18	06:47 (3)	07:11	07:41 (2)	07:05		08:02	08:32		
	21:22	06:56 (4)	20:21	36 07:39 (1)	19:07	21 08:02 (2)	16:58		16:09	16:05		
28	05:27	06:24 (4)	06:19	06:47 (3)	07:13	07:40 (2)	07:07		08:03	08:32		
	21:21	06:56 (4)	20:19	38 07:40 (1)	19:04	20 08:00 (2)	16:56		16:08	16:06		
29	05:29	06:25 (4)	06:21	06:48 (3)	07:14	07:41 (2)	07:09		08:05	08:32		
	21:19	06:56 (4)	20:16	37 07:41 (1)	19:02	18 07:59 (2)	16:54		16:07	16:07		
30	05:30	06:24 (4)	06:23	06:51 (3)	07:16	07:43 (2)	07:11		08:06	08:32		
	21:18	06:56 (4)	20:14	34 07:43 (1)	19:00	14 07:57 (2)	16:52		16:06	16:08		
31	05:32	06:24 (4)	06:24	07:16 (1)			07:13			08:32		
	21:16	06:57 (4)	20:12	26 07:42 (1)			16:50			16:09		
Sonnenscheinstunden	508		458		382		330		262	237		
astr.max.mögl.Beschattung	611		795		570		10					
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29					
Reduktion Betriebsdauer	0.96		0.96		0.96		0.96					
Reduktion Windrichtung	0.72		0.72		0.70		0.69					
Gesamte Reduktion	0.26		0.29		0.23		0.19					
Met.wahrsch.Beschattung	160		232		133		2					

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: FB - IO158

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:08	06:54	07:23 (1)	05:46	06:20 (4)	04:59	05:30 (9)	
	16:10	17:00	17:55	19:51	12 07:35 (1)	20:45	19 06:39 (4)	21:34	9 05:39 (9)	
2	08:32	08:02	07:05	06:52	07:21 (1)	05:44	06:18 (4)	04:58	05:30 (9)	
	16:12	17:02	17:57	19:53	17 07:38 (1)	20:47	22 06:40 (4)	21:35	11 05:41 (9)	
3	08:32	08:00	07:03	06:49	07:19 (1)	05:42	06:17 (4)	04:57	05:29 (9)	
	16:13	17:04	17:58	19:55	21 07:40 (1)	20:49	24 06:41 (4)	21:36	12 05:41 (9)	
4	08:32	07:58	07:01	06:47	07:17 (1)	05:41	06:15 (4)	04:56	05:28 (9)	
	16:14	17:06	18:00	19:57	23 07:40 (1)	20:50	26 06:41 (4)	21:37	14 05:42 (9)	
5	08:32	07:57	06:58	06:45	07:16 (1)	05:39	06:14 (4)	04:55	05:28 (9)	
	16:15	17:08	18:02	19:59	25 07:41 (1)	20:52	28 06:42 (4)	21:38	15 05:43 (9)	
6	08:31	07:55	06:56	06:42	07:14 (1)	05:37	06:14 (4)	04:55	05:28 (9)	
	16:16	17:10	18:04	20:00	26 07:40 (1)	20:54	28 06:42 (4)	21:39	15 05:43 (9)	
7	08:31	07:53	06:54	06:40	07:14 (1)	05:35	06:14 (4)	04:54	05:28 (9)	
	16:18	17:12	18:06	20:02	27 07:41 (1)	20:56	29 06:43 (4)	21:40	16 05:44 (9)	
8	08:30	07:51	06:51	06:37	07:14 (1)	05:33	06:13 (4)	04:53	05:27 (9)	
	16:19	17:14	18:08	20:04	27 07:41 (1)	20:57	30 06:43 (4)	21:41	17 05:44 (9)	
9	08:30	07:49	06:49	06:35	07:12 (1)	05:31	06:12 (4)	04:53	05:28 (9)	
	16:20	17:16	18:10	20:06	28 07:40 (1)	20:59	31 06:43 (4)	21:42	17 05:45 (9)	
10	08:29	07:48	06:47	06:33	07:12 (1)	05:29	06:13 (4)	04:52	05:27 (9)	
	16:22	17:18	18:11	20:08	28 07:40 (1)	21:01	31 06:44 (4)	21:43	18 05:45 (9)	
11	08:29	07:46	06:44	06:30	07:13 (1)	05:27	06:12 (4)	04:52	05:28 (9)	
	16:23	17:20	18:13	20:09	27 07:40 (1)	21:03	31 06:43 (4)	21:44	17 05:45 (9)	
12	08:28	07:44	06:42	06:28	07:13 (1)	05:26	06:12 (4)	04:52	05:28 (9)	
	16:25	17:22	18:15	20:11	27 07:40 (1)	21:04	31 06:43 (4)	21:44	18 05:46 (9)	
13	08:27	07:42	06:40	06:26	07:13 (1)	05:24	06:13 (4)	04:51	05:28 (9)	
	16:26	17:24	18:17	20:13	25 07:38 (1)	21:06	30 06:43 (4)	21:45	18 05:46 (9)	
14	08:26	07:40	06:37	06:23	06:47 (3)	05:22	06:12 (4)	04:51	05:28 (9)	
	16:28	17:26	18:19	10 07:11 (2)	20:15	34 07:37 (1)	21:08	31 06:43 (4)	21:46	18 05:46 (9)
15	08:25	07:38	06:35	06:21	06:45 (3)	05:21	06:13 (4)	04:51	05:28 (9)	
	16:30	17:28	18:21	15 07:13 (2)	20:17	37 07:36 (1)	21:09	30 06:43 (4)	21:46	18 05:46 (9)
16	08:24	07:36	06:32	06:19	06:43 (3)	05:19	06:13 (4)	04:51	05:28 (9)	
	16:31	17:30	18:23	17 07:14 (2)	20:18	38 07:35 (1)	21:11	29 06:42 (4)	21:47	19 05:47 (9)
17	08:23	07:34	06:30	06:17	06:41 (3)	05:17	06:13 (4)	04:50	05:28 (9)	
	16:33	17:32	18:24	20 07:15 (2)	20:20	36 07:32 (1)	21:12	29 06:42 (4)	21:47	19 05:47 (9)
18	08:22	07:32	06:28	06:14	06:41 (3)	05:16	06:14 (4)	04:50	05:28 (9)	
	16:35	17:34	18:26	21 07:15 (2)	20:22	30 07:29 (1)	21:14	28 06:42 (4)	21:48	19 05:47 (9)
19	08:21	07:29	06:25	06:12	06:40 (3)	05:14	06:14 (4)	04:50	05:28 (9)	
	16:36	17:35	18:28	22 07:16 (2)	20:24	22 07:02 (3)	21:16	27 06:41 (4)	21:48	19 05:47 (9)
20	08:20	07:27	06:23	06:10	06:40 (3)	05:13	06:15 (4)	04:51	05:30 (9)	
	16:38	17:37	18:30	22 07:15 (2)	20:26	22 07:02 (3)	21:17	26 06:41 (4)	21:48	18 05:48 (9)
21	08:19	07:25	06:20	06:08	06:40 (3)	05:12	06:16 (4)	04:51	05:30 (9)	
	16:40	17:39	18:32	22 07:15 (2)	20:27	22 07:02 (3)	21:19	25 06:41 (4)	21:49	18 05:48 (9)
22	08:18	07:23	06:18	06:05	06:40 (3)	05:10	06:16 (4)	04:51	05:30 (9)	
	16:42	17:41	18:33	22 07:14 (2)	20:29	22 07:02 (3)	21:20	23 06:39 (4)	21:49	18 05:48 (9)
23	08:17	07:21	06:16	06:03	06:40 (3)	05:09	06:17 (4)	04:51	05:29 (9)	
	16:43	17:43	18:35	21 07:14 (2)	20:31	21 07:01 (3)	21:22	22 06:39 (4)	21:49	19 05:48 (9)
24	08:15	07:19	06:13	06:01	06:40 (3)	05:07	06:18 (4)	04:51	05:30 (9)	
	16:45	17:45	18:37	19 07:12 (2)	20:33	21 07:01 (3)	21:23	20 06:38 (4)	21:49	19 05:49 (9)
25	08:14	07:16	06:11	05:59	06:40 (3)	05:06	06:19 (4)	04:52	05:30 (9)	
	16:47	17:47	18:39	17 07:11 (2)	20:35	19 06:59 (3)	21:24	18 06:37 (4)	21:49	19 05:49 (9)
26	08:13	07:14	06:08	05:57	06:40 (3)	05:05	06:20 (4)	04:52	05:30 (9)	
	16:49	17:49	18:41	13 07:09 (2)	20:36	18 06:58 (3)	21:26	16 06:36 (4)	21:49	19 05:49 (9)
27	08:11	07:12	06:06	05:55	06:42 (3)	05:04	06:22 (4)	04:53	05:31 (9)	
	16:50	17:51	18:42	8 07:06 (2)	20:38	14 06:56 (3)	21:27	13 06:35 (4)	21:49	18 05:49 (9)
28	08:10	07:10	06:04	05:53	06:43 (3)	05:03	06:23 (4)	04:53	05:31 (9)	
	16:53	17:53	18:44	20:40	11 06:54 (3)	21:29	10 06:33 (4)	21:49	18 05:49 (9)	
29	08:08	07:01	06:01	05:51	06:24 (4)	05:02	06:26 (4)	04:54	05:31 (9)	
	16:55	19:46	19:46	20:42	14 06:51 (3)	21:30	5 06:31 (4)	21:49	19 05:50 (9)	
30	08:07	06:59	05:49	05:49	06:22 (4)	05:00	06:31 (4)	04:54	05:31 (9)	
	16:57	19:48	19:48	20:43	15 06:37 (4)	21:31	06:31 (4)	21:48	18 05:49 (9)	
31	08:05	06:56	05:50	05:49	06:37 (4)	21:31	06:31 (4)	21:48	18 05:49 (9)	
	16:58	19:50	19:50	20:43	15 06:37 (4)	21:31	06:31 (4)	21:48	18 05:49 (9)	
Sonnenscheinstunden	253	275	367	418	491	506	512	512	512	
astr.max.mögl.Beschattung				0.28	0.37	0.43	0.39	0.39	0.39	
Red.Sonnenscheinwahrsch.				0.96	0.96	0.96	0.96	0.96	0.96	
Reduktion Betriebsdauer				0.69	0.72	0.73	0.72	0.72	0.72	
Gesamte Reduktion				0.18	0.26	0.30	0.27	0.27	0.27	
Met.wahrsch.Beschattung				46	181	215	136	136	136	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: FB - IO158

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

Juli		August		September		Oktober		November		Dezember		
1	04:55	05:32 (9)	05:34	06:22 (4)	06:26	07:12 (1)	07:18	07:14	08:08			
	21:48	05:50 (9)	21:14	06:53 (4)	20:09	27	07:39 (1)	18:57	16:48	16:05		
2	04:56	05:32 (9)	05:35	06:23 (4)	06:28		07:11 (1)	07:20	07:16	08:09		
	21:48	05:50 (9)	21:12	06:54 (4)	20:07	28	07:39 (1)	18:55	16:46	16:05		
3	04:56	05:33 (9)	05:37	06:22 (4)	06:30		07:10 (1)	07:21	07:18	08:11		
	21:47	05:50 (9)	21:11	06:53 (4)	20:05	28	07:38 (1)	18:52	16:44	16:04		
4	04:57	05:33 (9)	05:38	06:23 (4)	06:31		07:11 (1)	07:23	07:20	08:12		
	21:47	05:49 (9)	21:09	06:53 (4)	20:02	27	07:38 (1)	18:50	16:42	16:03		
5	04:58	05:33 (9)	05:40	06:24 (4)	06:33		07:11 (1)	07:25	07:22	08:14		
	21:46	05:50 (9)	21:07	29	06:53 (4)	20:00	27	07:38 (1)	18:48	16:41	16:03	
6	04:59	05:34 (9)	05:42	06:23 (4)	06:35		07:10 (1)	07:27	07:24	08:15		
	21:46	05:50 (9)	21:05	29	06:52 (4)	19:57	27	07:37 (1)	18:45	16:39	16:02	
7	05:00	05:35 (9)	05:43	06:24 (4)	06:36		07:11 (1)	07:28	07:26	08:16		
	21:45	05:50 (9)	21:03	28	06:52 (4)	19:55	25	07:36 (1)	18:43	16:37	16:02	
8	05:01	05:35 (9)	05:45	06:24 (4)	06:38		07:12 (1)	07:30	07:28	08:18		
	21:45	05:49 (9)	21:01	27	06:51 (4)	19:53	23	07:35 (1)	18:41	16:35	16:01	
9	05:02	05:36 (9)	05:47	06:25 (4)	06:40		07:12 (1)	07:32	07:30	08:19		
	21:44	05:49 (9)	20:59	25	06:50 (4)	19:50	21	07:33 (1)	18:38	16:33	16:01	
10	05:03	05:37 (9)	05:48	06:25 (4)	06:42		07:14 (1)	07:34	07:31	08:20		
	21:43	05:49 (9)	20:57	24	06:49 (4)	19:48	17	07:31 (1)	18:36	16:32	16:01	
11	05:04	05:38 (9)	05:50	06:27 (4)	06:43		07:16 (1)	07:36	07:33	08:21		
	21:42	05:48 (9)	20:55	21	06:48 (4)	19:46	13	07:29 (1)	18:34	16:30	16:01	
12	05:05	05:39 (9)	05:52	06:29 (4)	06:45		07:20 (1)	07:37	07:35	08:22		
	21:41	05:47 (9)	20:53	18	06:47 (4)	19:43	3	07:23 (1)	18:31	16:28	16:00	
13	05:06	05:41 (9)	05:54	06:30 (4)	06:47			07:39	07:37	08:23		
	21:40	05:45 (9)	20:51	14	06:44 (4)	19:41		18:29	16:27	16:00		
14	05:07		05:55	06:34 (4)	06:48			07:41	07:39	08:24		
	21:39		20:49	12	07:00 (3)	19:38		18:27	16:25	16:00		
15	05:09	06:33 (4)	05:57	06:50 (3)	06:50			07:43	07:41	08:25		
	21:38	8	06:41 (4)	20:47	12	07:02 (3)	19:36		18:24	16:24	16:00	
16	05:10	06:31 (4)	05:59	06:49 (3)	06:52		07:48 (2)	07:45	07:42	08:26		
	21:37	12	06:43 (4)	20:45	15	07:04 (3)	19:33	6	07:54 (2)	18:22	16:22	16:00
17	05:11	06:30 (4)	06:00	06:48 (3)	06:54		07:45 (2)	07:46	07:44	08:27		
	21:36	15	06:45 (4)	20:43	18	07:06 (3)	19:31	12	07:57 (2)	18:20	16:21	16:01
18	05:13	06:29 (4)	06:02	06:46 (3)	06:55		07:42 (2)	07:48	07:46	08:28		
	21:35	17	06:46 (4)	20:41	20	07:06 (3)	19:29	16	07:58 (2)	18:18	16:19	16:01
19	05:14	06:28 (4)	06:04	06:46 (3)	06:57		07:41 (2)	07:50	07:48	08:28		
	21:34	19	06:47 (4)	20:39	20	07:06 (3)	19:26	18	07:59 (2)	18:15	16:18	16:01
20	05:15	06:27 (4)	06:05	06:44 (3)	06:59		07:40 (2)	07:52	07:50	08:29		
	21:32	21	06:48 (4)	20:37	22	07:06 (3)	19:24	20	08:00 (2)	18:13	16:17	16:01
21	05:17	06:27 (4)	06:07	06:44 (3)	07:00		07:38 (2)	07:54	07:51	08:30		
	21:31	23	06:50 (4)	20:34	22	07:06 (3)	19:21	22	08:00 (2)	18:11	16:15	16:02
22	05:18	06:26 (4)	06:09	06:44 (3)	07:02		07:38 (2)	07:56	07:53	08:30		
	21:30	24	06:50 (4)	20:32	23	07:07 (3)	19:19	22	08:00 (2)	18:09	16:14	16:02
23	05:20	06:25 (4)	06:11	06:44 (3)	07:04		07:37 (2)	07:58	07:55	08:31		
	21:28	25	06:50 (4)	20:30	22	07:06 (3)	19:16	23	08:00 (2)	18:07	16:13	16:03
24	05:21	06:25 (4)	06:12	06:44 (3)	07:06		07:36 (2)	07:59	07:57	08:31		
	21:27	27	06:52 (4)	20:28	21	07:05 (3)	19:14	23	07:59 (2)	18:05	16:12	16:03
25	05:23	06:24 (4)	06:14	06:45 (3)	07:07		07:37 (2)	07:01	07:58	08:31		
	21:25	28	06:52 (4)	20:25	31	07:33 (1)	19:12	21	07:58 (2)	17:02	16:11	16:04
26	05:24	06:24 (4)	06:16	06:44 (3)	07:09		07:37 (2)	07:03	08:00	08:32		
	21:24	29	06:53 (4)	20:23	35	07:35 (1)	19:09	21	07:58 (2)	17:00	16:10	16:05
27	05:26	06:24 (4)	06:18	06:45 (3)	07:11		07:38 (2)	07:05	08:02	08:32		
	21:22	29	06:53 (4)	20:21	38	07:37 (1)	19:07	19	07:57 (2)	16:58	16:09	16:05
28	05:27	06:23 (4)	06:19	06:46 (3)	07:13		07:38 (2)	07:07	08:03	08:32		
	21:21	30	06:53 (4)	20:19	36	07:37 (1)	19:04	16	07:54 (2)	16:56	16:08	16:06
29	05:29	06:23 (4)	06:21	06:48 (3)	07:14		07:40 (2)	07:09	08:05	08:32		
	21:19	30	06:53 (4)	20:16	34	07:38 (1)	19:02	12	07:52 (2)	16:54	16:07	16:07
30	05:30	06:22 (4)	06:23	07:13 (1)	07:16		07:44 (2)	07:11	08:06	08:32		
	21:18	31	06:53 (4)	20:14	26	07:39 (1)	19:00	4	07:48 (2)	16:52	16:06	16:08
31	05:32	06:23 (4)	06:24	07:12 (1)					07:13		08:32	
	21:16	31	06:54 (4)	20:12	27	07:39 (1)			16:50		16:09	
Sonnenscheinstunden	508		458		382			330	262		237	
astr.max.mögl.Beschattung	577		772		521							
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35							
Reduktion Betriebsdauer	0.96		0.96		0.96							
Reduktion Windrichtung	0.72		0.72		0.70							
Gesamte Reduktion	0.26		0.29		0.23							
Met.wahrsch.Beschattung	151		226		122							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: FC - IO159

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:32	08:03	07:07	06:54	05:46	06:21 (3)	04:59
	16:10	17:00	17:55	19:51	20:45	07:50 (1)	21:34
2	08:32	08:02	07:05	06:52	05:44	06:20 (3)	04:58
	16:11	17:02	17:56	19:53	20:47	07:49 (1)	21:35
3	08:32	08:00	07:03	06:49	05:42	06:19 (3)	04:57
	16:13	17:04	17:58	19:55	20:49	07:48 (1)	21:36
4	08:32	07:58	07:01	06:47	05:40	06:18 (3)	04:56
	16:14	17:06	18:00	19:57	20:50	07:46 (1)	21:37
5	08:32	07:57	06:58	06:45	05:39	06:18 (3)	04:55
	16:15	17:08	18:02	19:59	20:52	07:45 (1)	21:38
6	08:31	07:55	06:56	06:42	05:37	06:17 (3)	04:55
	16:16	17:10	18:04	20:00	20:54	07:44 (1)	21:39
7	08:31	07:53	06:54	06:40	07:24 (1)	06:18 (3)	04:54
	16:18	17:12	18:06	20:02	07:42 (1)	20:56	07:43 (1)
8	08:30	07:51	06:51	06:37	07:21 (1)	06:17 (3)	04:53
	16:19	17:14	18:08	6 07:25 (2)	20:04	07:41 (1)	21:41
9	08:30	07:49	06:49	06:35	07:18 (1)	06:17 (3)	04:53
	16:20	17:16	18:10	16 07:20 (2)	20:06	07:40 (1)	21:42
10	08:29	07:47	06:47	06:33	07:16 (1)	06:18 (3)	04:52
	16:22	17:18	18:11	20 07:37 (2)	20:08	07:38 (1)	21:43
11	08:28	07:46	06:44	06:30	07:14 (1)	06:17 (3)	04:52
	16:23	17:20	18:13	24 07:39 (2)	20:09	07:36 (1)	21:43
12	08:28	07:44	06:42	06:28	07:13 (1)	06:17 (3)	04:51
	16:25	17:22	18:15	27 07:40 (2)	20:11	07:33 (1)	21:44
13	08:27	07:42	06:40	06:26	07:11 (1)	06:18 (3)	04:51
	16:26	17:24	18:17	29 07:41 (2)	20:13	07:29 (1)	21:45
14	08:26	07:40	06:37	06:23	07:10 (1)	06:18 (3)	04:51
	16:28	17:26	18:19	31 07:42 (2)	20:15	06:49 (3)	21:46
15	08:25	07:38	06:35	06:21	07:09 (1)	06:19 (3)	04:51
	16:30	17:28	18:21	32 07:42 (2)	20:17	06:49 (3)	21:46
16	08:24	07:36	06:32	06:19	07:08 (1)	06:19 (3)	04:51
	16:31	17:30	18:22	33 07:42 (2)	20:18	06:48 (3)	21:47
17	08:23	07:34	06:30	06:17	07:07 (1)	06:20 (3)	04:50
	16:33	17:32	18:24	34 07:42 (2)	20:20	06:48 (3)	21:47
18	08:22	07:31	06:28	06:14	07:06 (1)	06:21 (3)	04:50
	16:35	17:33	18:26	34 07:42 (2)	20:22	06:48 (3)	21:48
19	08:21	07:29	06:25	06:12	07:06 (1)	06:21 (3)	04:50
	16:36	17:35	18:28	34 07:42 (2)	20:24	06:46 (3)	21:48
20	08:20	07:27	06:23	06:10	07:05 (1)	06:22 (3)	04:51
	16:38	17:37	18:30	34 07:41 (2)	20:26	06:46 (3)	21:48
21	08:19	07:25	06:20	06:08	07:05 (1)	06:23 (3)	04:51
	16:40	17:39	18:32	33 07:41 (2)	20:27	06:45 (3)	21:49
22	08:18	07:23	06:18	06:05	07:05 (1)	06:24 (3)	04:51
	16:42	17:41	18:33	33 07:40 (2)	20:29	06:43 (3)	21:49
23	08:17	07:21	06:16	06:03	07:04 (1)	06:25 (3)	04:51
	16:43	17:43	18:35	31 07:39 (2)	20:31	06:42 (3)	21:49
24	08:15	07:19	06:13	06:01	07:04 (1)	06:36 (10)	04:51
	16:45	17:45	18:37	29 07:37 (2)	20:33	06:41 (3)	21:49
25	08:14	07:16	06:11	05:59	06:31 (3)	06:35 (10)	04:52
	16:47	17:47	18:39	27 07:36 (2)	20:34	06:39 (3)	21:49
26	08:13	07:14	06:08	05:57	06:28 (3)	06:34 (10)	04:52
	16:49	17:49	18:41	25 07:35 (2)	20:36	06:38 (10)	21:49
27	08:11	07:12	06:06	05:55	06:25 (3)	06:33 (10)	04:53
	16:50	17:51	18:42	21 07:32 (2)	20:38	06:49 (10)	21:49
28	08:10	07:10	06:04	05:53	06:23 (3)	06:32 (10)	04:53
	16:53	17:53	18:44	16 07:30 (2)	20:40	07:51 (1)	21:29
29	08:08	07:01	06:02	05:51	06:22 (3)	06:31 (10)	04:54
	16:55	19:46	9 08:25 (2)	20:42	07:50 (1)	21:30	20 05:51 (10)
30	08:07	06:59	05:48	05:48	06:22 (3)	06:30 (10)	04:54
	16:57	19:48	20:43	72 07:50 (1)	21:31	22 05:52 (10)	21:48
31	08:05	06:56	05:47	05:47	04:59	05:30 (10)	
	16:58	19:50	21:32	22 05:52 (10)			
Sonnenscheinstunden	253	275	367	418	491	506	802
astr. max. mögl. Beschattung			578	1142	1240		802
Red. Sonnenscheinwahrsch.			0.28	0.37	0.43		0.39
Reduktion Betriebsdauer			0.96	0.96	0.96		0.96
Reduktion Windrichtung			0.67	0.72	0.72		0.72
Gesamte Reduktion			0.18	0.26	0.30		0.27
Met. wahrsch. Beschattung			103	292	368		214

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: **GBSchattenrezeptor: FC - IO159**

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember				
1	04:55	05:34 (10)	05:33	06:28 (3)	06:26	07:13 (1)	07:18	07:52 (2)	07:14	08:08
	21:48	27 06:01 (10)	21:14	50 07:44 (1)	20:09	36 07:49 (1)	18:57	28 08:20 (2)	16:48	16:05
2	04:56	05:34 (10)	05:35	06:28 (3)	06:28	07:15 (1)	07:20	07:52 (2)	07:16	08:09
	21:48	27 06:01 (10)	21:12	55 07:47 (1)	20:07	32 07:47 (1)	18:55	26 08:18 (2)	16:46	16:05
3	04:56	05:35 (10)	05:37	06:27 (3)	06:30	07:16 (1)	07:21	07:54 (2)	07:18	08:11
	21:47	27 06:02 (10)	21:11	60 07:48 (1)	20:05	28 07:44 (1)	18:52	22 08:16 (2)	16:44	16:04
4	04:57	05:34 (10)	05:38	06:27 (3)	06:31	07:18 (1)	07:23	07:56 (2)	07:20	08:12
	21:47	27 06:01 (10)	21:09	64 07:51 (1)	20:02	24 07:42 (1)	18:50	18 08:14 (2)	16:42	16:03
5	04:58	05:35 (10)	05:40	06:28 (3)	06:33	07:21 (1)	07:25	07:59 (2)	07:22	08:14
	21:46	26 06:01 (10)	21:07	66 07:52 (1)	20:00	18 07:39 (1)	18:48	11 08:10 (2)	16:41	16:03
6	04:59	05:35 (10)	05:42	06:27 (3)	06:35	07:27 (1)	07:27	07:24	07:24	08:15
	21:46	26 06:01 (10)	21:05	69 07:53 (1)	19:57	4 07:31 (1)	18:45	16:39	16:02	
7	05:00	05:36 (10)	05:43	06:28 (3)	06:36		07:28	07:26	08:16	
	21:45	25 06:01 (10)	21:03	70 07:55 (1)	19:55		18:43	16:37	16:02	
8	05:01	05:36 (10)	05:45	06:27 (3)	06:38		07:30	07:28	08:18	
	21:44	26 06:02 (10)	21:01	72 07:55 (1)	19:53		18:40	16:35	16:01	
9	05:02	05:37 (10)	05:47	06:28 (3)	06:40		07:32	07:29	08:19	
	21:44	24 06:01 (10)	20:59	72 07:56 (1)	19:50		18:38	16:33	16:01	
10	05:03	05:37 (10)	05:48	06:28 (3)	06:42		07:34	07:31	08:20	
	21:43	24 06:01 (10)	20:57	73 07:56 (1)	19:48		18:36	16:32	16:01	
11	05:04	05:38 (10)	05:50	06:29 (3)	06:43		07:36	07:33	08:21	
	21:42	23 06:01 (10)	20:55	73 07:57 (1)	19:45		18:33	16:30	16:01	
12	05:05	05:38 (10)	05:52	06:29 (3)	06:45		07:37	07:35	08:22	
	21:41	23 06:01 (10)	20:53	73 07:58 (1)	19:43		18:31	16:28	16:00	
13	05:06	05:39 (10)	05:53	06:30 (3)	06:47		07:39	07:37	08:23	
	21:40	21 06:00 (10)	20:51	73 07:58 (1)	19:41		18:29	16:27	16:00	
14	05:07	05:39 (10)	05:55	06:31 (3)	06:48	08:08 (2)	07:41	07:39	08:24	
	21:39	21 06:00 (10)	20:49	72 07:59 (1)	19:38	7 08:15 (2)	18:27	16:25	16:00	
15	05:09	05:40 (10)	05:57	06:31 (3)	06:50	08:03 (2)	07:43	07:41	08:25	
	21:38	19 05:59 (10)	20:47	70 07:58 (1)	19:36	16 08:19 (2)	18:24	16:24	16:00	
16	05:10	05:41 (10)	05:59	06:33 (3)	06:52	08:01 (2)	07:45	07:42	08:26	
	21:37	17 05:58 (10)	20:45	67 07:59 (1)	19:33	20 08:21 (2)	18:22	16:22	16:00	
17	05:11	05:43 (10)	06:00	06:36 (3)	06:54	07:59 (2)	07:46	07:44	08:27	
	21:36	15 05:58 (10)	20:43	63 08:00 (1)	19:31	24 08:23 (2)	18:20	16:21	16:01	
18	05:13	05:44 (10)	06:02	06:39 (3)	06:55	07:57 (2)	07:48	07:46	08:28	
	21:35	20 06:47 (3)	20:41	55 07:59 (1)	19:29	27 08:24 (2)	18:18	16:19	16:01	
19	05:14	05:45 (10)	06:04	07:10 (1)	06:57	07:56 (2)	07:50	07:48	08:28	
	21:34	22 06:50 (3)	20:39	49 07:59 (1)	19:26	29 08:25 (2)	18:15	16:18	16:01	
20	05:15	05:47 (10)	06:05	07:09 (1)	06:59	07:55 (2)	07:52	07:50	08:29	
	21:32	20 06:51 (3)	20:36	49 07:58 (1)	19:24	30 08:25 (2)	18:13	16:17	16:01	
21	05:17	06:35 (3)	06:07	07:09 (1)	07:00	07:53 (2)	07:54	07:51	08:30	
	21:31	18 06:53 (3)	20:34	50 07:59 (1)	19:21	32 08:25 (2)	18:11	16:15	16:02	
22	05:18	06:34 (3)	06:09	07:10 (1)	07:02	07:53 (2)	07:56	07:53	08:30	
	21:30	20 06:54 (3)	20:32	49 07:59 (1)	19:19	33 08:26 (2)	18:09	16:14	16:02	
23	05:20	06:32 (3)	06:11	07:09 (1)	07:04	07:52 (2)	07:57	07:55	08:31	
	21:28	23 06:55 (3)	20:30	49 07:58 (1)	19:16	34 08:26 (2)	18:07	16:13	16:03	
24	05:21	06:32 (3)	06:12	07:09 (1)	07:06	07:51 (2)	07:59	07:57	08:31	
	21:27	25 06:57 (3)	20:28	48 07:57 (1)	19:14	34 08:25 (2)	18:04	16:12	16:03	
25	05:23	06:31 (3)	06:14	07:10 (1)	07:07	07:51 (2)	07:01	07:58	08:31	
	21:25	26 06:57 (3)	20:25	47 07:57 (1)	19:12	34 08:25 (2)	17:02	16:11	16:04	
26	05:24	06:31 (3)	06:16	07:09 (1)	07:09	07:51 (2)	07:03	08:00	08:32	
	21:24	28 06:59 (3)	20:23	47 07:56 (1)	19:09	34 08:25 (2)	17:00	16:10	16:05	
27	05:26	06:30 (3)	06:17	07:10 (1)	07:11	07:51 (2)	07:05	08:02	08:32	
	21:22	29 06:59 (3)	20:21	45 07:55 (1)	19:07	33 08:24 (2)	16:58	16:09	16:05	
28	05:27	06:29 (3)	06:19	07:10 (1)	07:13	07:50 (2)	07:07	08:03	08:32	
	21:21	30 06:59 (3)	20:19	44 07:54 (1)	19:04	33 08:23 (2)	16:56	16:08	16:06	
29	05:29	06:29 (3)	06:21	07:11 (1)	07:14	07:51 (2)	07:09	08:05	08:32	
	21:19	31 07:00 (3)	20:16	42 07:53 (1)	19:02	31 08:22 (2)	16:54	16:07	16:07	
30	05:30	06:28 (3)	06:23	07:12 (1)	07:16	07:51 (2)	07:11	08:06	08:32	
	21:18	32 07:00 (3)	20:14	40 07:52 (1)	18:59	30 08:21 (2)	16:52	16:06	16:08	
31	05:32	06:28 (3)	06:24	07:12 (1)			07:12		08:32	
	21:16	44 07:41 (1)	20:12	38 07:50 (1)			16:50		16:09	
Sonnenscheinstunden	508		458		382		330		262	237
astr.max.mögl.Beschattung	766		1794		623		105			
Red.Sonnenscheinwahrsch.	0.38		0.42		0.35		0.29			
Reduktion Betriebsdauer	0.96				0.96		0.96			
Reduktion Windrichtung	0.72		0.72		0.68		0.67			
Gesamte Reduktion	0.26		0.29		0.23		0.19			
Met.wahrsch.Beschattung	200		523		142		20			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
 Am Westersielzug 11
 DE-25840 Friedrichstadt
 -
 Dennis Kramer / dennis.kramer@i17-wind.de
 Berechnet:
 05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: FD - IO160

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:07	06:54	05:46	06:20 (3) 04:59
	16:10	17:00	17:55	19:51	20:45	79 07:55 (1) 21:34
2	08:32	08:02	07:05	06:52	05:44	06:19 (3) 04:58
	16:11	17:02	17:56	19:53	20:47	79 07:54 (1) 21:35
3	08:32	08:00	07:03	06:49	05:42	06:18 (3) 04:57
	16:13	17:04	17:58	19:55	20:49	79 07:53 (1) 21:36
4	08:32	07:58	07:01	06:47	05:40	06:17 (3) 04:56
	16:14	17:06	18:00	19:57	20:50	80 07:52 (1) 21:37
5	08:32	07:57	06:58	06:44	05:39	06:17 (3) 04:55
	16:15	17:08	18:02	19:59	20:52	79 07:51 (1) 21:38
6	08:31	07:55	06:56	06:42	05:37	06:16 (3) 04:55
	16:16	17:10	18:04	20:00	20:54	78 07:50 (1) 21:39
7	08:31	07:53	06:54	07:28 (2) 06:40	07:30 (1) 05:35	06:16 (3) 04:54
	16:18	17:12	18:06	7 07:35 (2) 20:02	11 07:41 (1) 20:56	78 07:50 (1) 21:40
8	08:30	07:51	06:51	07:24 (2) 06:37	07:25 (1) 05:33	06:16 (3) 04:53
	16:19	17:14	18:08	16 07:40 (2) 20:04	21 07:46 (1) 20:57	77 07:49 (1) 21:41
9	08:30	07:49	06:49	07:21 (2) 06:35	07:21 (1) 05:31	06:15 (3) 04:53
	16:20	17:16	18:10	21 07:42 (2) 20:06	27 07:48 (1) 20:59	75 07:48 (1) 21:42
10	08:29	07:47	06:47	07:18 (2) 06:33	07:19 (1) 05:29	06:16 (3) 04:52
	16:22	17:18	18:11	25 07:43 (2) 20:08	31 07:50 (1) 21:01	73 07:47 (1) 21:43
11	08:28	07:46	06:44	07:17 (2) 06:30	07:17 (1) 05:27	06:15 (3) 04:52
	16:23	17:20	18:13	28 07:45 (2) 20:09	35 07:52 (1) 21:02	71 07:45 (1) 21:43
12	08:28	07:44	06:42	07:15 (2) 06:28	07:15 (1) 05:26	06:15 (3) 04:51
	16:25	17:22	18:15	30 07:45 (2) 20:11	38 07:53 (1) 21:04	68 07:44 (1) 21:44
13	08:27	07:42	06:40	07:14 (2) 06:26	07:13 (1) 05:24	06:15 (3) 04:51
	16:26	17:24	18:17	32 07:46 (2) 20:13	41 07:54 (1) 21:06	66 07:43 (1) 21:45
14	08:26	07:40	06:37	07:14 (2) 06:23	07:12 (1) 05:22	06:15 (3) 04:51
	16:28	17:26	18:19	33 07:47 (2) 20:15	43 07:55 (1) 21:07	62 07:41 (1) 21:46
15	08:25	07:38	06:35	07:12 (2) 06:21	07:11 (1) 05:21	06:16 (3) 04:51
	16:30	17:28	18:21	35 07:47 (2) 20:17	45 07:56 (1) 21:09	57 07:39 (1) 21:46
16	08:24	07:36	06:32	07:12 (2) 06:19	07:10 (1) 05:19	06:15 (3) 04:51
	16:31	17:30	18:22	35 07:47 (2) 20:18	47 07:57 (1) 21:11	52 07:36 (1) 21:47
17	08:23	07:34	06:30	07:11 (2) 06:17	07:08 (1) 05:17	06:16 (3) 04:50
	16:33	17:32	18:24	36 07:47 (2) 20:20	48 07:56 (1) 21:12	46 07:34 (1) 21:47
18	08:22	07:31	06:28	07:11 (2) 06:14	07:07 (1) 05:16	06:17 (3) 04:50
	16:35	17:33	18:26	36 07:47 (2) 20:22	50 07:57 (1) 21:14	32 06:49 (3) 21:48
19	08:21	07:29	06:25	07:11 (2) 06:12	07:07 (1) 05:14	06:17 (3) 04:50
	16:36	17:35	18:28	36 07:47 (2) 20:24	50 07:57 (1) 21:15	31 06:48 (3) 21:48
20	08:20	07:27	06:23	07:11 (2) 06:10	07:06 (1) 05:13	06:18 (3) 04:51
	16:38	17:37	18:30	35 07:46 (2) 20:26	52 07:58 (1) 21:17	30 06:48 (3) 21:48
21	08:19	07:25	06:20	07:11 (2) 06:08	07:06 (1) 05:11	06:19 (3) 04:51
	16:40	17:39	18:32	34 07:45 (2) 20:27	52 07:58 (1) 21:19	29 06:48 (3) 21:49
22	08:18	07:23	06:18	07:11 (2) 06:05	07:05 (1) 05:10	06:19 (3) 04:51
	16:42	17:41	18:33	33 07:44 (2) 20:29	53 07:58 (1) 21:20	27 06:46 (3) 21:49
23	08:17	07:21	06:16	07:11 (2) 06:03	07:05 (1) 05:09	06:19 (3) 04:51
	16:43	17:43	18:35	32 07:43 (2) 20:31	53 07:58 (1) 21:22	27 06:46 (3) 21:49
24	08:15	07:19	06:13	07:11 (2) 06:01	07:05 (1) 05:07	06:20 (3) 04:51
	16:45	17:45	18:37	31 07:42 (2) 20:33	53 07:58 (1) 21:23	25 06:45 (3) 21:49
25	08:14	07:16	06:11	07:12 (2) 05:59	07:04 (1) 05:06	06:21 (3) 04:52
	16:47	17:47	18:39	29 07:41 (2) 20:34	53 07:57 (1) 21:24	24 06:45 (3) 21:49
26	08:13	07:14	06:08	07:14 (2) 05:57	07:03 (1) 05:05	06:23 (3) 04:52
	16:49	17:49	18:41	25 07:39 (2) 20:36	53 07:56 (1) 21:26	21 06:44 (3) 21:49
27	08:11	07:12	06:06	07:15 (2) 05:55	06:27 (3) 05:04	05:35 (10) 04:53
	16:50	17:51	18:42	21 07:36 (2) 20:38	67 07:56 (1) 21:27	24 06:43 (3) 21:49
28	08:10	07:10	06:04	07:17 (2) 05:53	06:25 (3) 05:03	05:33 (10) 04:53
	16:53	17:53	18:44	17 07:34 (2) 20:40	71 07:56 (1) 21:29	27 06:42 (3) 21:49
29	08:08	07:01	06:00	08:20 (2) 05:51	06:23 (3) 05:02	05:31 (10) 04:54
	16:55	19:46	9 08:29 (2)	20:42	74 07:55 (1) 21:30	29 06:41 (3) 21:49
30	08:07	06:59	06:00	05:48	06:22 (3) 05:00	05:30 (10) 04:54
	16:57	19:48	20:43	77 07:56 (1) 21:31	27 06:39 (3) 21:48	27 05:57 (10)
31	08:05	06:56	06:00	04:59	04:59	05:29 (10)
	16:58	19:50	21:32	23 06:36 (3)		
Sonnenscheinstunden	253	275	367	418	491	506
astr. max.mögl. Beschattung			636	1145	1575	765
Red. Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96
Reduktion Windrichtung			0.67	0.72	0.72	0.72
Gesamte Reduktion			0.18	0.26	0.30	0.27
Met. wahrsch. Beschattung			113	293	467	204

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: FD - IO160

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 721 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1 04:55	05:31 (10) 05:33	06:25 (3) 06:26	07:16 (1) 07:18	07:55 (2) 07:14	08:08	
21:48	26 05:57 (10) 21:14	70 07:55 (1) 20:09	35 07:51 (1) 18:57	31 08:26 (2) 16:48	16:05	
2 04:56	05:32 (10) 05:35	06:26 (3) 06:28	07:18 (1) 07:20	07:55 (2) 07:16	08:09	
21:48	25 05:57 (10) 21:12	71 07:56 (1) 20:07	31 07:49 (1) 18:55	28 08:23 (2) 16:46	16:05	
3 04:56	05:32 (10) 05:37	06:25 (3) 06:30	07:19 (1) 07:21	07:56 (2) 07:18	08:11	
21:47	26 05:58 (10) 21:11	75 07:57 (1) 20:05	27 07:46 (1) 18:52	26 08:22 (2) 16:44	16:04	
4 04:57	05:32 (10) 05:38	06:25 (3) 06:31	07:22 (1) 07:23	07:57 (2) 07:20	08:12	
21:47	25 05:57 (10) 21:09	76 07:58 (1) 20:02	21 07:43 (1) 18:50	23 08:20 (2) 16:42	16:03	
5 04:58	05:33 (10) 05:40	06:26 (3) 06:33	07:27 (1) 07:25	07:59 (2) 07:22	08:14	
21:46	24 05:57 (10) 21:07	78 08:00 (1) 20:00	11 07:38 (1) 18:48	19 08:18 (2) 16:41	16:03	
6 04:59	05:33 (10) 05:42	06:26 (3) 06:35	07:27	08:02 (2) 07:24	08:15	
21:46	24 05:57 (10) 21:05	78 08:00 (1) 19:57	18:45	13 08:15 (2) 16:39	16:02	
7 05:00	05:34 (10) 05:43	06:26 (3) 06:36	07:28	07:26	08:16	
21:45	23 05:57 (10) 21:03	79 08:01 (1) 19:55	18:43	16:37	16:02	
8 05:01	05:34 (10) 05:45	06:26 (3) 06:38	07:30	07:28	08:18	
21:44	23 05:57 (10) 21:01	80 08:01 (1) 19:53	18:40	16:35	16:01	
9 05:02	05:35 (10) 05:47	06:27 (3) 06:40	07:32	07:29	08:19	
21:44	22 05:57 (10) 20:59	80 08:02 (1) 19:50	18:38	16:33	16:01	
10 05:03	05:36 (10) 05:48	06:27 (3) 06:42	07:34	07:31	08:20	
21:43	20 05:56 (10) 20:57	79 08:02 (1) 19:48	18:36	16:32	16:01	
11 05:04	05:36 (10) 05:50	06:28 (3) 06:43	07:36	07:33	08:21	
21:42	20 05:56 (10) 20:55	79 08:03 (1) 19:45	18:33	16:30	16:01	
12 05:05	05:37 (10) 05:52	06:29 (3) 06:45	07:37	07:35	08:22	
21:41	18 05:55 (10) 20:53	78 08:04 (1) 19:43	18:31	16:28	16:00	
13 05:06	05:38 (10) 05:53	06:30 (3) 06:47	07:39	07:37	08:23	
21:40	25 06:46 (3) 20:51	75 08:03 (1) 19:41	18:29	16:27	16:00	
14 05:07	05:39 (10) 05:55	06:31 (3) 06:48	08:12 (2) 07:41	07:39	08:24	
21:39	27 06:48 (3) 20:49	74 08:04 (1) 19:38	6 08:18 (2) 18:27	16:25	16:00	
15 05:09	05:40 (10) 05:57	06:33 (3) 06:50	08:07 (2) 07:43	07:41	08:25	
21:38	28 06:50 (3) 20:47	69 08:03 (1) 19:36	16 08:23 (2) 18:24	16:24	16:00	
16 05:10	05:42 (10) 05:59	06:36 (3) 06:52	08:05 (2) 07:45	07:42	08:26	
21:37	26 06:51 (3) 20:45	64 08:04 (1) 19:33	20 08:25 (2) 18:22	16:22	16:00	
17 05:11	06:33 (3) 06:00	07:11 (1) 06:54	08:03 (2) 07:46	07:44	08:27	
21:36	20 06:53 (3) 20:43	53 08:04 (1) 19:31	24 08:27 (2) 18:20	16:21	16:01	
18 05:13	06:31 (3) 06:02	07:10 (1) 06:55	08:00 (2) 07:48	07:46	08:28	
21:35	23 06:54 (3) 20:41	53 08:03 (1) 19:29	28 08:28 (2) 18:18	16:19	16:01	
19 05:14	06:30 (3) 06:04	07:10 (1) 06:57	07:59 (2) 07:50	07:48	08:28	
21:34	25 06:55 (3) 20:39	53 08:03 (1) 19:26	30 08:29 (2) 18:15	16:18	16:01	
20 05:15	06:29 (3) 06:05	07:10 (1) 06:59	07:58 (2) 07:52	07:50	08:29	
21:32	26 06:55 (3) 20:36	53 08:03 (1) 19:24	32 08:30 (2) 18:13	16:17	16:01	
21 05:17	06:30 (3) 06:07	07:10 (1) 07:00	07:56 (2) 07:54	07:51	08:30	
21:31	27 06:57 (3) 20:34	52 08:02 (1) 19:21	33 08:29 (2) 18:11	16:15	16:02	
22 05:18	06:29 (3) 06:09	07:10 (1) 07:02	07:56 (2) 07:56	07:53	08:30	
21:30	28 06:57 (3) 20:32	52 08:02 (1) 19:19	34 08:30 (2) 18:09	16:14	16:02	
23 05:20	06:28 (3) 06:11	07:10 (1) 07:04	07:55 (2) 07:57	07:55	08:31	
21:28	29 06:57 (3) 20:30	51 08:01 (1) 19:16	35 08:30 (2) 18:07	16:13	16:03	
24 05:21	06:28 (3) 06:12	07:10 (1) 07:06	07:54 (2) 07:59	07:57	08:31	
21:27	31 06:59 (3) 20:28	51 08:01 (1) 19:14	35 08:29 (2) 18:04	16:12	16:03	
25 05:23	06:27 (3) 06:14	07:11 (1) 07:07	07:54 (2) 07:01	07:58	08:31	
21:25	32 06:59 (3) 20:25	50 08:01 (1) 19:12	35 08:29 (2) 17:02	16:11	16:04	
26 05:24	06:27 (3) 06:16	07:11 (1) 07:09	07:54 (2) 07:03	08:00	08:32	
21:24	41 07:42 (1) 20:23	48 07:59 (1) 19:09	35 08:29 (2) 17:00	16:10	16:05	
27 05:26	06:27 (3) 06:17	07:12 (1) 07:11	07:54 (2) 07:05	08:02	08:32	
21:22	49 07:46 (1) 20:21	46 07:58 (1) 19:07	35 08:29 (2) 16:58	16:09	16:05	
28 05:27	06:26 (3) 06:19	07:12 (1) 07:13	07:53 (2) 07:07	08:03	08:32	
21:21	55 07:48 (1) 20:19	45 07:57 (1) 19:04	35 08:28 (2) 16:56	16:08	16:06	
29 05:29	06:26 (3) 06:21	07:13 (1) 07:14	07:53 (2) 07:09	08:05	08:32	
21:19	59 07:50 (1) 20:16	43 07:56 (1) 19:02	34 08:27 (2) 16:54	16:07	16:07	
30 05:30	06:25 (3) 06:23	07:14 (1) 07:16	07:54 (2) 07:11	08:06	08:32	
21:18	64 07:52 (1) 20:14	41 07:55 (1) 18:59	32 08:26 (2) 16:52	16:06	16:08	
31 05:32	06:26 (3) 06:24	07:14 (1) 07:16	07:12	08:32	08:32	
21:16	66 07:54 (1) 20:12	38 07:52 (1) 18:50	16:50	16:09	16:09	
Sonnenscheinstunden	508	458	382	330	262	237
astr. max.mögl. Beschattung	957	1934	624	140		
Red. Sonnenscheinwahrsch.	0.38	0.42	0.35	0.29		
Reduktion Betriebsdauer	0.96	0.96	0.96	0.96		
Reduktion Windrichtung	0.72	0.72	0.68	0.67		
Gesamte Reduktion	0.26	0.29	0.23	0.19		
Met. wahrsch. Beschattung	250	564	141	26		

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	-------------------	----------------	--------------	---------------------------	----------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: FE - IO161

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:32	08:03	07:07	06:54	07:38 (1)	05:46	06:28 (3) 04:59
	16:10	17:00	17:55	19:51	25 08:03 (1)	20:45	63 07:57 (1) 21:34
2	08:32	08:02	07:05	06:52	07:36 (1)	05:44	06:27 (3) 04:58
	16:11	17:02	17:56	19:53	29 08:05 (1)	20:47	60 07:55 (1) 21:35
3	08:32	08:00	07:03	06:49	07:33 (1)	05:42	06:27 (3) 04:57
	16:13	17:04	17:58	9 07:45 (2)	19:55	34 08:07 (1)	20:49 55 07:52 (1) 21:36
4	08:32	07:58	07:01	06:47	07:32 (2)	06:47	06:27 (3) 04:56
	16:14	17:06	18:00	17 07:49 (2)	19:57	37 08:08 (1)	20:50 48 07:48 (1) 21:37
5	08:32	07:57	06:58	06:44	07:29 (2)	06:44	06:26 (3) 04:55
	16:15	17:08	18:02	21 07:50 (2)	19:59	40 08:10 (1)	20:52 35 07:01 (3) 21:38
6	08:31	07:55	06:56	06:42	07:28 (2)	06:42	06:26 (3) 04:55
	16:16	17:10	18:04	24 07:52 (2)	20:00	42 08:10 (1)	20:54 35 07:01 (3) 21:39
7	08:31	07:53	06:54	06:40	07:27 (1)	06:35	06:27 (3) 04:54
	16:18	17:12	18:06	28 07:53 (2)	20:02	44 08:11 (1)	20:56 34 07:01 (3) 21:40
8	08:30	07:51	06:51	06:37	07:24 (2)	06:37	06:27 (3) 04:53
	16:19	17:14	18:08	30 07:54 (2)	20:04	46 08:12 (1)	20:57 33 07:00 (3) 21:41
9	08:30	07:49	06:49	06:35	07:24 (2)	06:35	06:27 (3) 04:53
	16:20	17:16	18:10	31 07:55 (2)	20:06	47 08:11 (1)	20:59 32 06:59 (3) 21:42
10	08:29	07:47	06:47	06:33	07:22 (2)	06:33	06:28 (3) 04:52
	16:22	17:18	18:11	33 07:55 (2)	20:08	48 08:12 (1)	21:01 32 07:00 (3) 21:43
11	08:28	07:46	06:44	06:30	07:22 (2)	06:30	06:28 (3) 04:52
	16:23	17:20	18:13	33 07:55 (2)	20:09	49 08:12 (1)	21:02 30 06:58 (3) 21:43
12	08:28	07:44	06:42	06:28	07:21 (2)	06:28	06:29 (3) 04:51
	16:25	17:22	18:15	34 07:55 (2)	20:11	50 08:13 (1)	21:04 28 06:57 (3) 21:44
13	08:27	07:42	06:40	06:26	07:21 (2)	06:26	06:30 (3) 04:51
	16:26	17:24	18:17	34 07:55 (2)	20:13	50 08:12 (1)	21:06 27 06:57 (3) 21:45
14	08:26	07:40	06:37	06:23	07:21 (2)	06:23	06:30 (3) 04:51
	16:28	17:26	18:19	34 07:55 (2)	20:15	51 08:12 (1)	21:07 26 06:56 (3) 21:46
15	08:25	07:38	06:35	06:21	07:20 (2)	06:21	06:32 (3) 04:51
	16:30	17:28	18:21	34 07:54 (2)	20:17	51 08:12 (1)	21:09 23 06:55 (3) 21:46
16	08:24	07:36	06:32	06:19	07:21 (2)	06:19	06:33 (3) 04:51
	16:31	17:30	18:22	33 07:54 (2)	20:18	51 08:12 (1)	21:11 20 06:53 (3) 21:47
17	08:23	07:34	06:30	06:17	07:20 (1)	06:17	06:34 (3) 04:50
	16:33	17:32	18:24	33 07:53 (2)	20:20	51 08:11 (1)	21:12 18 06:52 (3) 21:47
18	08:22	07:31	06:28	06:14	07:20 (1)	06:14	06:37 (3) 04:50
	16:35	17:33	18:26	31 07:52 (2)	20:22	50 08:10 (1)	21:14 14 06:51 (3) 21:48
19	08:21	07:29	06:25	06:12	07:20 (1)	06:12	06:39 (3) 04:50
	16:36	17:35	18:28	29 07:51 (2)	20:24	50 08:10 (1)	21:15 9 06:48 (3) 21:48
20	08:20	07:27	06:23	06:10	07:21 (1)	06:13	05:42 (10) 04:51
	16:38	17:37	18:30	27 07:49 (2)	20:26	49 08:10 (1)	21:17 10 05:52 (10) 21:48
21	08:19	07:25	06:20	06:08	06:40 (3)	05:11	05:40 (10) 04:51
	16:40	17:39	18:32	25 07:48 (2)	20:27	61 08:09 (1)	21:19 14 05:54 (10) 21:49
22	08:18	07:23	06:18	06:05	06:37 (3)	05:10	05:38 (10) 04:51
	16:42	17:41	18:33	22 07:46 (2)	20:29	66 08:08 (1)	21:20 17 05:55 (10) 21:49
23	08:17	07:21	06:16	06:03	06:35 (3)	05:09	05:37 (10) 04:51
	16:43	17:43	18:35	17 07:43 (2)	20:31	69 08:08 (1)	21:22 19 05:56 (10) 21:49
24	08:15	07:19	06:13	06:01	06:34 (3)	05:07	05:37 (10) 04:51
	16:45	17:45	18:37	10 07:39 (2)	20:33	70 08:07 (1)	21:23 20 05:57 (10) 21:49
25	08:14	07:16	06:11	05:59	06:31 (3)	05:06	05:36 (10) 04:52
	16:47	17:47	18:39	20:34	71 08:05 (1)	21:24 22 05:58 (10) 21:49	
26	08:13	07:14	06:08	05:57	06:30 (3)	05:05	05:36 (10) 04:52
	16:49	17:49	18:41	20:36	72 08:04 (1)	21:26 23 05:59 (10) 21:49	
27	08:11	07:12	06:06	05:55	06:29 (3)	05:04	05:35 (10) 04:53
	16:50	17:51	18:42	20:38	71 08:03 (1)	21:27 24 05:59 (10) 21:49	
28	08:10	07:10	06:04	05:53	06:28 (3)	05:03	05:35 (10) 04:53
	16:53	17:53	18:44	20:40	70 08:01 (1)	21:29 25 06:00 (10) 21:49	
29	08:08	07:01	06:00	05:51	06:28 (3)	05:02	05:35 (10) 04:54
	16:55	17:55	18:46	20:42	68 08:00 (1)	21:30 25 06:00 (10) 21:49	
30	08:07	06:59	06:00	05:48	06:28 (3)	05:00	05:34 (10) 04:54
	16:57	17:57	18:48	3 07:53 (1)	20:43	66 07:59 (1)	21:31 27 06:01 (10) 21:48
31	08:05	06:56	06:00	05:43 (1)	20:43	66 07:59 (1)	21:31 27 06:01 (10) 21:48
	16:58	17:58	18:49	17 08:00 (1)	20:43	66 07:59 (1)	21:31 27 06:01 (10) 21:48
Sonnenscheinstunden	253	275	367	418	491	506	
astr.max.mögl.Beschattung			609	1578	875	1063	
Red.Sonnenscheinwahrsch.			0.28	0.37	0.43	0.39	
Reduktion Betriebsdauer			0.96	0.96	0.96	0.96	
Reduktion Windrichtung			0.66	0.71	0.72	0.72	
Gesamte Reduktion			0.17	0.25	0.30	0.27	
Met.wahrsch.Beschattung			106	401	259	284	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: FE - IO161

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	05:39 (10)	05:33	06:39 (3)	06:26	07:22 (1)	07:18	08:01 (2)	07:14	08:08		
	21:48	36 06:15 (4)	21:14	29 07:08 (3)	20:09	49 08:11 (1)	18:57	34 08:35 (2)	16:48	16:05		
2	04:56	05:40 (10)	05:35	06:39 (3)	06:28	07:23 (1)	07:20	08:00 (2)	07:16	08:09		
	21:48	34 06:14 (4)	21:12	30 07:09 (3)	20:07	48 08:11 (1)	18:55	33 08:33 (2)	16:46	16:05		
3	04:56	05:40 (10)	05:37	06:38 (3)	06:30	07:22 (1)	07:21	08:00 (2)	07:18	08:11		
	21:47	33 06:13 (4)	21:11	31 07:09 (3)	20:05	47 08:09 (1)	18:52	33 08:33 (2)	16:44	16:04		
4	04:57	05:40 (10)	05:38	06:37 (3)	06:31	07:23 (1)	07:23	08:00 (2)	07:20	08:12		
	21:47	29 06:09 (4)	21:09	33 07:10 (3)	20:02	46 08:09 (1)	18:50	32 08:32 (2)	16:42	16:03		
5	04:58	05:40 (10)	05:40	06:38 (3)	06:33	07:24 (1)	07:25	08:01 (2)	07:22	08:14		
	21:46	29 06:09 (10)	21:07	33 07:11 (3)	20:00	44 08:08 (1)	18:48	30 08:31 (2)	16:41	16:03		
6	04:59	05:41 (10)	05:42	06:37 (3)	06:35	07:24 (1)	07:27	08:02 (2)	07:24	08:15		
	21:46	28 06:09 (10)	21:05	34 07:11 (3)	19:57	42 08:06 (1)	18:45	28 08:30 (2)	16:39	16:02		
7	05:00	05:41 (10)	05:43	06:37 (3)	06:36	07:25 (1)	07:28	08:03 (2)	07:26	08:16		
	21:45	28 06:09 (10)	21:03	34 07:11 (3)	19:55	40 08:05 (1)	18:43	26 08:29 (2)	16:37	16:02		
8	05:01	05:41 (10)	05:45	06:36 (3)	06:38	07:26 (1)	07:30	08:03 (2)	07:28	08:18		
	21:44	28 06:09 (10)	21:01	35 07:11 (3)	19:53	37 08:03 (1)	18:40	23 08:26 (2)	16:35	16:01		
9	05:02	05:42 (10)	05:47	06:36 (3)	06:40	07:27 (1)	07:32	08:05 (2)	07:29	08:19		
	21:44	28 06:10 (10)	20:59	50 07:59 (1)	19:50	34 08:01 (1)	18:38	19 08:24 (2)	16:33	16:01		
10	05:03	05:42 (10)	05:48	06:35 (3)	06:42	07:29 (1)	07:34	08:08 (2)	07:31	08:20		
	21:43	28 06:10 (10)	20:57	56 08:01 (1)	19:48	30 07:59 (1)	18:36	13 08:21 (2)	16:32	16:01		
11	05:04	05:42 (10)	05:50	06:36 (3)	06:43	07:30 (1)	07:36	08:01 (2)	07:33	08:21		
	21:42	28 06:10 (10)	20:55	60 08:04 (1)	19:45	26 07:56 (1)	18:33	16 16:30	16:01			
12	05:05	05:42 (10)	05:52	06:36 (3)	06:45	07:33 (1)	07:37	08:02 (2)	07:35	08:22		
	21:41	27 06:09 (10)	20:53	65 08:06 (1)	19:43	19 07:52 (1)	18:31	16 16:28	16:00			
13	05:06	05:43 (10)	05:53	06:36 (3)	06:47	07:39 (1)	07:39	08:03 (2)	07:37	08:23		
	21:40	26 06:09 (10)	20:51	67 08:07 (1)	19:41	7 07:46 (1)	18:29	16 16:27	16:00			
14	05:07	05:43 (10)	05:55	06:36 (3)	06:48	07:41	18:29	16 16:27	16:00			
	21:39	26 06:09 (10)	20:49	69 08:09 (1)	19:38	18 18:27	16:25	16 16:00	16:00			
15	05:09	05:43 (10)	05:57	06:36 (3)	06:50	07:43	18:25	16 16:00	16:00			
	21:38	26 06:09 (10)	20:47	70 08:09 (1)	19:36	18 18:24	16:24	16 16:00	16:00			
16	05:10	05:44 (10)	05:59	06:37 (3)	06:52	07:45	18:22	16 16:00	16:00			
	21:37	24 06:08 (10)	20:45	71 08:10 (1)	19:33	18 18:22	16:22	16 16:00	16:00			
17	05:11	05:45 (10)	06:00	06:38 (3)	06:54	07:46	18:20	16 16:00	16:00			
	21:36	24 06:09 (10)	20:43	71 08:12 (1)	19:31	18 18:20	16:21	16 16:00	16:00			
18	05:13	05:45 (10)	06:02	06:38 (3)	06:55	07:48	18:18	16 16:00	16:00			
	21:35	23 06:08 (10)	20:41	71 08:12 (1)	19:29	18 18:18	16:19	16 16:00	16:00			
19	05:14	05:46 (10)	06:04	06:39 (3)	06:57	08:18 (2)	07:50	16 16:00	16:00			
	21:34	21 06:07 (10)	20:39	70 08:13 (1)	19:26	6 08:24 (2)	18:15	16 16:00	16:00			
20	05:15	05:46 (10)	06:05	06:40 (3)	06:59	08:14 (2)	07:52	16 16:00	16:00			
	21:32	20 06:06 (10)	20:36	68 08:12 (1)	19:24	15 08:29 (2)	18:13	16 16:00	16:00			
21	05:17	05:48 (10)	06:07	06:42 (3)	07:00	08:10 (2)	07:54	16 16:00	16:00			
	21:31	18 06:06 (10)	20:34	65 08:13 (1)	19:21	21 08:31 (2)	18:11	16 16:00	16:00			
22	05:18	05:49 (10)	06:09	06:45 (3)	07:02	08:08 (2)	07:56	16 16:00	16:00			
	21:30	15 06:04 (10)	20:32	61 08:14 (1)	19:19	24 08:32 (2)	18:09	16 16:00	16:00			
23	05:20	05:50 (10)	06:11	07:24 (1)	07:04	08:07 (2)	07:57	16 16:00	16:00			
	21:28	13 06:03 (10)	20:30	49 08:13 (1)	19:16	27 08:34 (2)	18:07	16 16:00	16:00			
24	05:21	05:53 (10)	06:12	07:24 (1)	07:06	08:05 (2)	07:59	16 16:00	16:00			
	21:27	12 06:56 (3)	20:28	50 08:14 (1)	19:14	29 08:34 (2)	18:04	16 16:00	16:00			
25	05:23	06:48 (3)	06:14	07:24 (1)	07:07	08:04 (2)	07:01	16 16:00	16:00			
	21:25	11 06:59 (3)	20:25	50 08:14 (1)	19:12	31 08:35 (2)	17:02	16 16:00	16:00			
26	05:24	06:46 (3)	06:16	07:23 (1)	07:09	08:03 (2)	07:03	16 16:00	16:00			
	21:24	16 07:02 (3)	20:23	51 08:14 (1)	19:09	32 08:35 (2)	17:00	16 16:00	16:00			
27	05:26	06:44 (3)	06:17	07:23 (1)	07:11	08:02 (2)	07:05	16 16:00	16:00			
	21:22	19 07:03 (3)	20:21	51 08:14 (1)	19:07	34 08:36 (2)	16:58	16 16:00	16:00			
28	05:27	06:42 (3)	06:19	07:22 (1)	07:13	08:01 (2)	07:07	16 16:00	16:00			
	21:21	22 07:04 (3)	20:19	51 08:13 (1)	19:04	34 08:35 (2)	16:56	16 16:00	16:00			
29	05:29	06:42 (3)	06:21	07:22 (1)	07:14	08:01 (2)	07:09	16 16:00	16:00			
	21:19	24 07:06 (3)	20:16	51 08:13 (1)	19:02	34 08:35 (2)	16:54	16 16:00	16:00			
30	05:30	06:40 (3)	06:23	07:23 (1)	07:16	08:01 (2)	07:11	16 16:00	16:00			
	21:18	26 07:06 (3)	20:14	50 08:13 (1)	18:59	34 08:35 (2)	16:52	16 16:00	16:00			
31	05:32	06:40 (3)	06:24	07:22 (1)	07:17	07:12	16:50	16 16:00	16:00			
	21:16	28 07:08 (3)	20:12	50 08:12 (1)	18:50	16 16:00	16:50	16 16:00	16:00			
Sonnenscheinstunden		508	458	382	330	262	237					
astr.max.mögl.Beschattung		750	1626	790	271							
Red.Sonnenscheinwahrsch.		0.38	0.42	0.35	0.29							
Reduktion Betriebsdauer		0.96	0.96	0.96	0.96							
Reduktion Windrichtung		0.72	0.71	0.69	0.66							
Gesamte Reduktion		0.26	0.29	0.23	0.18							
Met.wahrsch.Beschattung		196	471	181	49							

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)		Zeitpunkt (SS:MM)	Schattenende	

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: FF - IO162

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:33	09:06 (3) 08:04	08:31 (10) 07:08	07:51 (7) 06:54	05:46	04:58
	16:10	40 10:00 (4) 17:00	42 09:31 (6) 17:55	82 09:38 (5) 19:51	20:45	21:34
2	08:32	09:05 (3) 08:02	08:29 (10) 07:05	07:50 (7) 06:52	05:44	04:58
	16:11	41 09:59 (4) 17:02	45 09:31 (6) 17:56	82 09:37 (5) 19:53	20:47	21:35
3	08:32	09:05 (3) 08:00	08:27 (10) 07:03	07:50 (7) 06:49	05:42	04:57
	16:13	44 10:00 (4) 17:04	50 09:32 (6) 17:58	82 09:37 (5) 19:55	20:49	21:36
4	08:32	09:05 (3) 07:58	08:25 (10) 07:01	07:51 (7) 06:47	05:40	04:56
	16:14	43 10:00 (4) 17:06	53 09:32 (6) 18:00	80 09:37 (5) 19:57	20:51	21:37
5	08:32	09:04 (3) 07:57	08:23 (10) 06:58	07:50 (7) 06:45	05:38	04:55
	16:15	44 10:00 (4) 17:08	56 09:32 (6) 18:02	79 09:36 (5) 19:59	20:52	21:38
6	08:31	09:03 (3) 07:55	08:23 (10) 06:56	07:51 (7) 06:42	05:37	04:54
	16:16	44 09:59 (4) 17:10	57 09:32 (6) 18:04	75 09:35 (5) 20:00	20:54	21:39
7	08:31	09:03 (3) 07:53	08:23 (10) 06:54	07:51 (7) 06:40	05:35	04:54
	16:18	44 09:59 (4) 17:12	58 09:32 (6) 18:06	74 09:34 (5) 20:02	20:56	21:40
8	08:30	09:02 (3) 07:51	08:25 (10) 06:51	07:53 (7) 06:37	05:33	04:53
	16:19	44 09:58 (4) 17:14	58 09:33 (6) 18:08	68 09:33 (5) 20:04	20:57	21:41
9	08:30	09:01 (3) 07:49	08:25 (10) 06:49	07:55 (7) 06:35	05:31	04:53
	16:20	43 09:57 (4) 17:16	58 09:33 (6) 18:10	63 09:33 (5) 20:06	20:59	21:42
10	08:29	09:01 (3) 07:48	08:25 (10) 06:47	07:58 (7) 06:33	05:29	04:52
	16:22	40 09:56 (4) 17:18	56 09:32 (6) 18:11	55 09:31 (5) 20:08	21:01	21:43
11	08:29	09:00 (3) 07:46	08:25 (10) 06:44	08:44 (5) 06:30	05:27	04:52
	16:23	37 09:37 (8) 17:20	55 09:31 (6) 18:13	46 09:30 (5) 20:09	21:03	21:44
12	08:28	09:00 (3) 07:44	08:26 (9) 06:42	08:45 (5) 06:28	05:26	04:51
	16:25	37 09:37 (8) 17:22	53 09:31 (6) 18:15	43 09:28 (5) 20:11	21:04	21:44
13	08:27	09:01 (3) 07:42	08:27 (9) 06:40	08:46 (5) 06:26	05:24	04:51
	16:26	37 09:38 (8) 17:24	51 09:30 (6) 18:17	40 09:26 (5) 20:13	21:06	21:45
14	08:26	09:01 (3) 07:40	08:27 (9) 06:37	08:48 (5) 06:23	05:22	04:51
	16:28	38 09:39 (8) 17:26	51 09:29 (6) 18:19	37 09:25 (5) 20:15	21:08	21:46
15	08:25	09:01 (3) 07:38	08:28 (9) 06:35	08:48 (5) 06:21	05:21	04:51
	16:30	38 09:39 (8) 17:28	52 09:28 (5) 18:21	34 09:22 (5) 20:17	21:09	21:46
16	08:24	09:02 (3) 07:36	08:29 (9) 06:32	08:51 (5) 06:19	05:19	04:50
	16:31	38 09:40 (8) 17:30	52 09:30 (5) 18:23	28 09:19 (5) 20:18	21:11	21:47
17	08:24	09:03 (3) 07:34	08:31 (9) 06:30	08:53 (5) 06:17	05:17	04:50
	16:33	38 09:41 (8) 17:32	52 09:31 (5) 18:24	22 09:15 (5) 20:20	21:12	21:47
18	08:22	09:03 (3) 07:32	08:34 (9) 06:28	08:57 (5) 06:14	05:16	04:50
	16:35	37 09:40 (8) 17:33	49 09:33 (5) 18:26	14 09:11 (5) 20:22	21:14	21:48
19	08:21	09:03 (3) 07:29	08:49 (5) 06:25	06:12	05:14	04:50
	16:36	38 09:41 (8) 17:35	44 09:33 (5) 18:28	20:24	21:16	21:48
20	08:20	09:05 (3) 07:27	08:48 (5) 06:23	06:10	05:13	04:50
	16:38	37 09:42 (8) 17:37	46 09:34 (5) 18:30	20:26	21:17	21:48
21	08:19	09:05 (3) 07:25	08:02 (7) 06:20	06:08	05:11	04:51
	16:40	36 09:41 (8) 17:39	53 09:35 (5) 18:32	20:27	21:19	21:49
22	08:18	09:06 (3) 07:23	07:58 (7) 06:18	06:05	05:10	04:51
	16:42	36 09:42 (8) 17:41	63 09:36 (5) 18:33	20:29	21:20	21:49
23	08:17	09:07 (3) 07:21	07:56 (7) 06:16	06:03	05:09	04:51
	16:43	34 09:41 (8) 17:43	68 09:36 (5) 18:35	20:31	21:22	21:49
24	08:15	09:06 (6) 07:19	07:54 (7) 06:13	06:01	05:07	04:51
	16:45	35 09:41 (8) 17:45	73 09:37 (5) 18:37	20:33	21:23	21:49
25	08:14	09:04 (6) 07:16	07:53 (7) 06:11	05:59	05:06	04:52
	16:47	37 09:41 (8) 17:47	75 09:37 (5) 18:39	20:35	21:25	21:49
26	08:13	09:03 (6) 07:14	07:53 (7) 06:08	05:57	05:05	04:52
	16:49	38 09:41 (8) 17:49	78 09:38 (5) 18:41	20:36	21:26	21:49
27	08:11	09:02 (6) 07:12	07:51 (7) 06:06	05:55	05:04	04:52
	16:51	38 09:40 (8) 17:51	80 09:37 (5) 18:42	20:38	21:27	21:49
28	08:10	09:01 (6) 07:10	07:51 (7) 06:04	05:53	05:03	04:53
	16:53	39 09:40 (8) 17:53	80 09:37 (5) 18:44	20:40	21:29	21:49
29	08:08	09:00 (6)	07:01	05:51	05:01	04:54
	16:55	38 09:38 (8)	19:46	20:42	21:30	21:49
30	08:07	08:34 (10)	06:59	05:48	05:00	04:54
	16:56	39 09:36 (8)	19:48	20:43	21:31	21:49
31	08:05	08:33 (10)	06:56		04:59	
	16:58	40 09:33 (8)	19:50		21:32	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	1212	1608	1004			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.28			
Reduktion Betriebsdauer	0.96	0.96	0.96			
Reduktion Windrichtung	0.56	0.60	0.61			
Gesamte Reduktion	0.09	0.14	0.16			
Met.wahrsch.Beschattung	109	219	161			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender

Berechnung: GBSchattenrezeptor: FF - IO162
Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember	
1	04:55	05:33	06:26	07:18	09:25 (5) 07:14	07:54 (10) 08:08	
	21:48	21:14	20:09	18:57	42 10:07 (5) 16:48	57 09:01 (6) 16:05	
2	04:56	05:35	06:28	07:20	09:24 (5) 07:16	07:54 (10) 08:09	
	21:48	21:12	20:07	18:55	44 10:08 (5) 16:46	57 09:02 (6) 16:04	
3	04:56	05:37	06:30	07:21	09:22 (5) 07:18	07:53 (10) 08:11	
	21:47	21:11	20:05	18:52	46 10:08 (5) 16:44	58 09:02 (6) 16:04	
4	04:57	05:38	06:31	07:23	08:34 (7) 07:20	07:53 (10) 08:12	
	21:47	21:09	20:02	18:50	59 10:09 (5) 16:42	58 09:02 (6) 16:03	
5	04:58	05:40	06:33	07:25	08:31 (7) 07:22	07:54 (10) 08:14	
	21:46	21:07	20:00	18:48	66 10:10 (5) 16:41	57 09:03 (6) 16:03	
6	04:59	05:42	06:35	07:27	08:29 (7) 07:24	07:54 (10) 08:15	
	21:46	21:05	19:58	18:45	72 10:11 (5) 16:39	56 09:03 (6) 16:02	
7	05:00	05:43	06:36	07:28	08:28 (7) 07:26	07:56 (10) 08:16	
	21:45	21:03	19:55	18:43	74 10:11 (5) 16:37	53 09:03 (6) 16:02	
8	05:01	05:45	06:38	07:30	08:26 (7) 07:28	07:58 (10) 08:18	
	21:45	21:01	19:53	18:40	77 10:10 (5) 16:35	49 09:02 (6) 16:01	
9	05:02	05:47	06:40	07:32	08:25 (7) 07:30	08:00 (10) 08:19	
	21:44	20:59	19:50	18:38	79 10:11 (5) 16:33	45 09:02 (6) 16:01	
10	05:03	05:48	06:42	07:34	08:25 (7) 07:31	08:02 (10) 08:20	
	21:43	20:57	19:48	18:36	80 10:11 (5) 16:32	42 09:02 (6) 16:01	
11	05:04	05:50	06:43	07:36	08:24 (7) 07:33	08:04 (10) 08:21	
	21:42	20:55	19:46	18:33	82 10:11 (5) 16:30	41 09:05 (8) 16:00	
12	05:05	05:52	06:45	07:37	08:24 (7) 07:35	08:06 (10) 08:22	
	21:41	20:53	19:43	18:31	82 10:11 (5) 16:28	40 09:08 (8) 16:00	
13	05:06	05:53	06:47	07:39	08:24 (7) 07:37	08:32 (6) 08:23	
	21:40	20:51	19:41	18:29	82 10:11 (5) 16:27	38 09:10 (8) 16:00	
14	05:07	05:55	06:48	07:41	08:24 (7) 07:39	08:33 (6) 08:24	
	21:39	20:49	19:38	18:27	81 10:11 (5) 16:25	39 09:12 (8) 16:00	
15	05:09	05:57	06:50	07:43	08:24 (7) 07:41	08:35 (6) 08:25	
	21:38	20:47	19:36	18:24	80 10:10 (5) 16:24	38 09:13 (8) 16:00	
16	05:10	05:59	06:52	07:45	08:24 (7) 07:43	08:36 (6) 08:26	
	21:37	20:45	19:33	18:22	77 10:09 (5) 16:22	38 09:14 (8) 16:00	
17	05:11	06:00	06:54	07:46	08:25 (7) 07:44	08:38 (6) 08:27	
	21:36	20:43	19:31	18:20	74 10:08 (5) 16:21	37 09:15 (8) 16:00	
18	05:12	06:02	06:55	07:48	08:26 (7) 07:46	08:40 (6) 08:28	
	21:35	20:41	19:29	18:18	71 10:08 (5) 16:19	35 09:15 (8) 16:01	
19	05:14	06:04	06:57	07:50	08:27 (7) 07:48	08:42 (3) 08:28	
	21:34	20:39	19:26	18:15	67 10:07 (5) 16:18	34 09:16 (8) 16:01	
20	05:15	06:05	06:59	07:52	08:30 (7) 07:50	08:41 (3) 08:29	
	21:32	20:37	19:24	18:13	60 10:06 (5) 16:17	36 09:17 (8) 16:01	
21	05:17	06:07	07:00	07:54	09:18 (5) 07:52	08:41 (3) 08:30	
	21:31	20:34	19:21	18:11	47 10:05 (5) 16:15	36 09:17 (8) 16:02	
22	05:18	06:09	07:02	07:56	09:19 (5) 07:53	08:41 (3) 08:30	
	21:30	20:32	19:19	18:09	45 10:04 (5) 16:14	37 09:18 (8) 16:02	
23	05:20	06:11	07:04	07:58	09:20 (5) 07:55	08:41 (3) 08:31	
	21:28	20:30	19:16	18:07	43 10:03 (5) 16:13	37 09:18 (8) 16:03	
24	05:21	06:12	07:06	07:59	09:03 (9) 07:57	08:41 (3) 08:31	
	21:27	20:28	19:14	18:04	49 10:02 (5) 16:12	37 09:18 (8) 16:03	
25	05:22	06:14	07:07	07:01	08:00 (9) 07:58	08:40 (3) 08:32	
	21:26	20:25	19:12	9 09:42 (5) 17:02	52 09:00 (5) 16:11	38 09:18 (8) 16:04	
26	05:24	06:16	07:09	09:37 (5) 07:03	07:59 (9) 08:00	08:40 (3) 08:32	
	21:24	20:23	19:09	20 09:57 (5) 17:00	51 08:59 (5) 16:10	38 09:18 (8) 16:05	
27	05:26	06:17	07:11	09:33 (5) 07:05	07:57 (9) 08:02	08:41 (3) 08:32	
	21:22	20:21	19:07	27 10:00 (5) 16:58	52 08:58 (6) 16:09	38 09:19 (8) 16:05	
28	05:27	06:19	07:13	09:30 (5) 07:07	07:57 (9) 08:03	08:41 (3) 08:32	
	21:21	20:19	19:04	32 10:02 (5) 16:56	51 08:59 (6) 16:08	38 09:19 (8) 16:06	
29	05:29	06:21	07:14	09:28 (5) 07:09	07:56 (9) 08:05	08:41 (3) 08:32	
	21:19	20:16	19:02	36 10:04 (5) 16:54	51 09:00 (6) 16:07	37 09:18 (8) 16:07	
30	05:30	06:23	07:16	09:26 (5) 07:11	07:56 (9) 08:06	08:41 (3) 08:33	
	21:18	20:14	19:00	39 10:05 (5) 16:52	53 09:00 (6) 16:06	38 09:19 (8) 16:08	
31	05:32	06:24		07:13	07:55 (9)	08:33	
	21:16	20:12		16:50	55 09:01 (6)	16:09	36 09:59 (4)
Sonnenscheinstunden	509	458	382	330		262	237
astr.max.mögl.Beschattung			163	1944		1282	1033
Red.Sonnenscheinwahrsch.			0.35	0.29		0.19	0.14
Reduktion Betriebsdauer			0.96	0.96		0.96	0.96
Reduktion Windrichtung			0.60	0.61		0.58	0.56
Gesamte Reduktion			0.20	0.17		0.11	0.07
Met.wahrsch.Beschattung			32	328		135	76

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

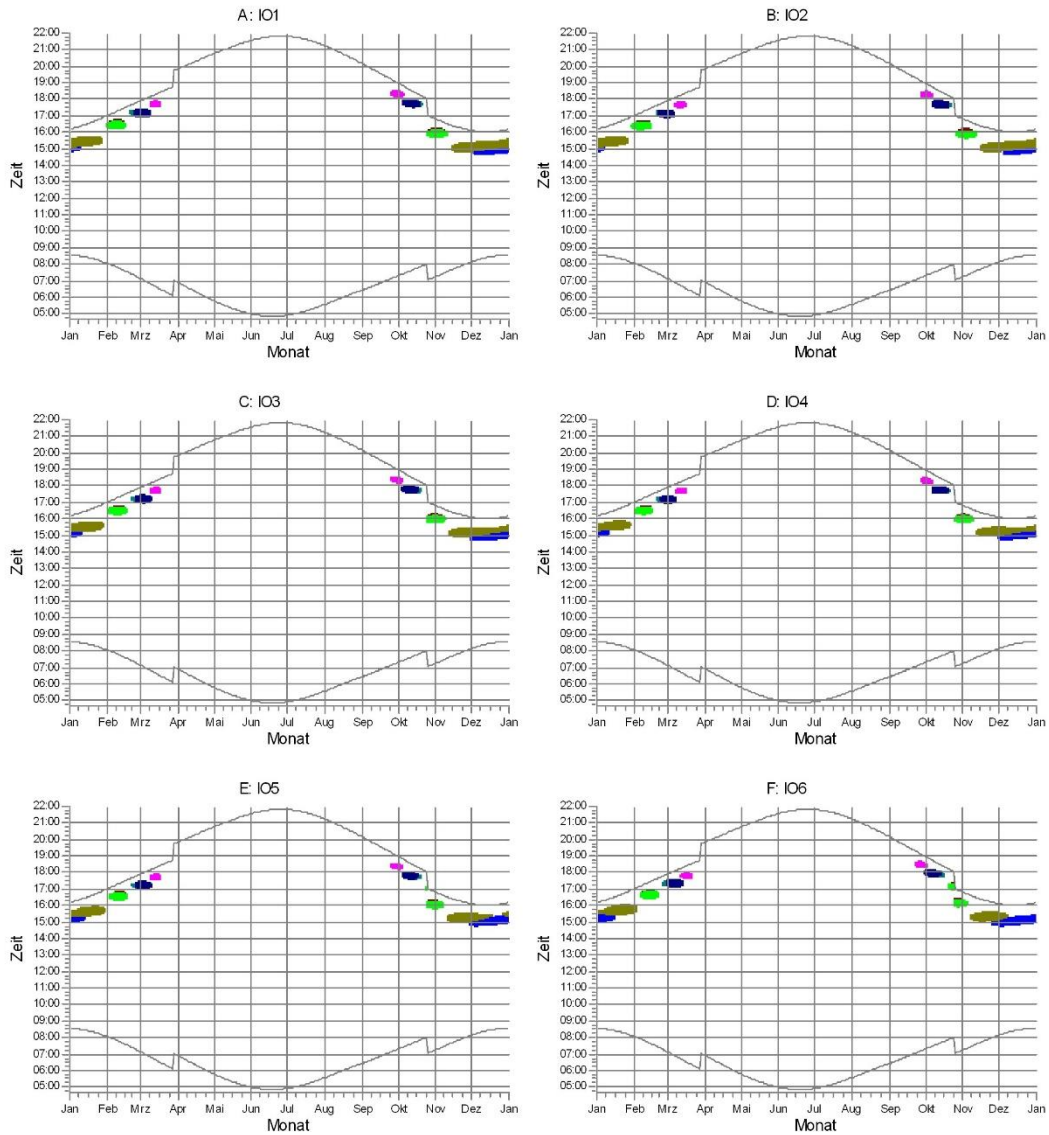
Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM)	Schattenanfang	Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Grafischer Kalender

Berechnung: GB



WEA

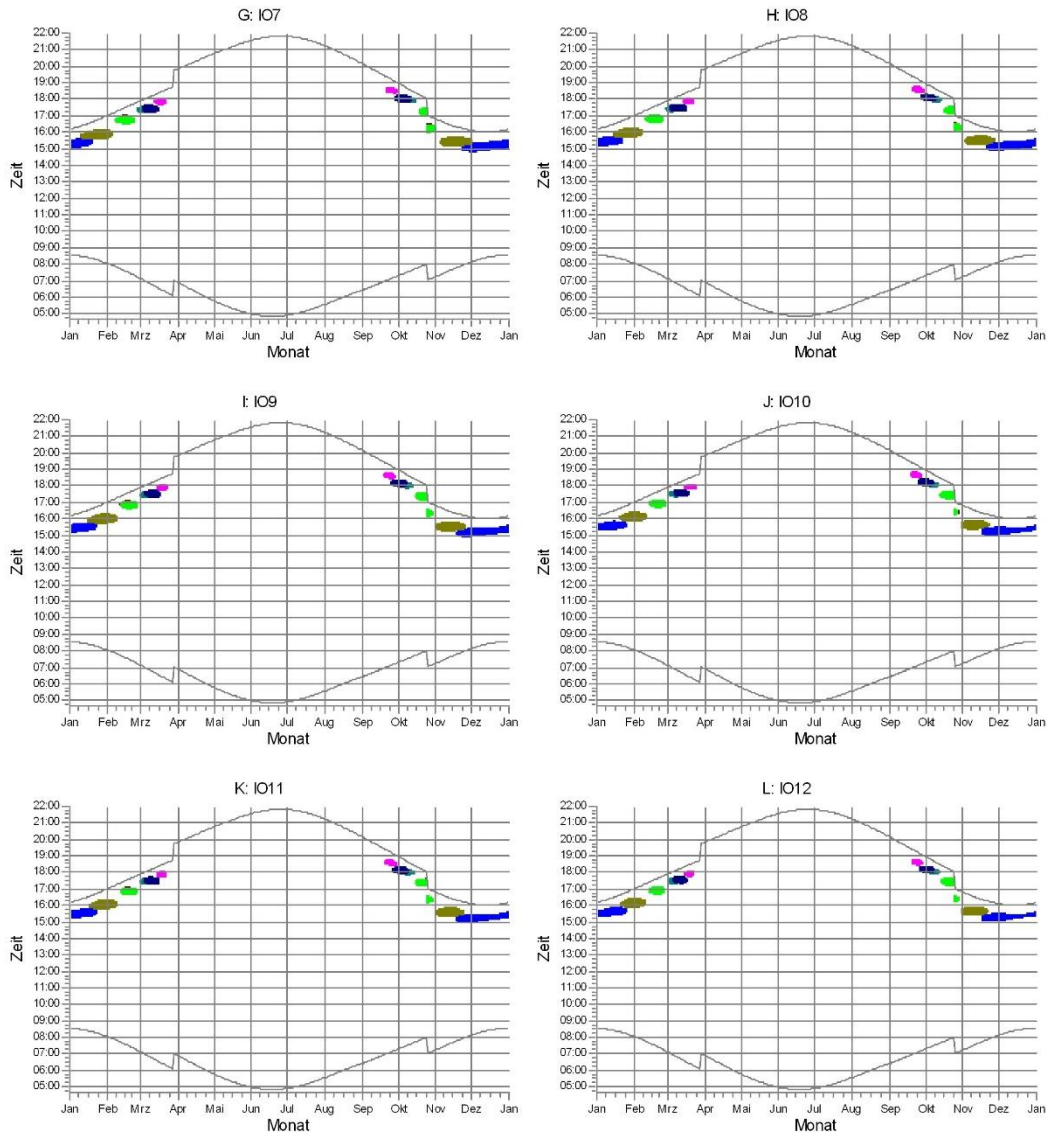


Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Grafischer Kalender

Berechnung: GB



WEA

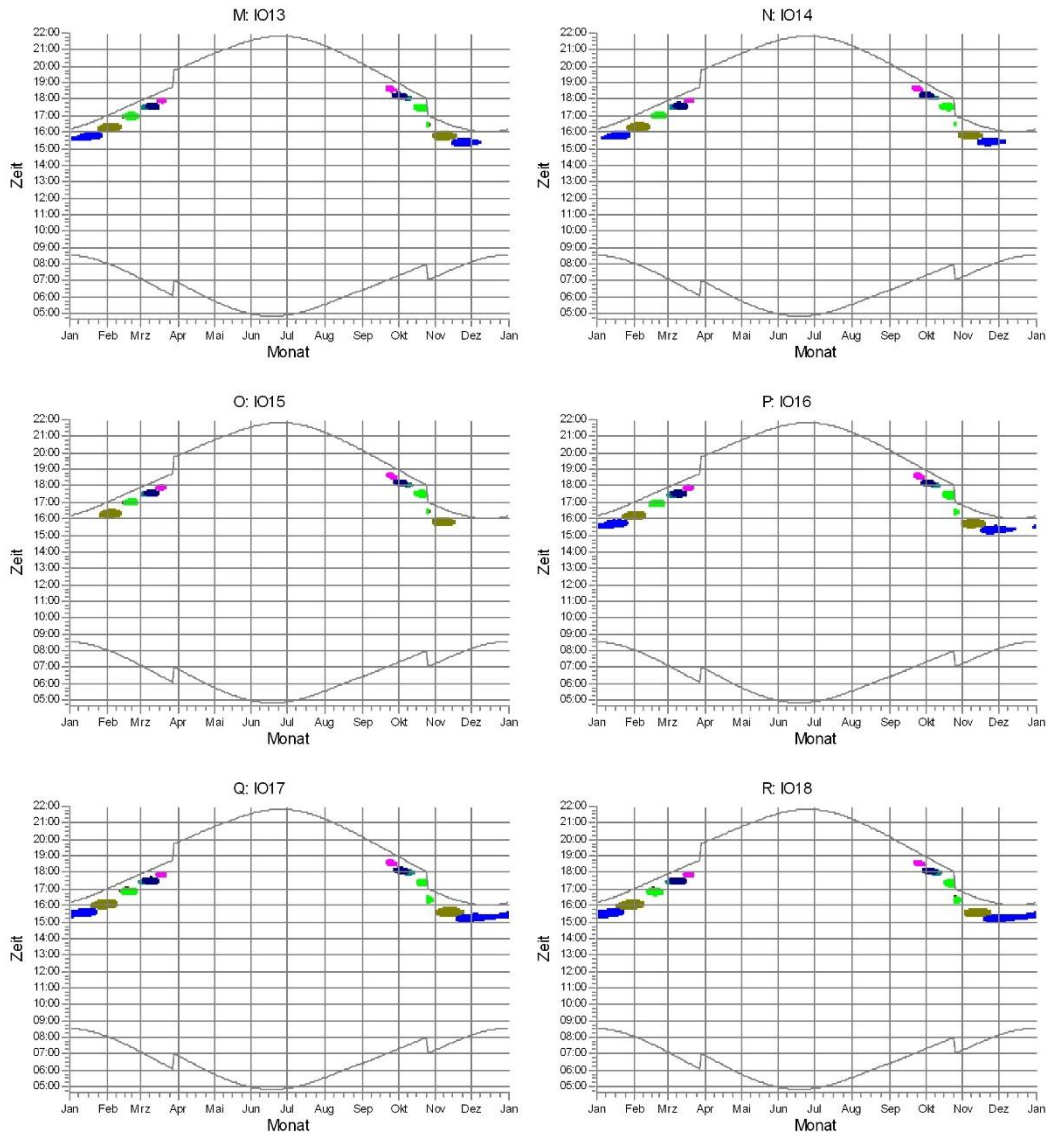


Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Grafischer Kalender

Berechnung: GB



WEA

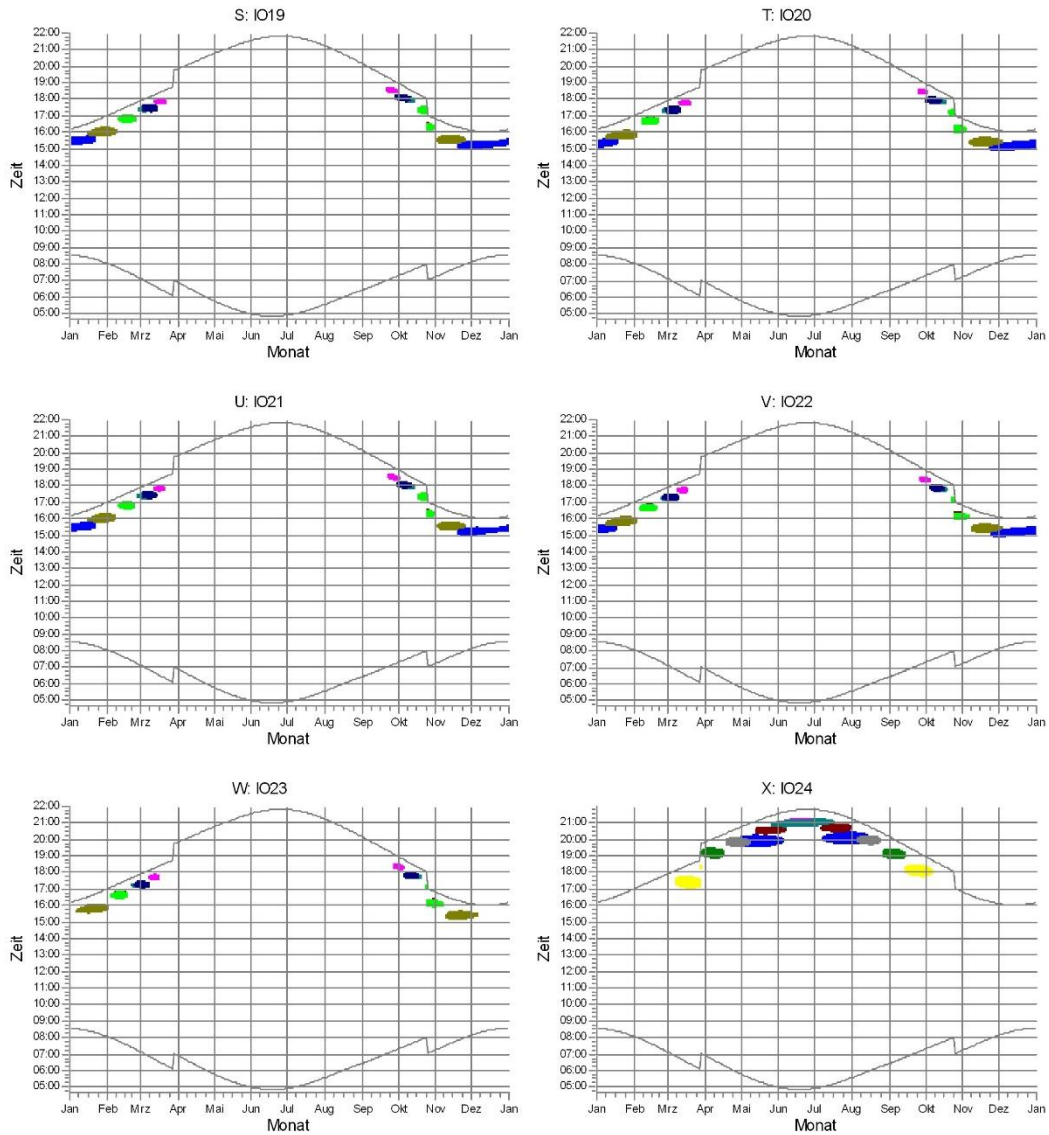


Projekt:
20190529_Bostelwiebeck II

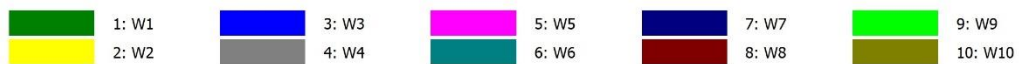
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Grafischer Kalender

Berechnung: GB



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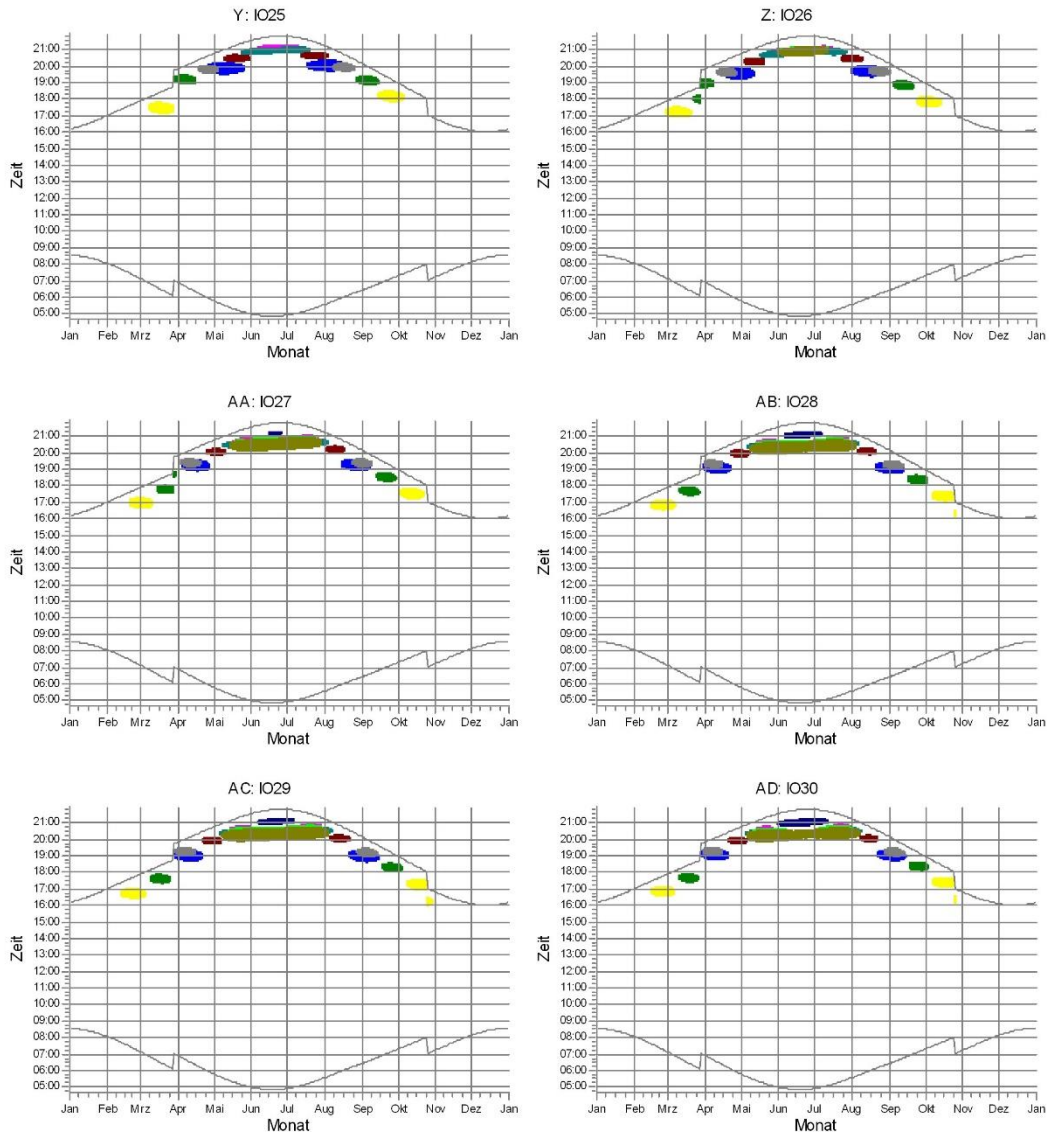


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20190529_Bostelwiebeck II

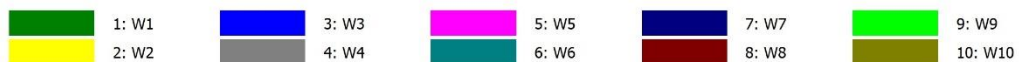
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SHADOW - Grafischer Kalender

Berechnung: GB



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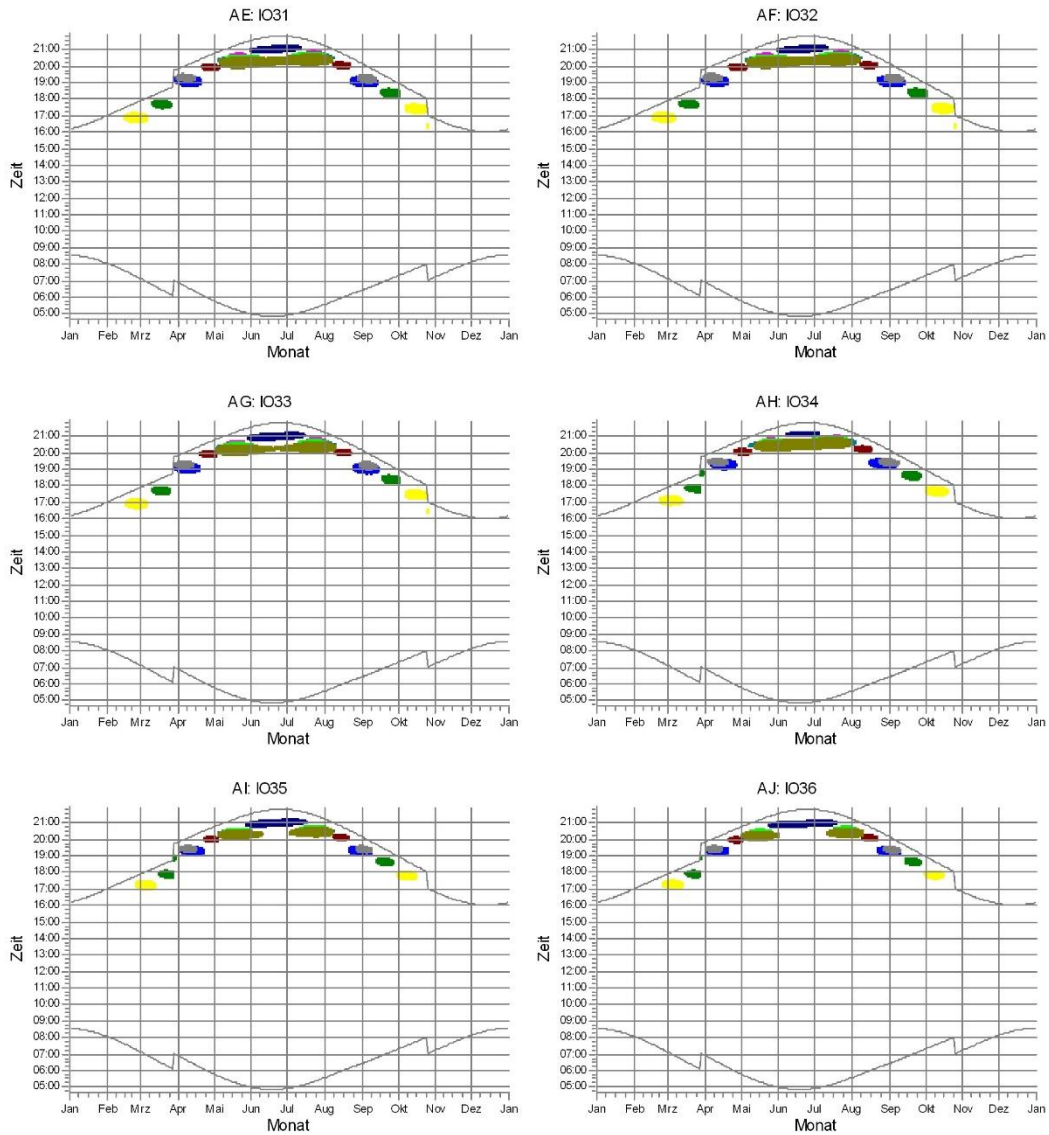


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20190529_Bostelwiebeck II

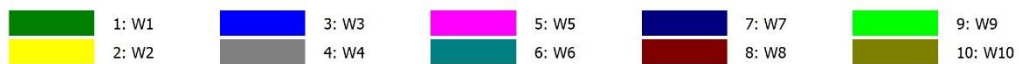
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SHADOW - Grafischer Kalender

Berechnung: GB



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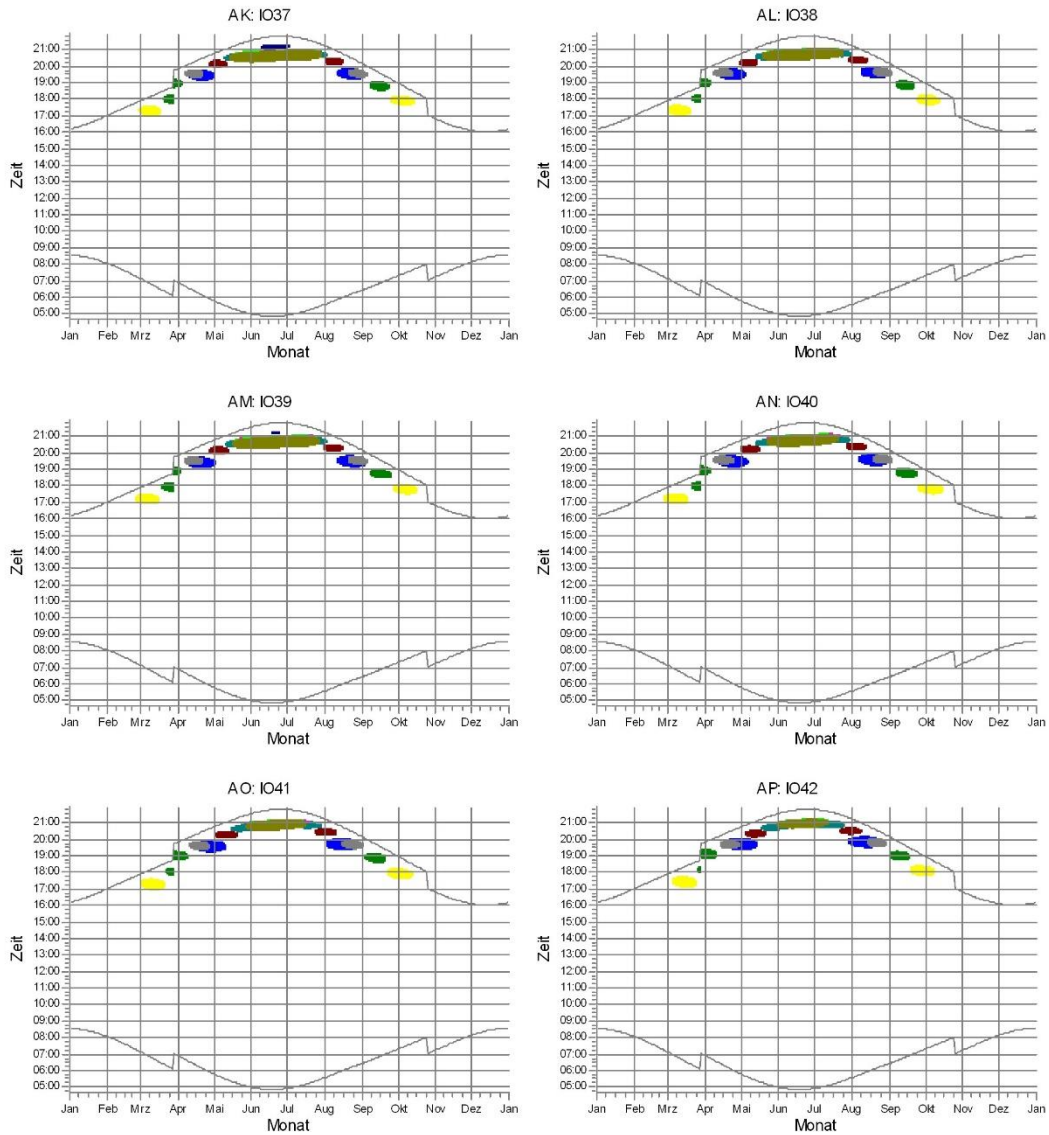


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20190529_Bostelwiebeck II

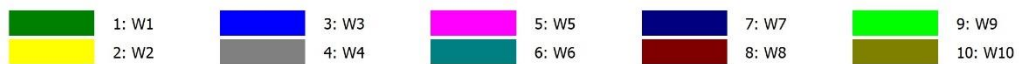
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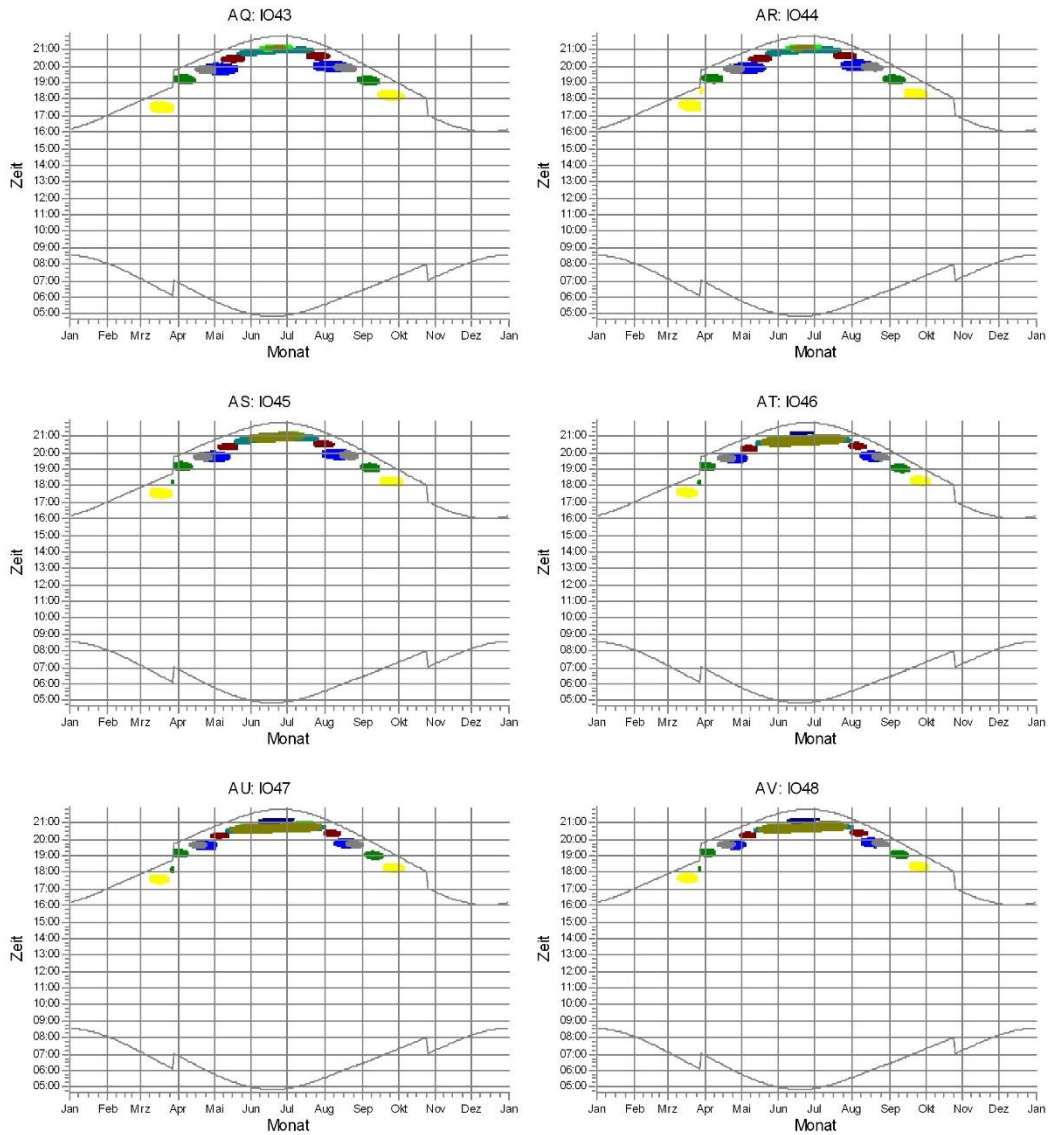


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20190529_Bostelwiebeck II

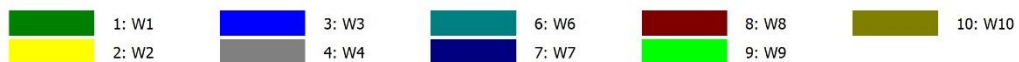
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SHADOW - Grafischer Kalender

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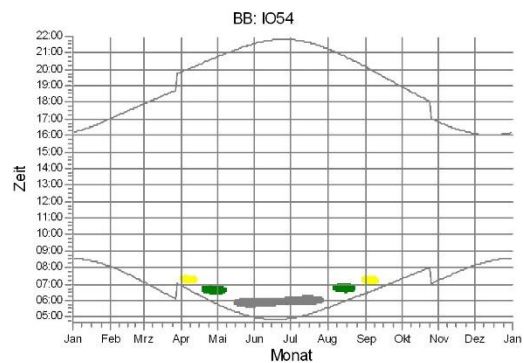
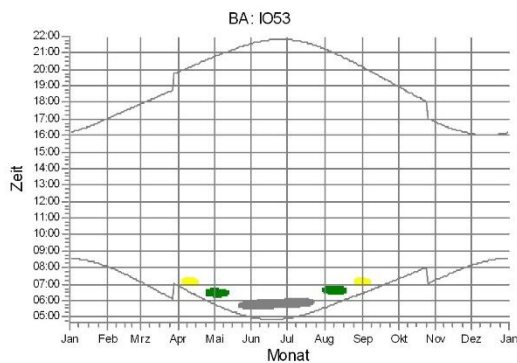
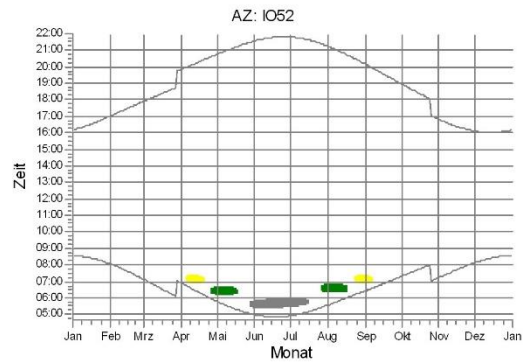
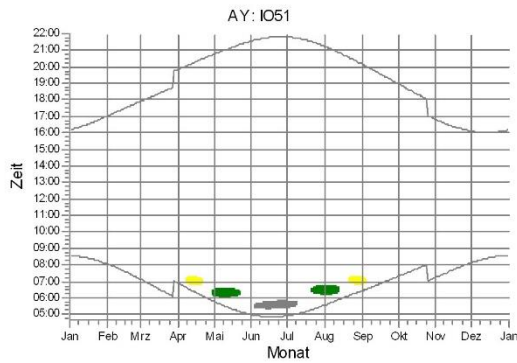
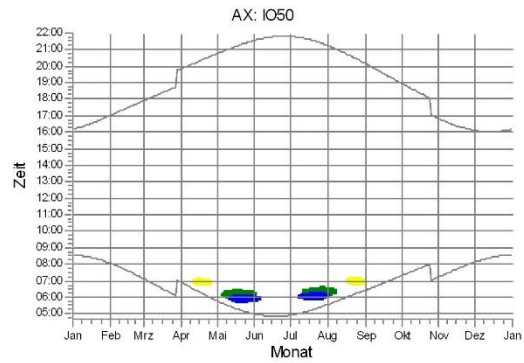
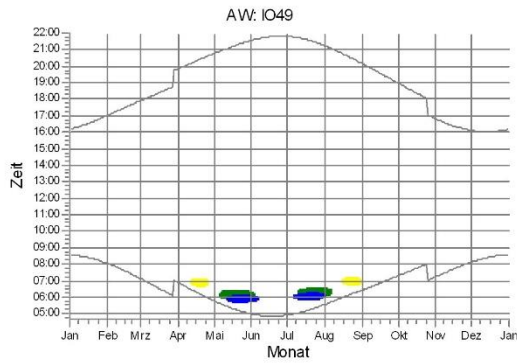


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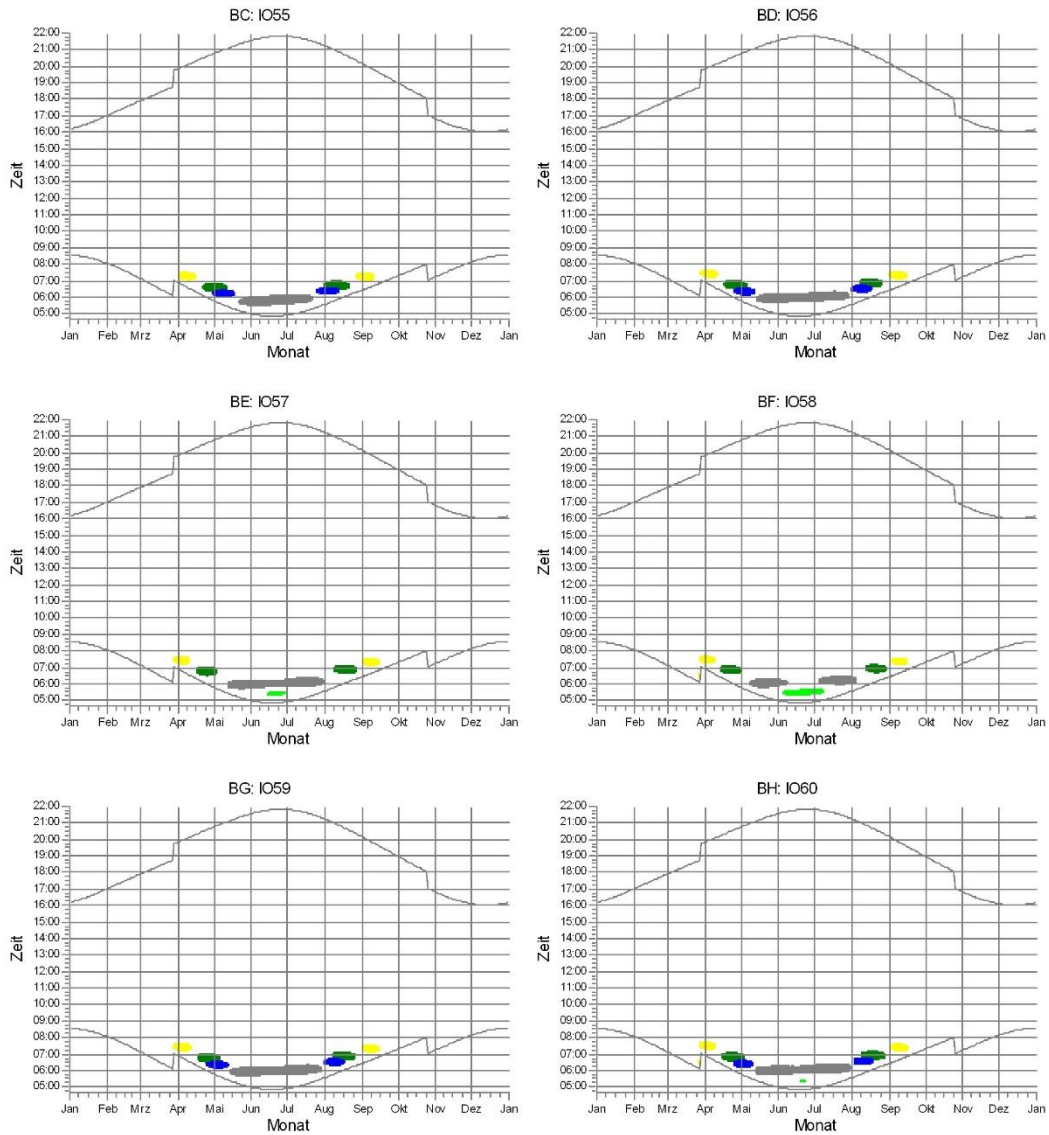
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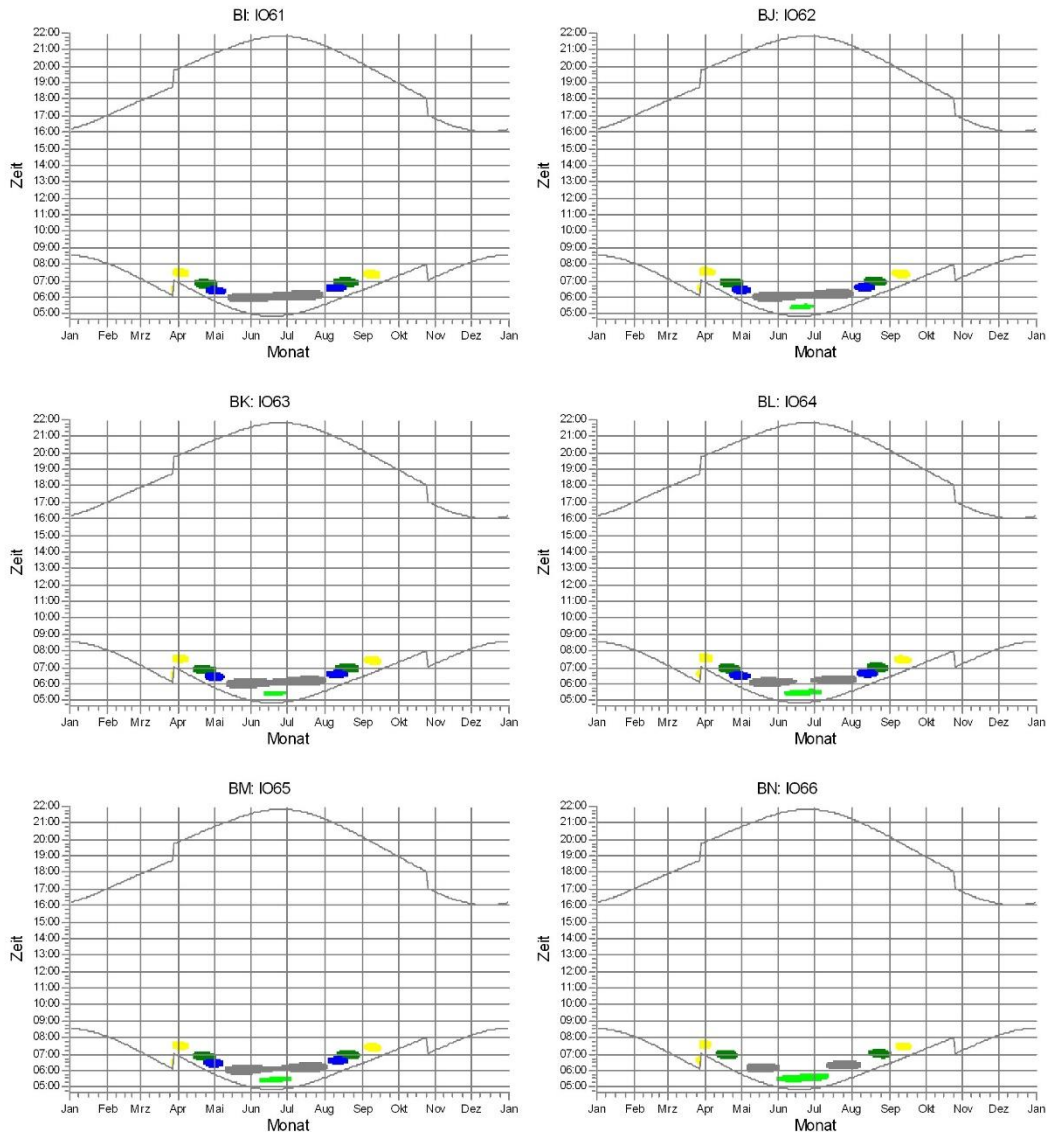


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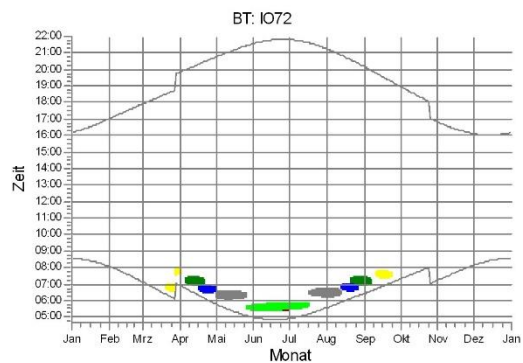
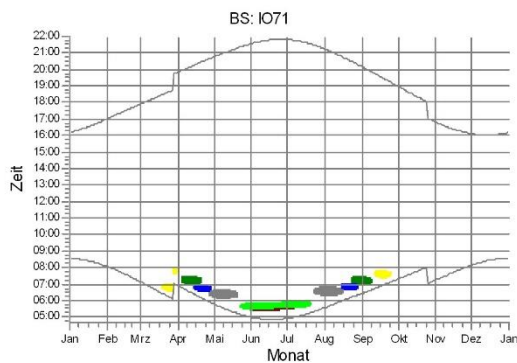
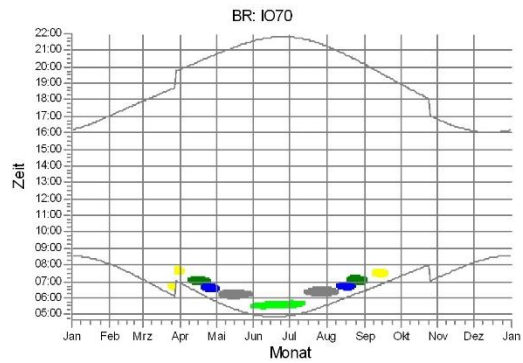
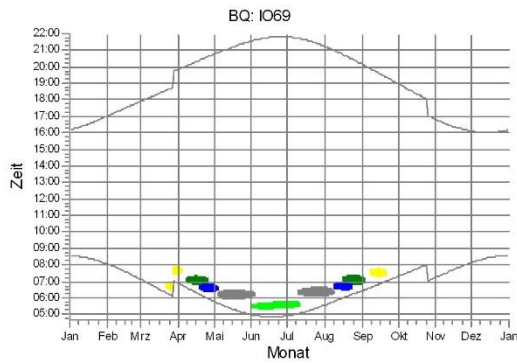
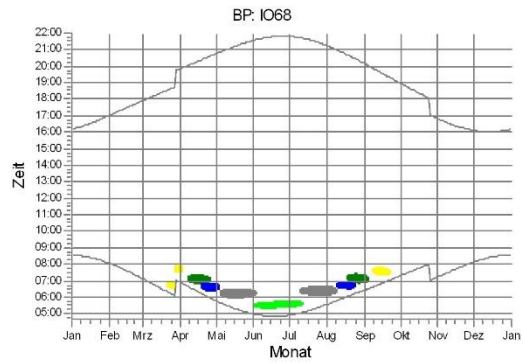
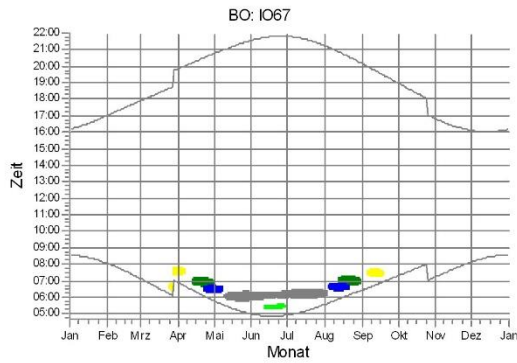


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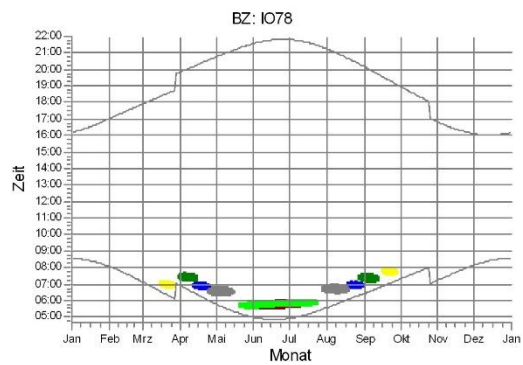
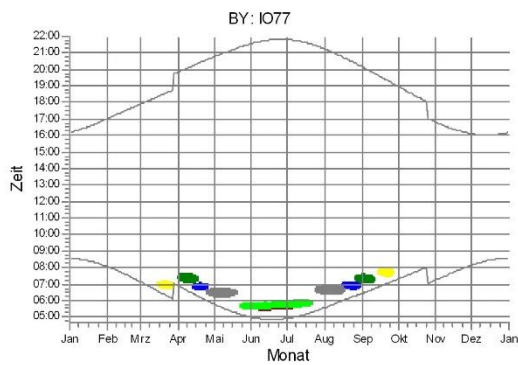
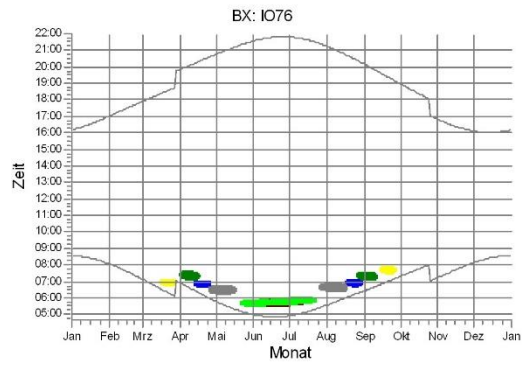
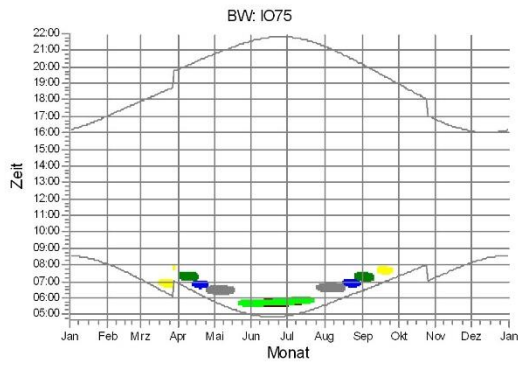
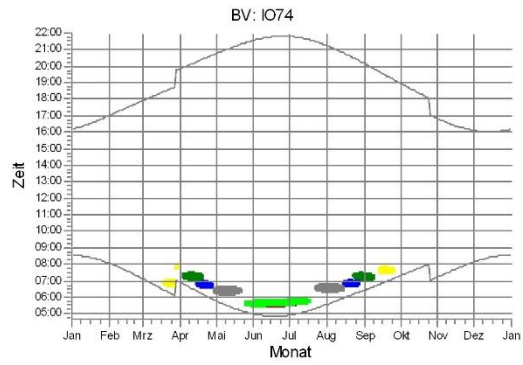
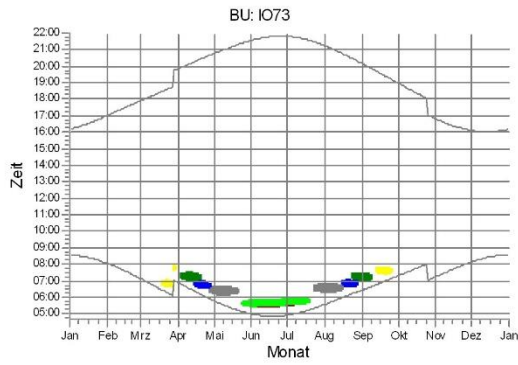


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SHADOW - Grafischer Kalender

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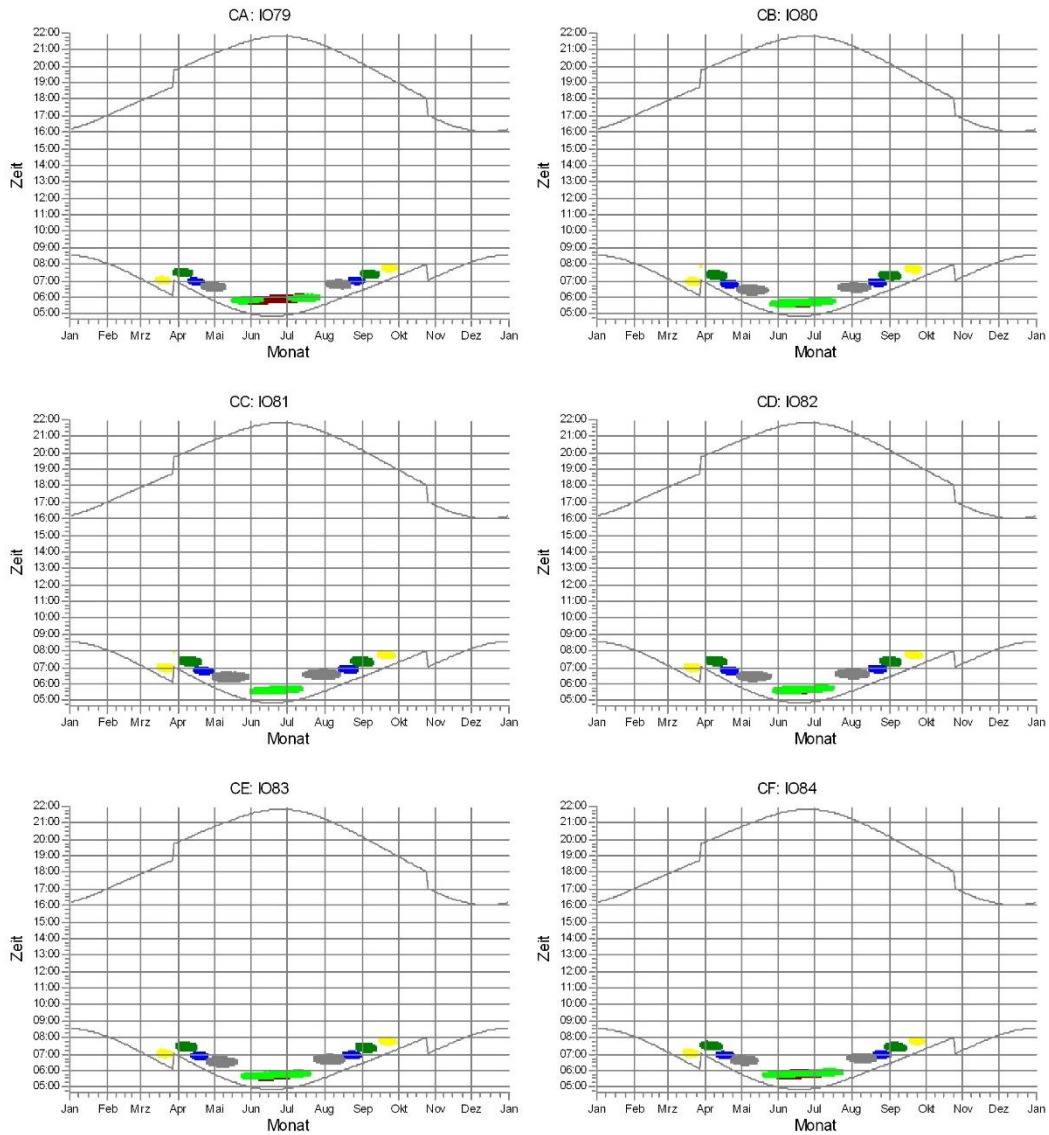


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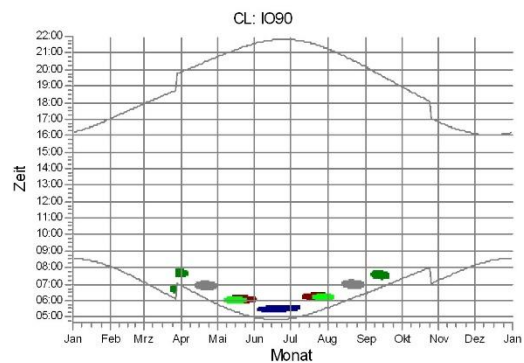
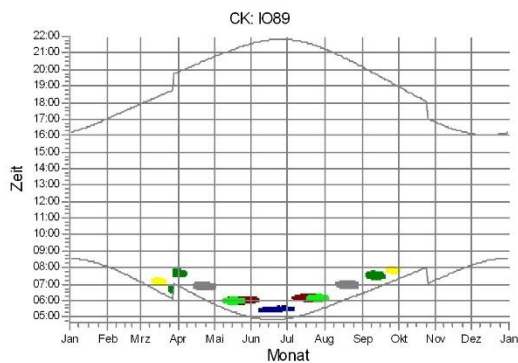
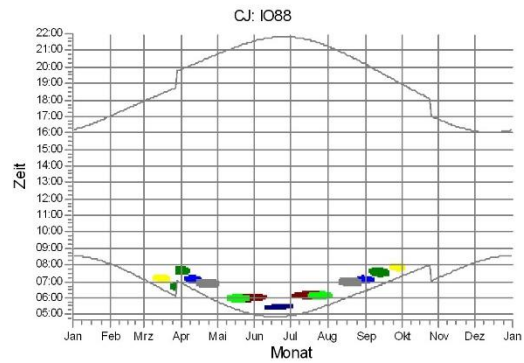
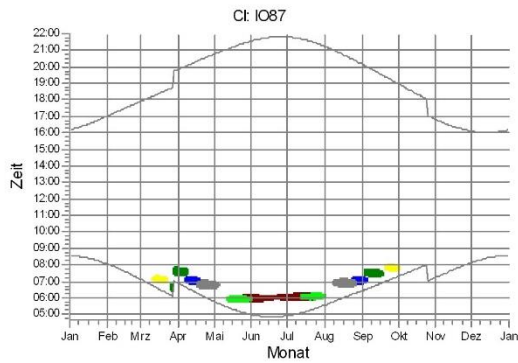
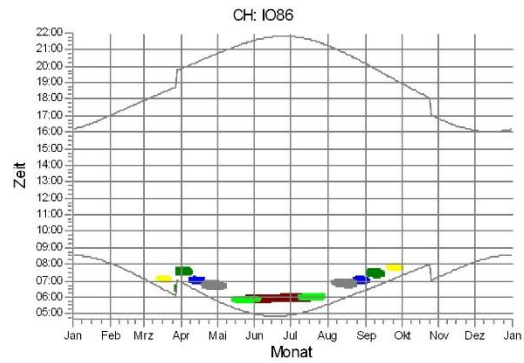
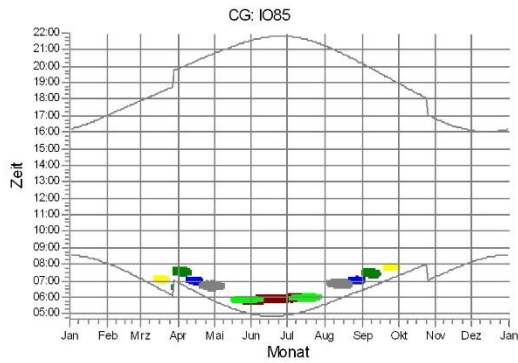


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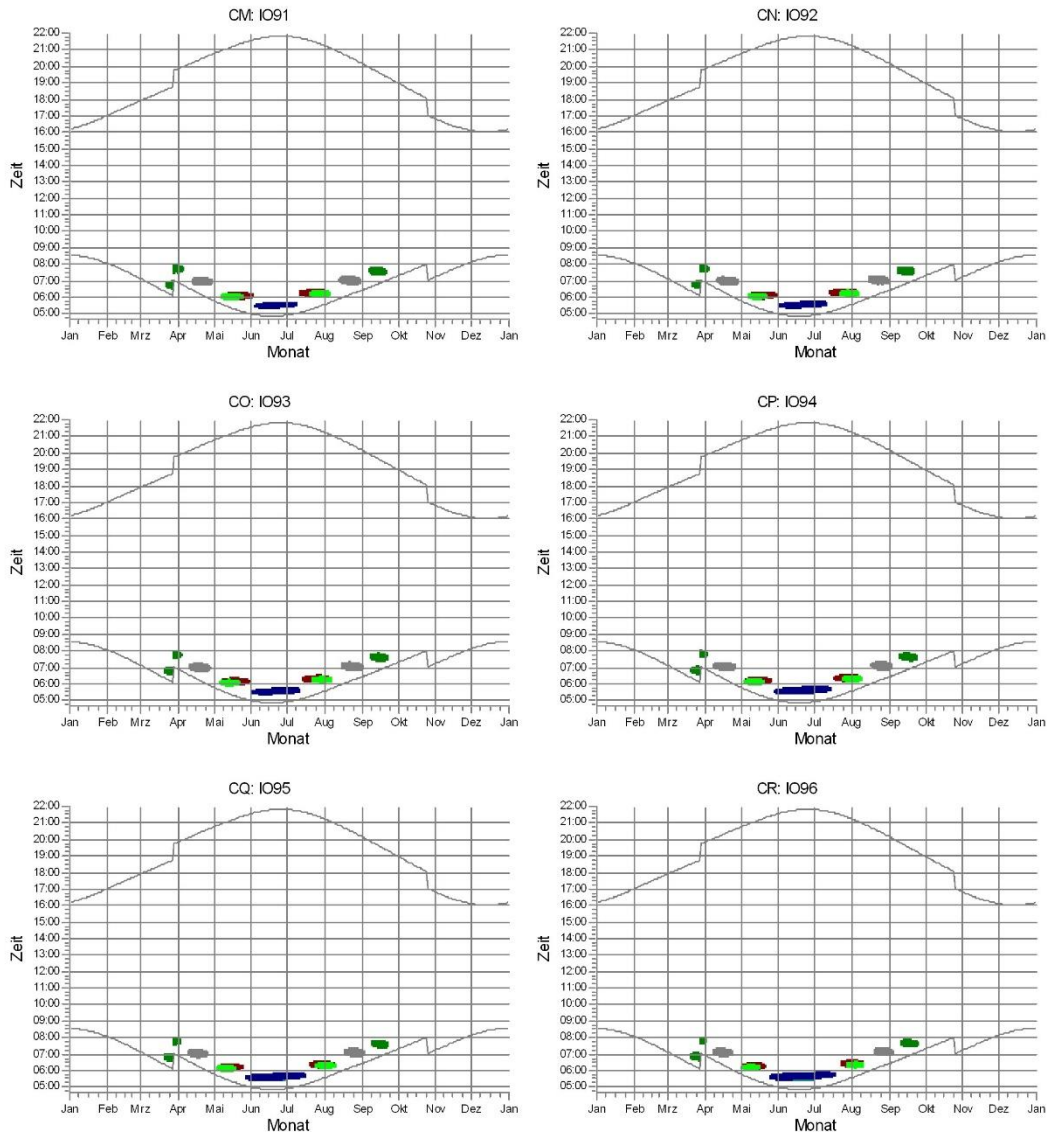


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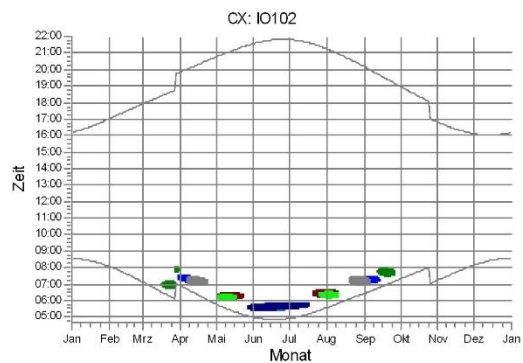
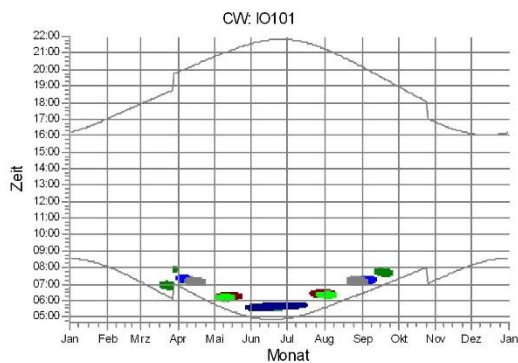
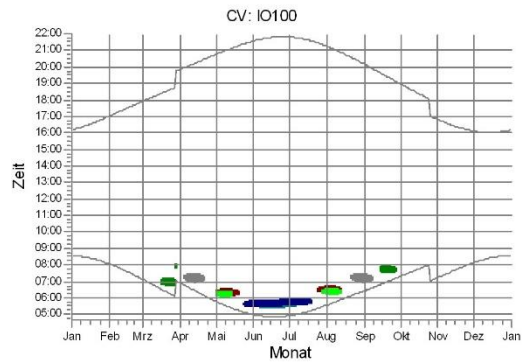
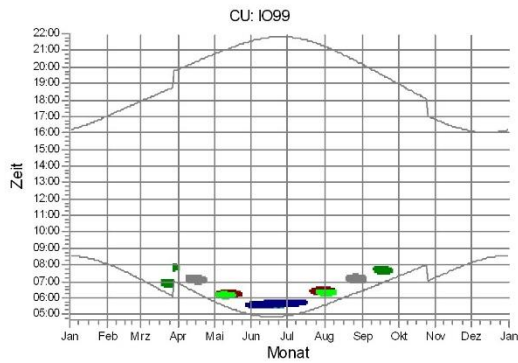
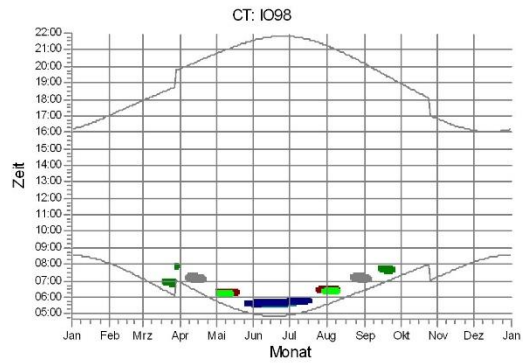
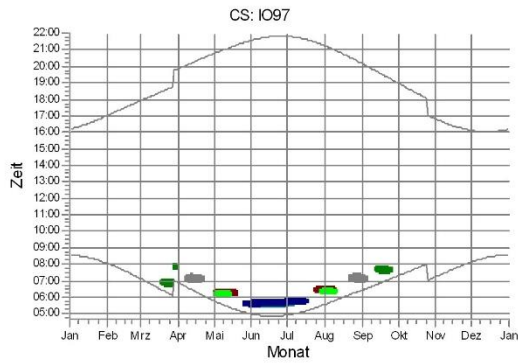


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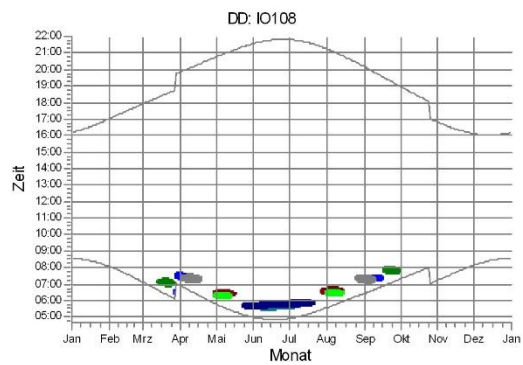
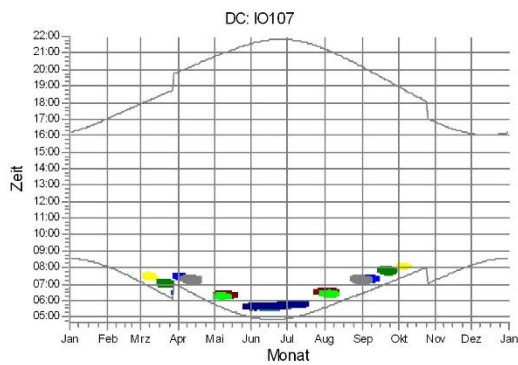
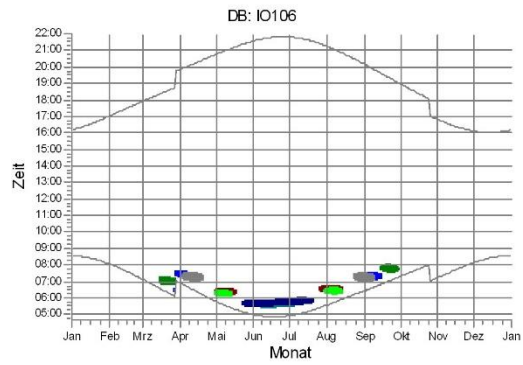
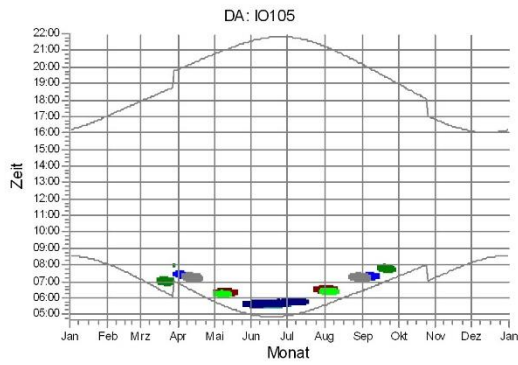
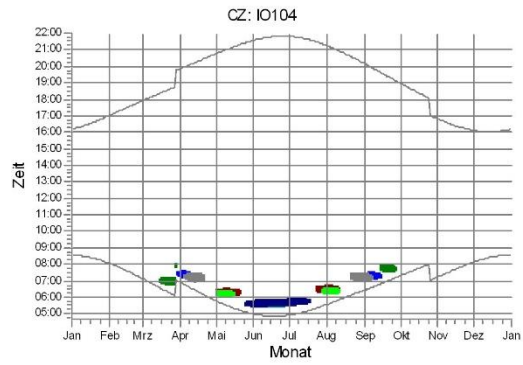
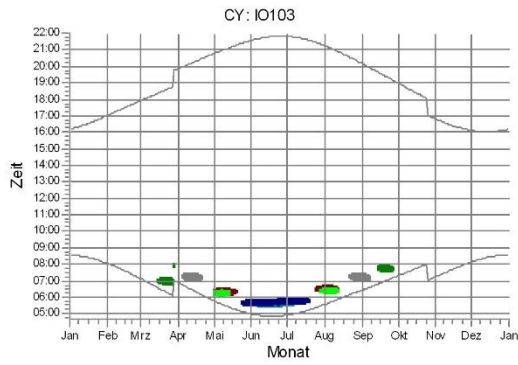


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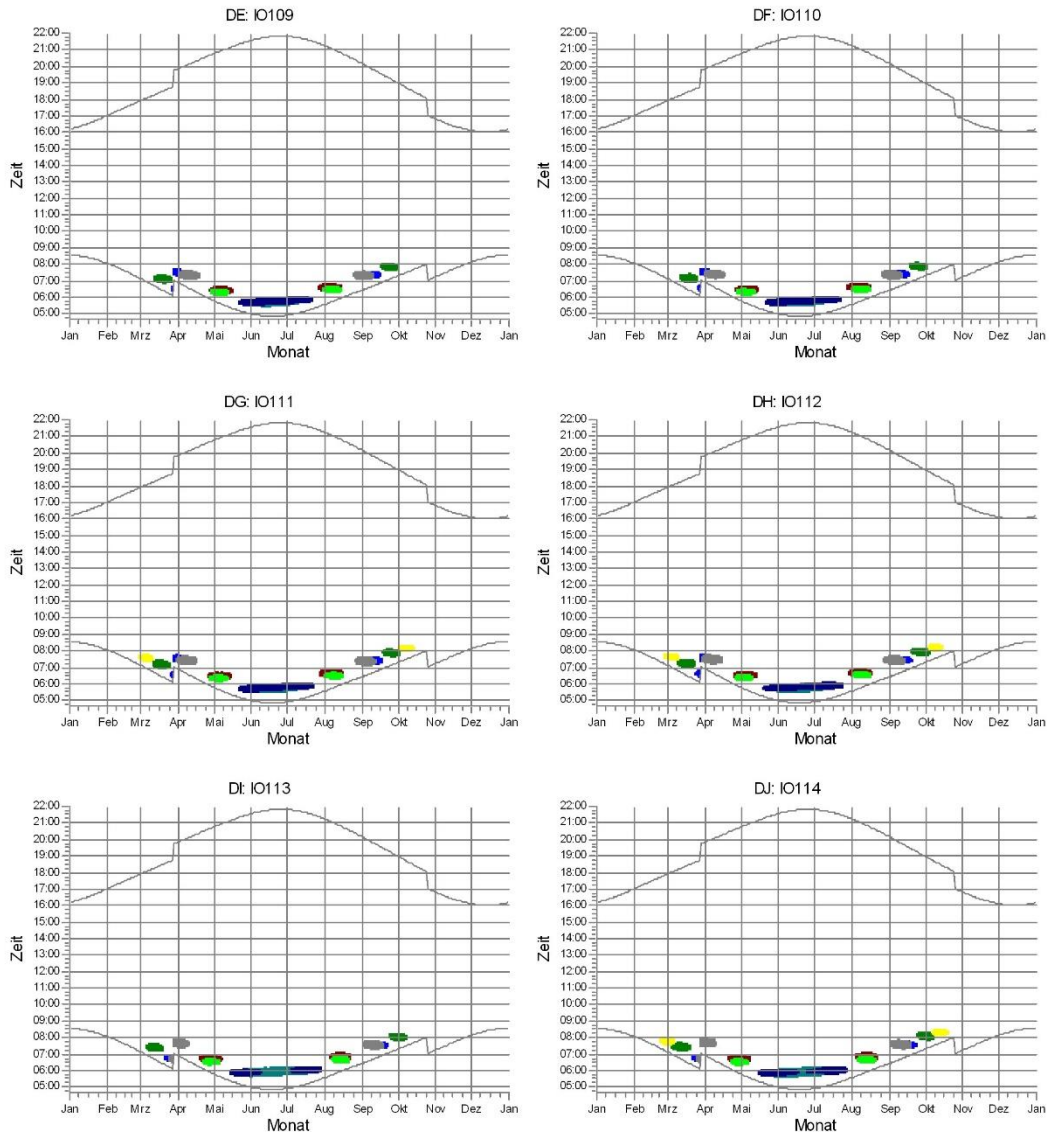


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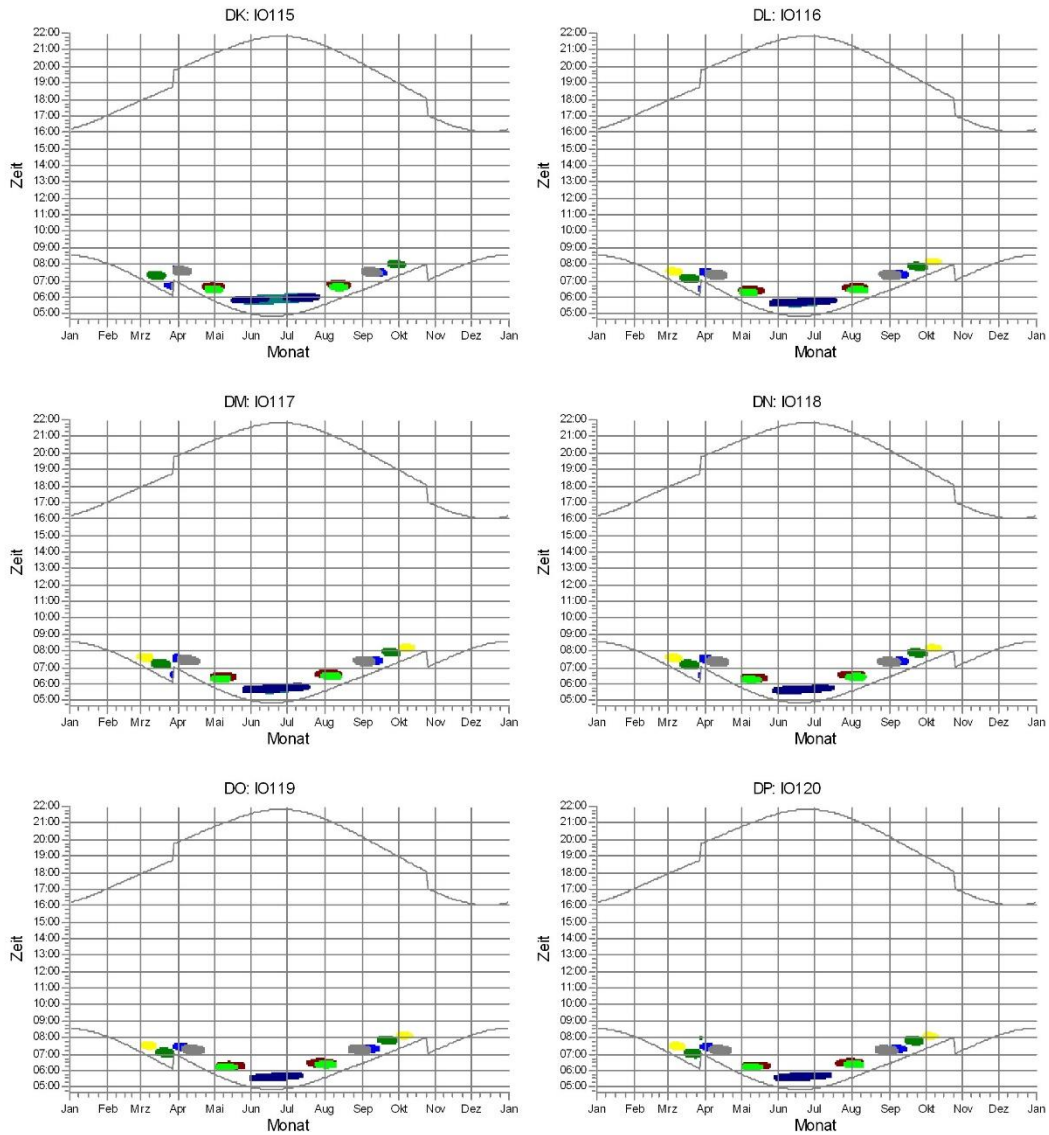


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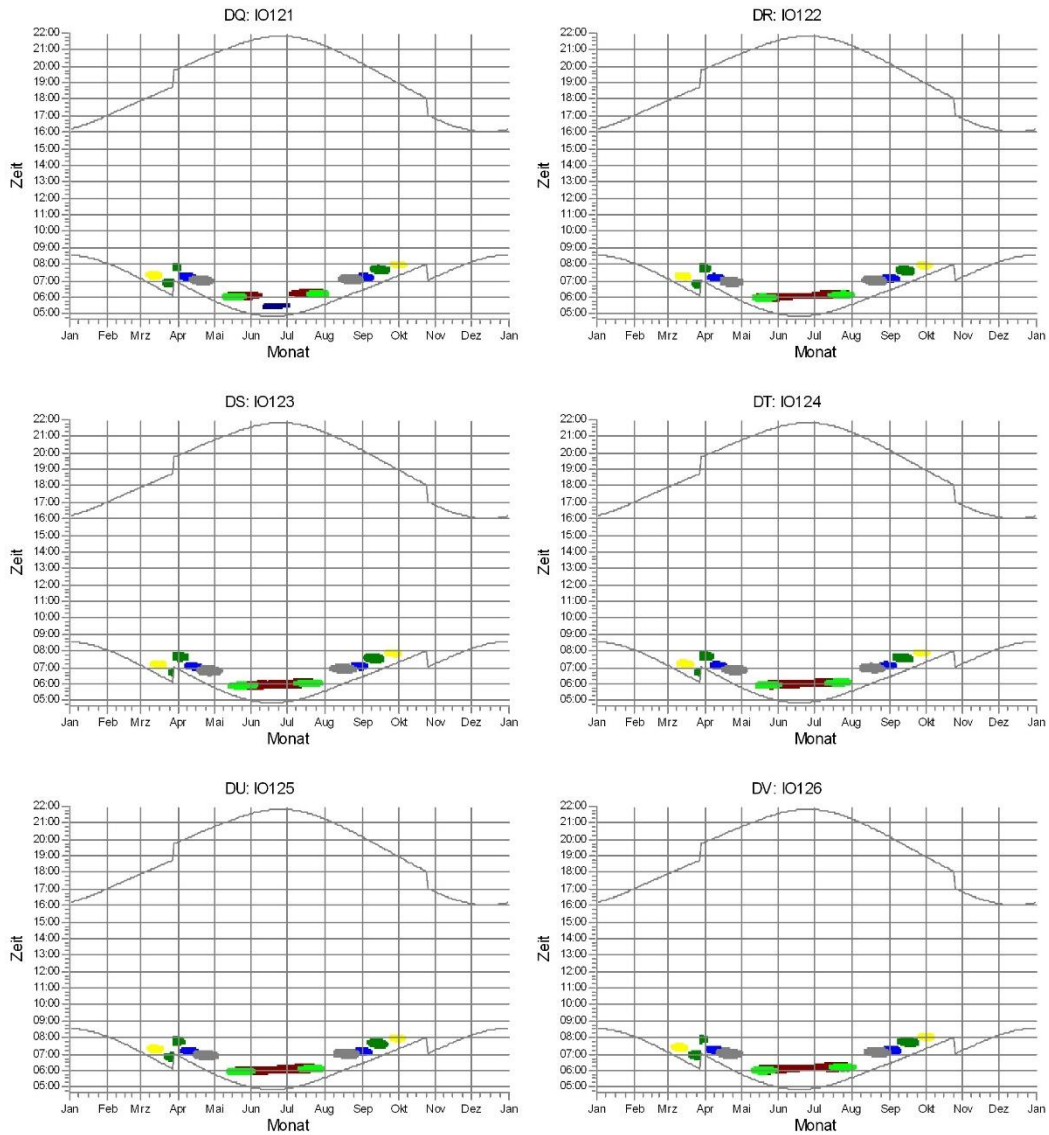


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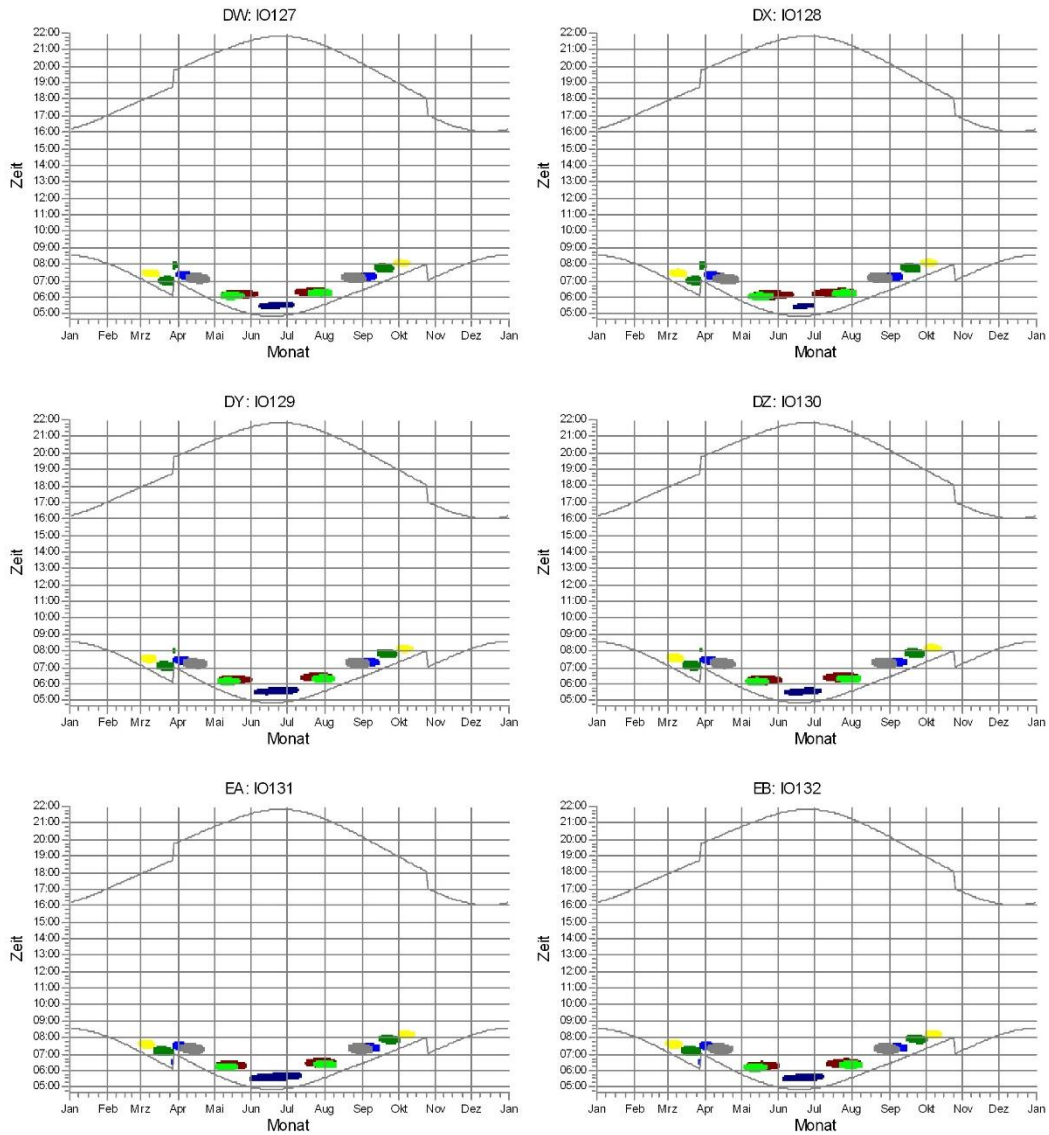


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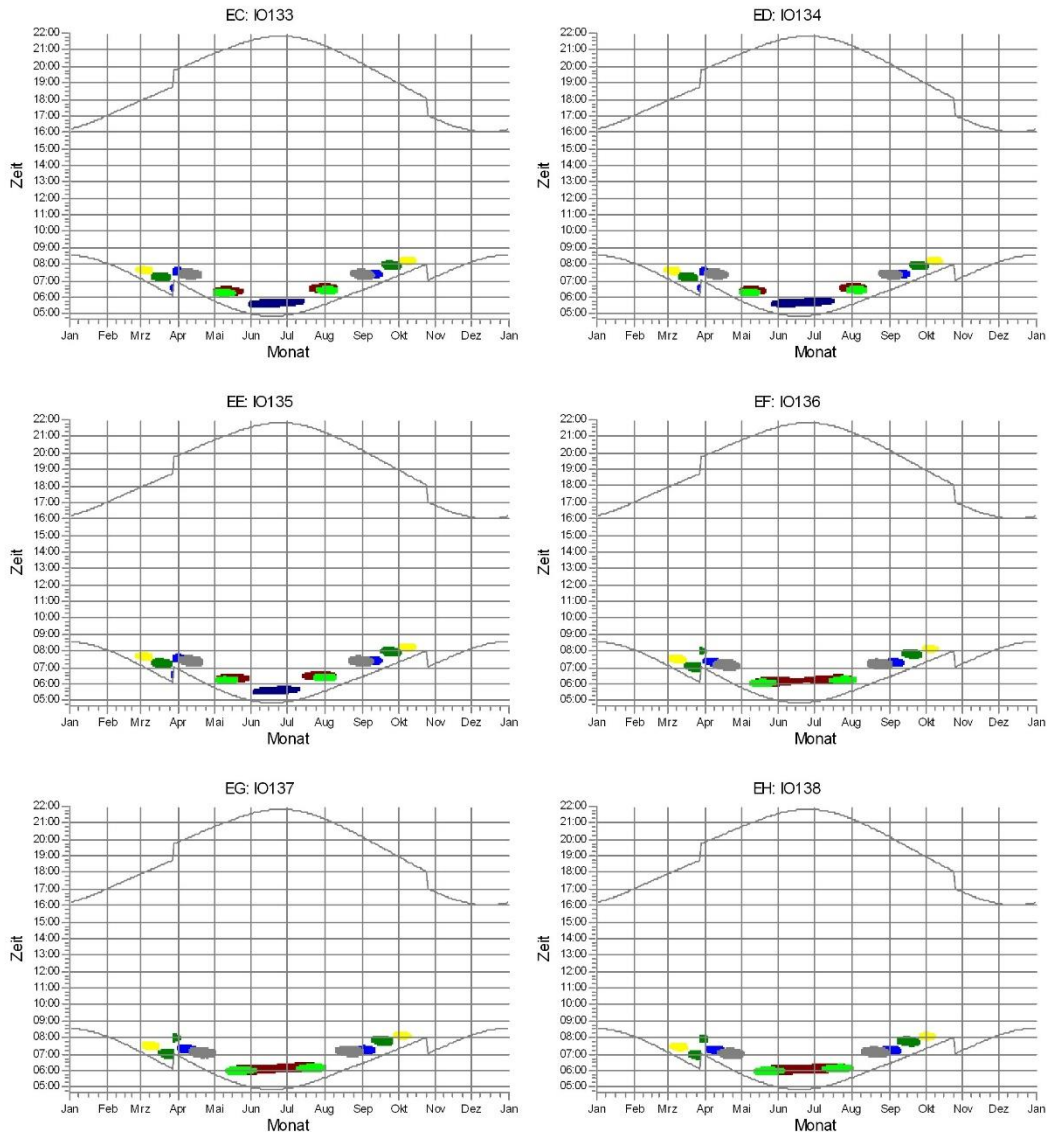


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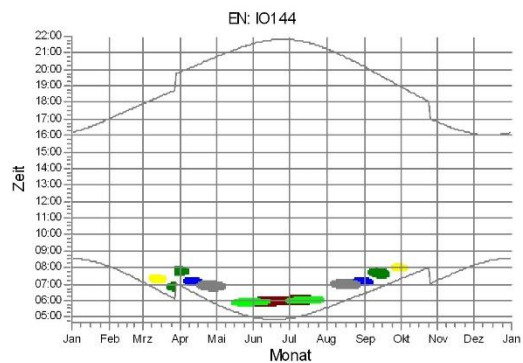
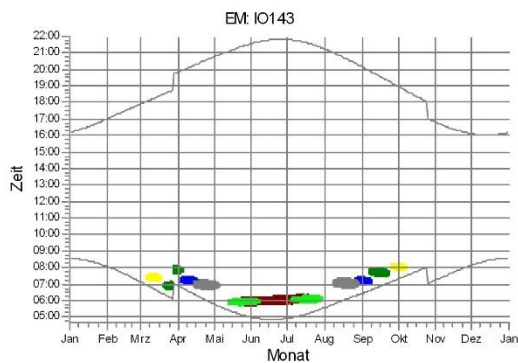
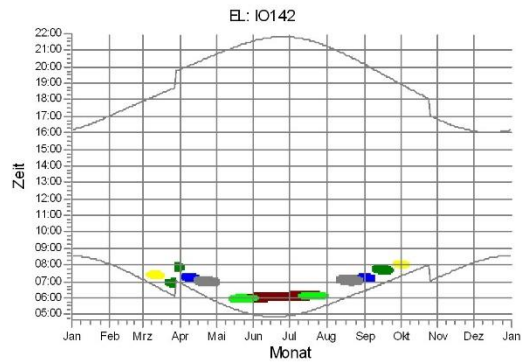
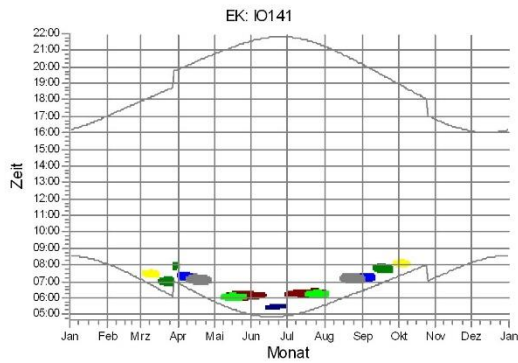
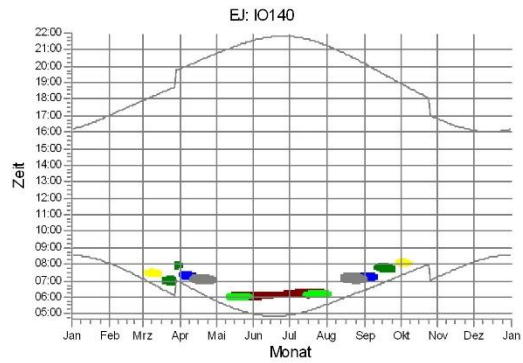
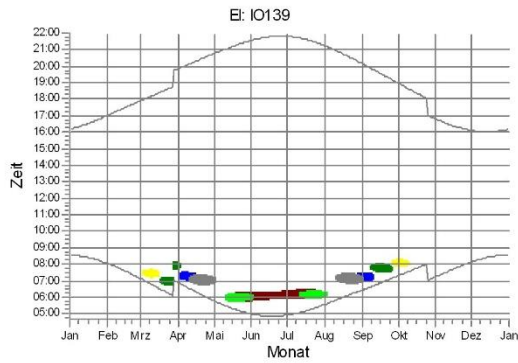


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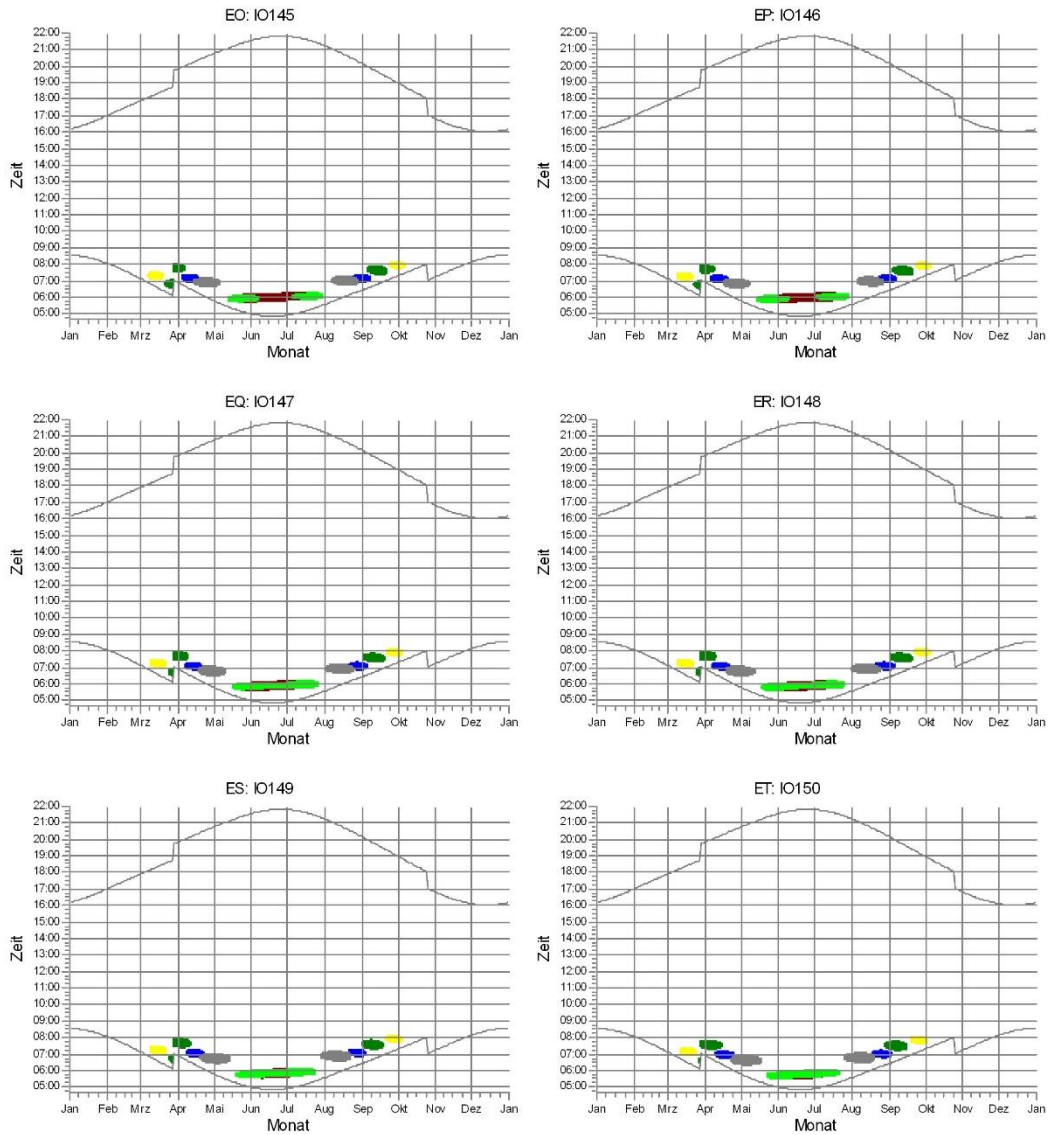


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WEA

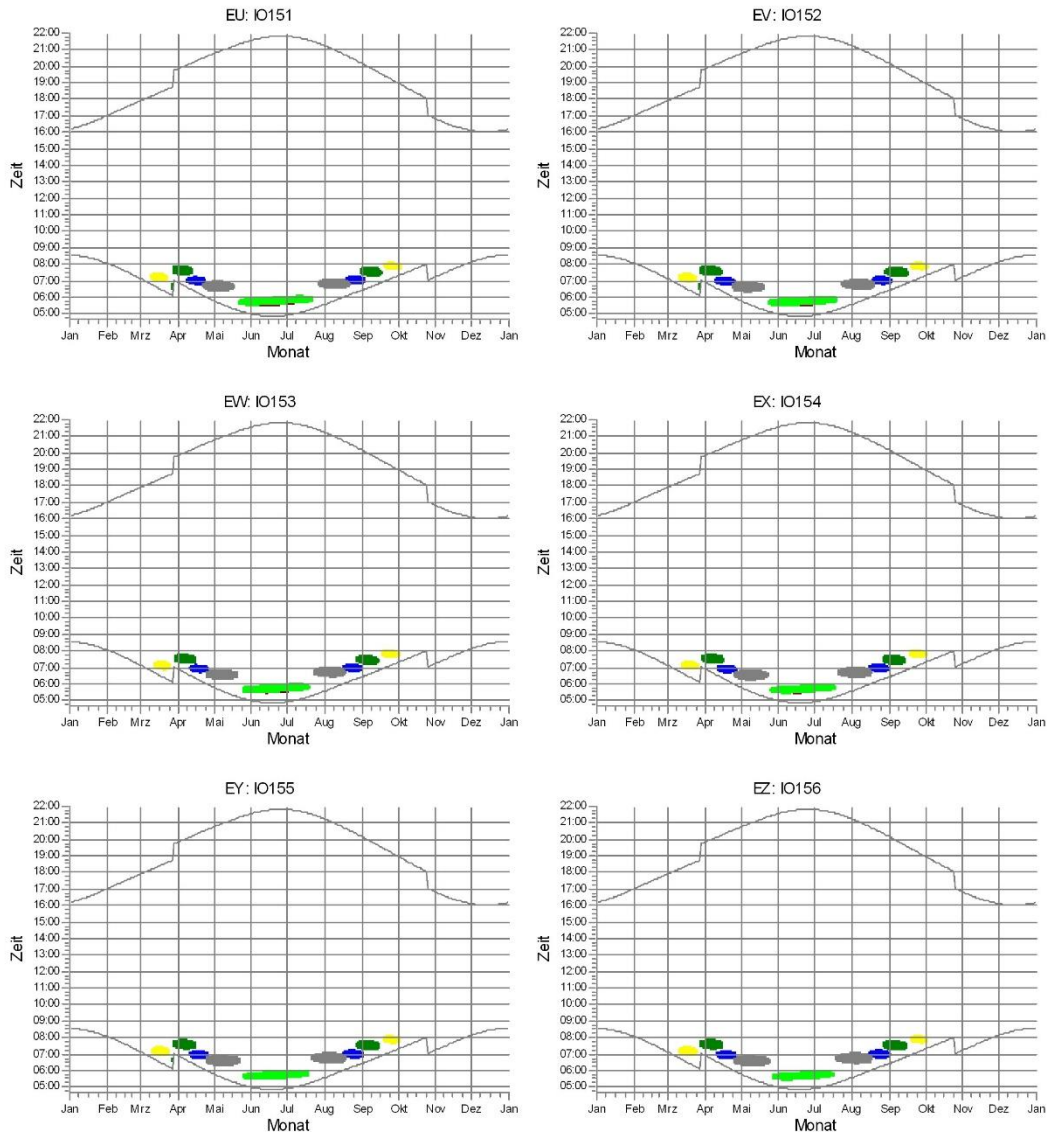


Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Grafischer Kalender

Berechnung: GB



WEA

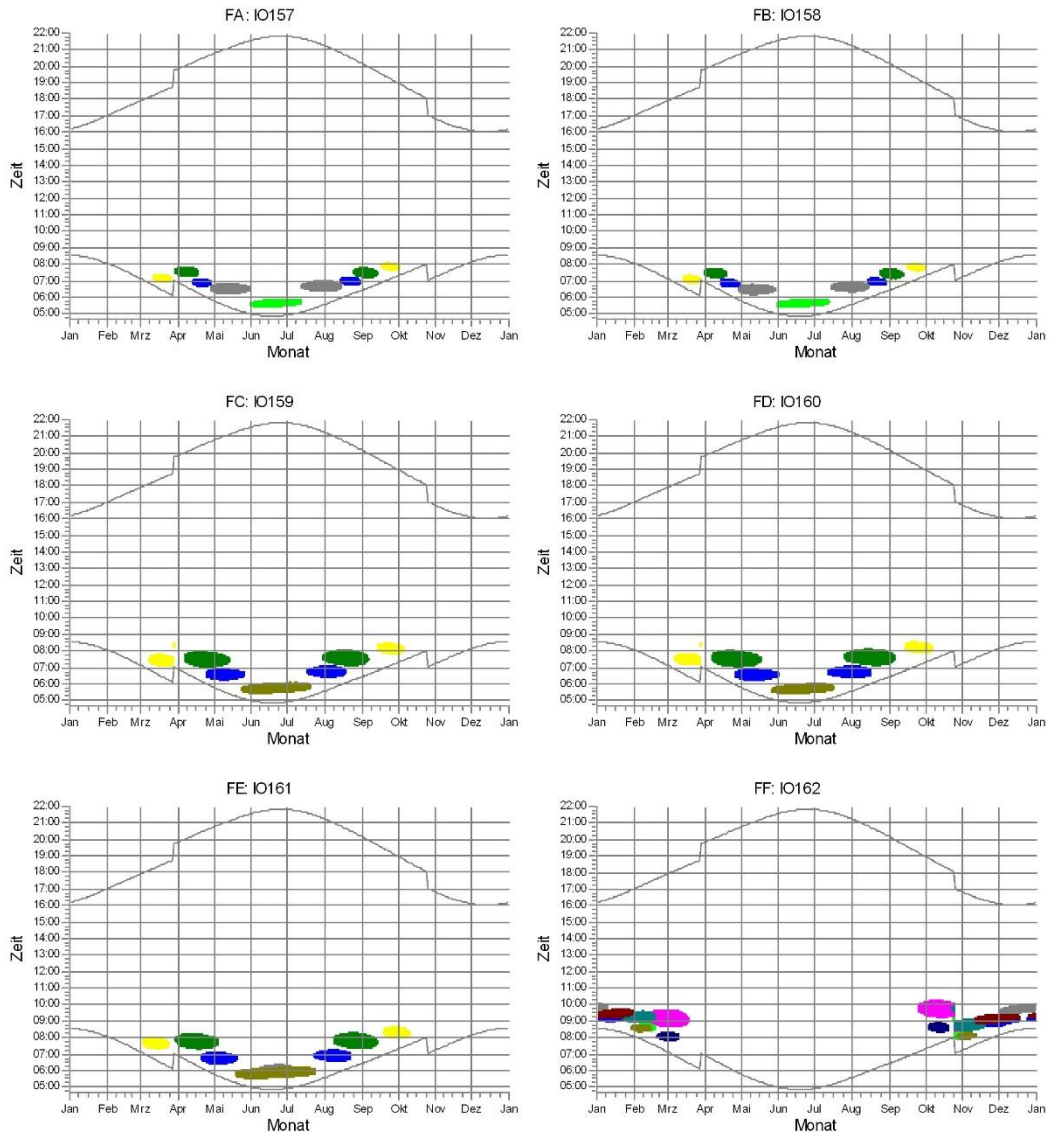


Projekt:
20190529_Bostelwiebeck II

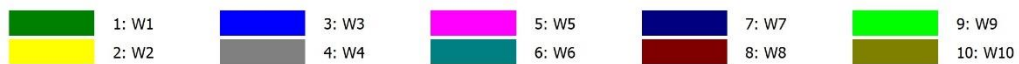
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Grafischer Kalender

Berechnung: GB



WEA



Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 1 - W1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:32	08:03	07:07	06:54	07:19-08:05/46	05:46	07:04-07:57/53	04:58	06:04-06:15/11
	16:10	17:00	17:55	19:51	18:44-19:25/41	20:45	06:14-06:56/42	21:34	
2	08:32	08:02	07:05	06:52	07:17-08:05/48	05:44	07:05-07:55/50	04:58	06:06-06:15/9
	16:11	17:02	17:56	19:53	18:45-19:27/42	20:47	06:12-06:54/42	21:35	
3	08:32	08:00	07:03	06:49	07:14-08:07/53	05:42	07:05-07:53/48	04:57	06:08-06:12/4
	16:13	17:04	17:58	19:55	18:46-19:27/41	20:49	06:10-06:51/41	21:36	
4	08:32	07:58	07:01	06:47	07:12-08:08/56	05:40	07:05-07:52/47	04:56	
	16:14	17:06	18:00	19:57	18:47-19:27/40	20:50	06:09-06:49/40	21:37	
5	08:31	07:57	06:58	07:23-07:30/7	06:44	07:09-08:10/61	05:38	07:05-07:51/46	04:55
	16:15	17:08	18:02	19:59	18:48-19:28/40	20:52	06:08-06:46/38	21:38	
6	08:31	07:55	06:56	07:20-07:33/13	06:42	07:06-08:10/64	05:37	07:06-07:50/44	04:54
	16:16	17:10	18:04	20:00	18:49-19:27/38	20:54	06:05-06:44/39	21:39	
7	08:31	07:53	06:54	07:18-07:35/17	06:40	07:05-08:11/66	05:35	07:07-07:50/43	04:54
	16:18	17:12	18:06	20:02	18:51-19:27/36	20:56	06:03-06:44/41	21:40	
8	08:30	07:51	06:51	07:15-07:36/21	06:37	07:03-08:12/69	05:33	07:07-07:49/42	04:53
	16:19	17:14	18:08	20:04	18:56-19:27/31	20:57	06:01-06:43/42	21:41	
9	08:30	07:49	06:49	07:13-07:37/24	06:35	07:02-08:11/69	05:31	07:08-07:48/40	04:53
	16:20	17:16	18:10	20:06	18:56-19:26/30	20:59	06:00-06:42/42	21:42	
10	08:29	07:47	06:47	07:11-07:36/25	06:33	06:57-08:12/75	05:29	07:09-07:47/38	04:52
	16:22	17:18	18:11	17:32-17:43/11	20:08	18:56-19:26/30	21:01	05:59-06:41/42	21:43
11	08:28	07:46	06:44	07:08-07:37/29	06:30	06:56-08:12/76	05:27	07:10-07:45/35	04:52
	16:23	17:20	18:13	17:30-17:47/17	20:09	18:57-19:25/28	21:02	05:58-06:38/40	21:43
12	08:28	07:44	06:42	07:06-07:37/31	06:28	06:53-08:13/80	05:26	07:11-07:44/33	04:51
	16:25	17:22	18:15	17:27-17:48/21	20:11	18:57-19:23/26	21:04	05:57-06:35/38	21:44
13	08:27	07:42	06:40	07:03-07:36/33	06:26	06:50-08:12/82	05:24	07:13-07:43/30	04:51
	16:26	17:24	18:17	17:26-17:51/25	20:13	18:58-19:22/24	21:06	05:57-06:34/37	21:45
14	08:26	07:40	06:37	07:01-07:36/35	06:23	06:49-08:12/83	05:22	07:14-07:41/27	04:51
	16:28	17:26	18:19	17:25-17:53/28	20:15	18:59-19:20/21	21:07	05:56-06:33/37	21:46
15	08:25	07:38	06:35	06:58-07:35/37	06:21	06:46-08:12/86	05:21	07:16-07:39/23	04:51
	16:30	17:28	18:21	17:24-17:53/29	20:17	19:01-19:17/16	21:09	05:57-06:32/35	21:46
16	08:24	07:36	06:32	06:56-07:34/38	06:19	06:44-08:12/88	05:19	07:18-07:36/18	04:51
	16:31	17:30	18:22	17:24-17:57/33	20:18	19:03-19:14/11	21:11	05:56-06:30/34	21:47
17	08:23	07:34	06:30	06:53-07:32/39	06:17	06:42-08:11/89	05:17	07:21-07:34/13	04:50
	16:33	17:32	18:24	17:23-17:58/35	20:20		21:12	05:56-06:29/33	21:47
18	08:22	07:31	06:28	06:51-07:30/39	06:14	06:39-08:10/91	05:16	05:57-06:28/31	04:50
	16:35	17:33	18:26	17:23-18:00/37	20:22		21:14		21:48
19	08:21	07:29	06:25	06:49-07:27/38	06:12	06:38-08:10/92	05:14	05:56-06:27/31	04:50
	16:36	17:35	18:28	17:22-18:01/39	20:24		21:15		21:48
20	08:20	07:27	06:23	06:46-07:26/40	06:10	06:35-08:10/95	05:13	05:57-06:26/29	04:50
	16:38	17:37	18:30	17:23-18:04/41	20:25		21:17		21:48
21	08:19	07:25	06:20	06:44-07:26/42	06:08	06:33-08:09/96	05:11	05:57-06:25/28	04:51
	16:40	17:39	18:32	17:23-18:06/43	20:27		21:19		21:48
22	08:18	07:23	06:18	06:41-07:24/43	06:05	06:31-08:08/97	05:10	05:57-06:22/25	04:51
	16:42	17:41	18:33	17:23-18:07/44	20:29		21:20		21:49
23	08:17	07:21	06:16	06:39-07:23/44	06:03	06:30-08:08/98	05:09	05:57-06:21/24	04:51
	16:43	17:43	18:35	17:25-18:09/44	20:31		21:22		21:49
24	08:15	07:19	06:13	06:36-07:21/45	06:01	06:28-08:07/99	05:07	05:58-06:21/23	04:51
	16:45	17:45	18:37	17:26-18:10/44	20:33		21:23		21:49
25	08:14	07:16	06:11	06:34-07:19/45	05:59	06:24-08:05/101	05:06	05:58-06:21/23	04:52
	16:47	17:47	18:39	17:28-18:12/44	20:34		21:24		21:49
26	08:13	07:14	06:08	06:33-07:17/44	05:57	06:21-08:04/103	05:05	05:59-06:21/22	04:52
	16:49	17:49	18:41	17:31-18:14/43	20:36		21:26		21:49
27	08:11	07:12	06:06	06:30-07:13/43	05:55	06:20-08:03/103	05:04	06:00-06:20/20	04:53
	16:51	17:51	18:42	17:34-18:16/42	20:38		21:27		21:49
28	08:10	07:10	06:04	06:28-07:12/44	05:53	07:03-08:01/58	05:03	06:00-06:19/19	04:53
	16:53	17:53	18:44	17:35-18:18/43	20:40	06:19-07:02/43	21:28		21:49
29	08:08		07:01	07:26-08:10/44	05:50	07:03-08:00/57	05:01	06:01-06:19/18	04:54
	16:55		19:46	18:36-19:19/43	20:42	06:18-07:02/44	21:30		21:49
30	08:07		06:59	07:23-08:09/46	05:48	07:04-07:59/55	05:00	06:02-06:18/16	04:54
	16:56		19:48	18:39-19:22/43	20:43	06:17-06:59/42	21:31		21:48
31	08:05		06:56	07:22-08:08/46			04:59	06:03-06:16/13	
	16:58		19:50	18:43-19:23/40			21:32		
Sonnenscheinstunden	253	275	367	418	491	506			
Anzahl Minuten mit Schatten	0	0	1741	2960	1615	24			

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
--------------	-----------------------	-------------------------	-------------------	----------------------------------	-----------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 1 - W1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55	05:33 07:21-07:55/34	06:26 06:55-08:11/76	07:18 07:44-08:16/32	07:14	08:08
	21:48	21:14 06:08-06:46/38	20:09 18:56-19:24/28	18:57 18:07-18:29/22	16:48	16:05
2	04:56	05:35 07:20-07:56/36	06:28 06:56-08:11/75	07:19 07:47-08:16/29	07:16	08:09
	21:48	21:12 06:09-06:50/41	20:07 18:55-19:25/30	18:55 18:07-18:26/19	16:46	16:04
3	04:56	05:37 07:18-07:57/39	06:29 06:59-08:09/70	07:21 07:47-08:14/27	07:18	08:11
	21:47	21:11 06:09-06:51/42	20:05 18:54-19:24/30	18:52 18:09-18:23/14	16:44	16:04
4	04:57	05:38 07:18-07:58/40	06:31 07:00-08:09/69	07:23 07:49-08:14/25	07:20	08:12
	21:47	21:09 06:10-06:52/42	20:02 18:53-19:24/31	18:50 18:12-18:19/7	16:42	16:03
5	04:58	05:40 07:17-08:00/43	06:33 07:02-08:08/66	07:25 07:51-08:13/22	07:22	08:14
	21:46	21:07 06:12-06:54/42	20:00 18:47-19:24/37	18:48	16:41	16:03
6	04:59	05:42 07:16-08:00/44	06:35 07:02-08:06/64	07:27 07:53-08:12/19	07:24	08:15
	21:46	21:05 06:13-06:54/41	19:57 18:45-19:23/38	18:45	16:39	16:02
7	05:00	05:43 07:16-08:01/45	06:36 07:04-08:05/61	07:28 07:55-08:10/15	07:26	08:16
	21:45	21:03 06:16-06:55/39	19:55 18:43-19:23/40	18:43	16:37	16:02
8	05:01	05:45 07:14-08:01/47	06:38 07:07-08:03/56	07:30 07:57-08:07/10	07:28	08:18
	21:44	21:01 06:18-06:57/39	19:53 18:41-19:22/41	18:40	16:35	16:01
9	05:02	05:47 07:14-08:02/48	06:40 07:07-08:01/54	07:32	07:29	08:19
	21:44	20:59 06:19-06:59/40	19:50 18:40-19:21/41	18:38	16:33	16:01
10	05:03 06:14-06:21/7	05:48 07:13-08:02/49	06:41 07:10-07:59/49	07:34	07:31	08:20
	21:43	20:57 06:19-07:00/41	19:48 18:39-19:20/41	18:36	16:32	16:01
11	05:04 06:13-06:23/10	05:50 07:13-08:04/51	06:43 07:12-07:58/46	07:35	07:33	08:21
	21:42	20:55 06:21-07:03/42	19:45 18:37-19:17/40	18:33	16:30	16:00
12	05:05 06:12-06:24/12	05:52 07:13-08:06/53	06:45 07:13-07:59/46	07:37	07:35	08:22
	21:41	20:53 06:23-07:05/42	19:43 18:36-19:15/39	18:31	16:28	16:00
13	05:06 06:11-06:25/14	05:53 07:12-08:07/55	06:47 07:14-08:00/46	07:39	07:37	08:23
	21:40	20:51 06:25-07:07/42	19:41 18:31-19:13/42	18:29	16:27	16:00
14	05:07 06:10-06:27/17	05:55 07:12-08:09/57	06:48 07:16-08:01/45	07:41	07:39	08:24
	21:39	20:49 06:26-07:10/44	19:38 18:27-19:10/43	18:27	16:25	16:00
15	05:09 06:09-06:27/18	05:57 07:11-08:09/58	06:50 07:17-08:01/44	07:43	07:41	08:25
	21:38	20:47 06:26-07:10/44	19:36 18:25-19:08/43	18:24	16:24	16:00
16	05:10 06:09-06:28/19	05:59 06:28-08:10/102	06:52 07:19-08:02/43	07:45	07:42	08:26
	21:37	20:45	19:33 18:24-19:06/42	18:22	16:22	16:00
17	05:11 06:09-06:30/21	06:00 06:29-08:12/103	06:53 07:21-08:05/44	07:46	07:44	08:27
	21:36	20:43	19:31 18:20-19:03/43	18:20	16:21	16:00
18	05:13 06:08-06:30/22	06:02 06:31-08:12/101	06:55 07:21-08:06/45	07:48	07:46	08:28
	21:35	20:41	19:28 18:17-19:01/44	18:17	16:19	16:01
19	05:14 06:08-06:31/23	06:04 06:34-08:13/99	06:57 07:23-08:08/45	07:50	07:48	08:28
	21:34	20:39	19:26 18:14-18:58/44	18:15	16:18	16:01
20	05:15 06:07-06:31/24	06:05 06:35-08:12/97	06:59 07:26-08:09/43	07:52	07:50	08:29
	21:32	20:36	19:24 18:11-18:55/44	18:13	16:17	16:01
21	05:17 06:07-06:32/25	06:07 06:36-08:13/97	07:00 07:26-08:09/43	07:54	07:51	08:30
	21:31	20:34	19:21 18:09-18:53/44	18:11	16:15	16:02
22	05:18 06:07-06:33/26	06:09 06:38-08:14/96	07:02 07:28-08:10/42	07:56	07:53	08:30
	21:30	20:32	19:19 18:08-18:51/43	18:09	16:14	16:02
23	05:20 06:06-06:35/29	06:11 06:39-08:13/94	07:04 07:30-08:11/41	07:57	07:55	08:31
	21:28	20:30	19:16 18:07-18:49/42	18:07	16:13	16:03
24	05:21 06:07-06:37/30	06:12 06:42-08:14/92	07:06 07:32-08:10/38	07:59	07:57	08:31
	21:27	20:28	19:14 18:06-18:46/40	18:04	16:12	16:03
25	05:22 06:06-06:37/31	06:14 06:43-08:14/91	07:07 07:33-08:12/39	07:01	07:58	08:31
	21:25	20:25	19:12 18:06-18:43/37	17:02	16:11	16:04
26	05:24 07:34-07:42/8	06:16 06:44-08:14/90	07:09 07:35-08:14/39	07:03	08:00	08:32
	21:24	20:23	19:09 18:05-18:41/36	17:00	16:10	16:05
27	05:26 07:30-07:46/16	06:17 06:46-08:14/88	07:11 07:37-08:15/38	07:05	08:02	08:32
	21:22	20:21 19:05-19:17/12	19:07 18:05-18:39/34	16:58	16:09	16:05
28	05:27 07:27-07:48/21	06:19 06:47-08:13/86	07:12 07:38-08:15/37	07:07	08:03	08:32
	21:21	20:18 19:01-18:18/17	19:04 18:05-18:35/30	16:56	16:08	16:06
29	05:29 07:26-07:50/24	06:21 06:50-08:13/83	07:14 07:40-08:16/36	07:09	08:05	08:32
	21:19	20:16 19:00-19:21/21	19:02 18:05-18:33/28	16:54	16:07	16:07
30	05:30 07:23-07:52/29	06:23 06:51-08:13/82	07:16 07:42-08:16/34	07:11	08:06	08:32
	21:18	20:14 18:59-19:23/24	18:59 18:06-18:31/25	16:52	16:06	16:08
31	05:32 07:23-07:54/31	06:24 06:52-08:12/80		07:12		08:32
	21:16	20:12 18:57-19:23/26		16:50		16:09
Sonnenscheinstunden	508	458	382	330	262	237
Anzahl Minuten mit Schatten	667	2899	2614	241	0	0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
--------------	-----------------------	-------------------------	-------------------	----------------------------------	-----------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 2 - W2

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:07 07:32-07:55/23	06:54 07:17-07:49/32	05:46	04:58
	16:10	17:00	17:55 16:30-17:26/56	19:51	20:45	21:34
2	08:32	08:02	07:05 07:29-07:54/25	06:52 07:15-07:48/33	05:44	04:58
	16:11	17:02	17:56 16:32-17:27/55	19:53	20:47	21:35
3	08:32	08:00	07:03 07:27-07:53/26	06:49 07:13-07:45/32	05:42	04:57
	16:13	17:04	17:58 16:33-17:29/56	19:55	20:49	21:36
4	08:32	07:58	07:01 07:25-07:53/28	06:47 07:10-07:43/33	05:40	04:56
	16:14	17:06	18:00 16:35-17:30/55	19:57	20:50	21:37
5	08:31	07:57	06:58 07:22-07:50/28	06:44 07:08-07:41/33	05:38	04:55
	16:15	17:08	18:02 16:39-17:32/53	19:59	20:52	21:38
6	08:31	07:55	06:56 07:20-07:52/32	06:42 07:05-07:38/33	05:37	04:54
	16:16	17:10	18:04 16:42-17:33/51	20:00	20:54	21:39
7	08:31	07:53	06:54 07:17-07:53/36	06:40 07:03-07:35/32	05:35	04:54
	16:18	17:12	18:06 16:44-17:35/51	20:02	20:56	21:40
8	08:30	07:51	06:51 07:15-07:54/39	06:37 07:01-07:34/33	05:33	04:53
	16:19	17:14	18:08 16:45-17:37/52	20:04	20:57	21:41
9	08:30	07:49	06:49 07:13-07:55/42	06:35 06:59-07:31/32	05:31	04:53
	16:20	17:16	18:10 16:47-17:43/56	20:06	20:59	21:42
10	08:29	07:47	06:47 07:10-07:55/45	06:33 06:56-07:28/32	05:29	04:52
	16:22	17:18	18:11 16:49-17:45/56	20:08	21:01	21:43
11	08:28	07:46	06:44 07:08-07:55/47	06:30 06:54-07:25/31	05:27	04:52
	16:23	17:20	18:13 16:54-17:47/53	20:09	21:02	21:43
12	08:28	07:44	06:42 07:05-07:55/50	06:28 06:52-07:24/32	05:26	04:51
	16:25	17:22	18:15 16:56-17:48/52	20:11	21:04	21:44
13	08:27	07:42 16:39-16:49/10	06:40 07:03-07:55/52	06:26 06:49-07:22/33	05:24	04:51
	16:26	17:24	18:17 16:56-17:50/54	20:13	21:06	21:45
14	08:26	07:40 16:36-16:52/16	06:37 07:01-07:55/54	06:23 06:47-07:20/33	05:22	04:51
	16:28	17:26	18:19 16:57-17:50/53	20:15	21:07	21:45
15	08:25	07:38 16:34-16:54/20	06:35 06:58-07:54/56	06:21 06:45-07:17/32	05:21	04:51
	16:30	17:28	18:21 16:57-17:51/54	20:17	21:09	21:46
16	08:24	07:36 16:33-16:58/25	06:32 06:56-07:54/58	06:19 06:44-07:15/31	05:19	04:50
	16:31	17:30	18:22 16:58-17:52/54	20:18	21:11	21:47
17	08:23	07:33 16:32-17:01/29	06:30 06:53-07:53/60	06:17 06:43-07:13/30	05:17	04:50
	16:33	17:31	18:24 16:59-17:51/52	20:20	21:12	21:47
18	08:22	07:31 16:30-17:03/33	06:28 06:51-07:52/61	06:14 06:42-07:11/29	05:16	04:50
	16:35	17:33	18:26 17:01-17:51/50	20:22	21:14	21:48
19	08:21	07:29 16:30-17:05/35	06:25 06:49-07:51/62	06:12 06:42-07:09/27	05:14	04:50
	16:36	17:35	18:28 17:03-17:50/47	20:24	21:15	21:48
20	08:20	07:27 16:29-17:06/37	06:23 06:46-07:49/63	06:10 06:42-07:07/25	05:13	04:50
	16:38	17:37	18:30 17:05-17:50/45	20:25	21:17	21:48
21	08:19	07:25 16:29-17:08/39	06:20 06:44-07:48/64	06:08 06:43-07:05/22	05:11	04:51
	16:40	17:39	18:32 17:06-17:51/45	20:27	21:18	21:48
22	08:18	07:23 16:29-17:10/41	06:18 06:41-07:46/65	06:05 06:43-07:04/21	05:10	04:51
	16:42	17:41	18:33 17:06-17:49/43	20:29	21:20	21:49
23	08:17	07:21 07:45-07:50/5	06:16 06:39-07:43/64	06:03 06:43-07:03/20	05:09	04:51
	16:43	17:43 16:28-17:12/44	18:35 17:06-17:49/43	20:31	21:21	21:49
24	08:15	07:19 07:43-07:52/9	06:13 06:36-07:42/66	06:01 06:44-07:01/17	05:07	04:51
	16:45	17:45 16:28-17:15/47	18:37 17:07-17:48/41	20:33	21:23	21:49
25	08:14	07:16 07:41-07:54/13	06:11 06:34-07:41/67	05:59 06:46-06:59/13	05:06	04:52
	16:47	17:47 16:29-17:18/49	18:39 17:08-17:47/39	20:34	21:24	21:49
26	08:12	07:14 07:39-07:55/16	06:08 06:32-07:39/67	05:57 06:46-06:56/10	05:05	04:52
	16:49	17:49 16:28-17:21/53	18:41 17:08-17:45/37	20:36	21:26	21:49
27	08:11	07:12 07:36-07:54/18	06:06 07:11-07:36/25 17:10-17:44/34	05:55	05:04	04:53
	16:51	17:51 16:29-17:23/54	18:42 06:29-07:06/37	20:38	21:27	21:49
28	08:10	07:10 07:34-07:55/21	06:04 07:14-07:34/20 17:13-17:43/30	05:53	05:03	04:53
	16:53	17:53 16:30-17:26/56	18:44 06:27-07:03/36	20:40	21:28	21:49
29	08:08		07:01 08:16-08:29/13 18:25-18:39/14	05:50	05:01	04:54
	16:55		19:46 07:24-07:57/33 18:17-18:23/6	20:42	21:30	21:49
30	08:07		06:59 07:22-07:53/31	05:48	05:00	04:54
	16:56		19:48 18:31-18:34/3	20:43	21:31	21:48
31	08:05		06:56 07:20-07:51/31		04:59	
	16:58		19:50		21:32	
Sonnenscheinstunden	253	275	367	418	491	506
Anzahl Minuten mit Schatten	0	670	2896	731	0	0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 2 - W2

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember		
1	04:55 21:48	05:33 21:14	06:26 20:09	06:53-07:24/31	07:18 18:57	08:35/51 17:36-18:29/53	07:14 16:48	08:08 16:05
2	04:56 21:48	05:35 21:12	06:28 20:07	06:55-07:27/32	07:19 18:55	07:46-08:33/47	07:16 16:46	08:09 16:04
3	04:56 21:47	05:37 21:11	06:29 20:05	06:56-07:28/32	07:21 18:52	07:47-08:33/46	07:18 16:44	08:11 16:04
4	04:57 21:47	05:38 21:09	06:31 20:02	06:58-07:31/33	07:23 18:50	07:49-08:32/43	07:20 16:42	08:12 16:03
5	04:58 21:46	05:40 21:07	06:33 20:00	07:00-07:32/32	07:25 18:47	07:51-08:31/40	07:22 16:41	08:14 16:03
6	04:59 21:46	05:42 21:05	06:35 19:57	07:01-07:34/33	07:27 18:45	07:53-08:30/37	07:24 16:39	08:15 16:02
7	05:00 21:45	05:43 21:03	06:36 19:55	07:03-07:36/33	07:28 18:43	07:55-08:29/34	07:26 16:37	08:16 16:02
8	05:01 21:44	05:45 21:01	06:38 19:53	07:05-07:38/33	07:30 18:40	07:56-08:26/30	07:28 16:35	08:17 16:01
9	05:02 21:44	05:47 20:59	06:40 19:50	07:06-07:38/32	07:32 18:38	07:58-08:26/28	07:29 16:33	08:19 16:01
10	05:03 21:43	05:48 20:57	06:41 19:48	07:08-07:41/33	07:34 18:36	08:00-08:27/27	07:31 16:32	08:20 16:01
11	05:04 21:42	05:50 20:55	06:43 19:45	07:10-07:42/32	07:35 18:33	08:02-08:28/26	07:33 16:30	08:21 16:00
12	05:05 21:41	05:52 20:53	06:45 19:43	07:11-07:43/32	07:37 18:31	08:04-08:28/24	07:35 16:28	08:22 16:00
13	05:06 21:40	05:53 20:51	06:47 19:41	07:13-07:44/31	07:39 18:29	08:06-08:28/22	07:37 16:27	08:23 16:00
14	05:07 21:39	05:55 20:49	06:48 19:38	08:08-08:18/10 18:16-18:29/13	07:41 18:27	08:08-08:28/20 17:02-17:57/55	07:39 16:25	08:24 16:00
15	05:09 21:38	05:57 20:47	06:50 19:36	08:03-08:23/20 18:03-18:32/29	07:43 18:24	08:10-08:27/17 17:01-17:55/54	07:41 16:24	08:25 16:00
16	05:10 21:37	05:59 20:45	06:52 19:33	08:01-08:25/24 18:00-18:33/33	07:45 18:22	08:11-08:26/15 17:00-17:53/53	07:42 16:22	08:26 16:00
17	05:11 21:36	06:00 20:43	06:53 19:31	07:59-08:27/28 17:57-18:34/37	07:46 18:20	08:13-08:25/12 17:00-17:47/47	07:44 16:21	08:27 16:00
18	05:13 21:35	06:02 20:41	06:55 19:28	07:21-08:28/67	07:48 18:17	08:15-08:23/8 17:00-17:45/45	07:46 16:19	08:28 16:01
19	05:14 21:34	06:04 20:39	06:57 19:26	07:23-08:29/66	07:50 18:15	08:17-08:21/4 16:59-17:42/43	07:48 16:18	08:28 16:01
20	05:15 21:32	06:05 20:36	06:59 19:24	07:25-08:30/65	07:52 18:13	16:59-17:39/40	07:50 16:17	08:29 16:01
21	05:17 21:31	06:07 20:34	07:00 19:21	07:26-08:31/65	07:54 18:11	17:00-17:37/37	07:51 16:15	08:30 16:02
22	05:18 21:30	06:09 20:32	07:02 19:19	07:28-08:32/64	07:56 18:09	17:00-17:36/36	07:53 16:14	08:30 16:02
23	05:20 21:28	06:11 20:30	07:04 19:16	07:30-08:34/64	07:57 18:07	17:00-17:35/35	07:55 16:13	08:31 16:03
24	05:21 21:27	06:12 20:28	07:06 19:14	07:31-08:34/63	07:59 18:04	17:01-17:33/32	07:57 16:12	08:31 16:03
25	05:22 21:25	06:14 20:25	07:07 19:11	07:33-08:35/62	07:01 17:02	16:02-16:30/28	07:58 16:11	08:31 16:04
26	05:24 21:24	06:16 20:23	07:09 19:09	07:35-08:35/60	07:03 17:00	16:03-16:27/24	08:00 16:10	08:32 16:05
27	05:26 21:22	06:17 20:21	07:11 19:07	07:37-08:36/59	07:05 16:58	16:04-16:23/19	08:02 16:09	08:32 16:05
28	05:27 21:21	06:19 20:18	07:12 19:04	07:38-08:35/57	07:07 16:56	16:06-16:21/15	08:03 16:08	08:32 16:06
29	05:29 21:19	06:21 20:16	07:14 19:02	07:40-08:35/55	07:09 16:54	16:10-16:18/8	08:05 16:07	08:32 16:07
30	05:30 21:17	06:23 20:14	07:16 18:59	07:42-08:35/53	07:11 16:52		08:06 16:06	08:32 16:08
31	05:32 21:16	06:24 20:12	07:18 18:57	07:44-08:35/51	07:13 16:50		08:08 16:09	08:32 16:09
Sonnenscheinstunden		508	458	382	330	262	237	
Anzahl Minuten mit Schatten		0	377	2172	1806	0	0	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 3 - W3

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:32 09:06-09:13/7 16:10 14:51-15:33/42	08:03 07:07 17:00 17:55	07:07 17:55 17:00 17:55	06:54 07:17-07:46/29 19:51 18:52-19:20/28	05:46 06:12-07:02/50 20:45 19:14-20:07/53	04:58 05:47-06:01/14 21:34 19:47-20:03/16	
2	08:32 09:05-09:13/8 16:11 14:52-15:35/43	08:02 07:05 17:02 17:56	07:05 17:56 17:02 17:56	06:52 07:15-07:43/28 19:53 18:51-19:21/30	05:44 06:10-07:02/52 20:47 19:16-20:08/52	04:58 05:49-06:01/12 21:35 19:49-20:03/14	
3	08:32 09:05-09:14/9 16:13 14:53-15:36/43	08:00 07:03 17:04 17:58	07:03 17:58 17:04 17:58	06:49 07:13-07:42/29 19:55 18:49-19:27/58	05:42 06:08-07:02/54 20:49 19:17-20:09/52	04:57 05:49-06:00/11 21:36 19:50-20:01/11	
4	08:32 09:05-09:15/10 16:14 14:53-15:37/44	07:58 07:01 17:06 18:00	07:01 18:00 17:06 18:00	06:47 07:10-07:40/30 19:57 18:48-19:29/41	05:40 06:06-07:02/56 20:50 19:18-20:10/52	04:56 05:50-05:59/9 21:37 19:52-19:59/7	
5	08:31 09:04-09:16/12 16:15 14:55-15:39/44	07:57 06:58 17:08 18:02	06:58 18:02 17:08 18:02	06:44 07:08-07:40/32 19:59 18:47-19:31/44	05:38 06:04-07:01/57 20:52 19:18-20:10/52	04:55 05:52-05:58/6 21:38	
6	08:31 09:03-09:16/13 16:16 14:56-15:40/44	07:55 06:56 17:10 18:04	06:56 18:04 17:10 18:04	06:42 07:05-07:38/33 20:00 18:46-19:31/45	05:37 06:03-07:01/58 20:54 19:19-20:10/51	04:54 05:54-05:56/2 21:39	
7	08:31 09:03-09:17/14 16:18 14:58-15:42/44	07:53 06:54 17:12 18:06	06:54 18:06 17:12 18:06	06:40 07:03-07:36/33 20:02 18:45-19:32/47	05:35 06:04-07:01/57 20:56 19:21-20:11/50	04:54 21:40	
8	08:30 09:02-09:18/16 16:19 14:59-15:43/44	07:51 06:51 17:14 18:08	06:51 18:08 17:14 18:08	06:37 07:01-07:34/33 20:04 18:45-19:33/48	05:33 06:03-07:00/57 20:57 19:21-20:11/50	04:53 21:41	
9	08:30 09:01-09:18/17 16:20 15:02-15:44/42	07:49 06:49 17:16 18:10	06:49 18:10 17:16 18:10	06:35 06:58-07:31/33 20:06 18:44-19:33/49	05:31 06:03-06:59/56 20:59 19:23-20:11/48	04:53 21:42	
10	08:29 09:01-09:19/18 16:22 15:04-15:46/42	07:47 06:47 17:18 18:11	06:47 18:11 17:18 18:11	06:33 06:56-07:29/33 20:08 18:44-19:36/52	05:29 06:04-07:00/56 21:01 19:24-20:11/47	04:52 21:43	
11	08:28 09:00-09:20/20 16:23 15:06-15:48/42	07:46 06:44 17:20 18:13	06:44 18:13 17:20 18:13	06:30 06:54-07:28/34 20:09 18:44-19:35/55	05:27 06:04-06:58/54 21:02 05:54-05:55/1	19:27-20:12/45 21:43	
12	08:28 09:00-09:20/20 16:25 15:09-15:50/41	07:44 06:42 17:22 18:15	06:42 18:15 17:22 18:15	06:28 06:52-07:26/34 20:11 18:44-19:40/56	05:26 06:04-06:57/53 21:04 05:52-05:58/6	19:33-20:12/39 21:44	
13	08:27 09:01-09:21/20 16:26 15:10-15:51/41	07:42 06:40 17:24 18:17	06:40 18:17 17:24 18:17	06:26 06:49-07:24/35 20:13 18:44-19:41/57	05:24 06:05-06:57/52 21:06 05:51-06:00/9	19:35-20:12/37 21:45	
14	08:26 09:01-09:21/20 16:28 15:11-15:53/42	07:40 06:37 17:26 18:19	06:37 18:19 17:26 18:19	06:23 06:47-07:22/35 20:15 18:45-19:46/61	05:22 06:05-06:56/51 21:07 05:49-06:01/12	19:35-20:12/37 21:46	
15	08:25 09:01-09:21/20 16:30 15:13-15:55/42	07:38 06:35 17:28 18:21	06:35 18:21 17:28 18:21	06:21 06:45-07:20/35 20:17 18:45-19:49/64	05:21 06:06-06:55/49 21:09 05:48-06:02/14	19:36-20:12/36 21:46	
16	08:24 09:02-09:22/20 16:31 15:15-15:57/42	07:36 06:32 17:30 18:22	06:32 18:22 17:30 18:22	06:19 06:43-07:17/34 20:18 18:46-19:50/64	05:19 06:07-06:53/46 21:11 05:46-06:02/16	19:35-20:11/36 21:47	
17	08:23 09:03-09:22/19 16:33 15:17-15:58/41	07:34 06:30 17:31 18:24	06:30 18:24 17:31 18:24	06:17 06:40-07:14/34 20:20 18:46-19:52/66	05:17 06:09-06:52/43 21:12 05:45-06:03/18	19:36-20:11/35 21:47	
18	08:22 09:03-09:21/18 16:35 15:19-15:59/40	07:31 06:28 17:33 18:26	06:28 18:26 17:33 18:26	06:14 06:38-07:13/35 20:22 18:48-19:53/65	05:16 06:17-06:51/34 21:14 05:44-06:04/20	19:36-20:11/35 21:48	
19	08:21 09:03-09:22/19 16:36 15:22-15:59/37	07:29 06:25 17:35 18:28	06:25 18:28 17:35 18:28	06:12 06:36-07:10/34 20:24 18:49-19:54/65	05:14 06:17-06:48/31 21:15 05:43-06:04/21	19:37-20:11/34 21:48	
20	08:20 09:05-09:22/17 16:38 15:25-16:00/35	07:27 06:23 17:37 18:30	06:23 18:30 17:37 18:30	06:10 06:34-07:09/35 20:25 18:52-19:55/63	05:13 06:18-06:48/30 21:17 05:43-06:04/21	19:37-20:11/34 21:48	
21	08:19 09:05-09:21/16 16:40 15:26-15:59/33	07:25 06:20 17:39 18:32	06:20 06:44-06:51/7 18:32	06:08 06:32-07:07/35 20:27 18:55-19:56/61	05:11 06:19-06:48/29 21:19 05:44-06:05/21	19:37-20:10/33 21:48	
22	08:18 09:06-09:21/15 16:42 15:28-16:00/32	07:23 06:18 17:41 18:33	06:18 06:41-06:52/11 18:33	06:05 06:30-07:06/36 20:29 19:00-19:58/58	05:10 06:19-06:46/27 21:20 05:43-06:04/21	19:38-20:09/31 21:49	
23	08:17 09:07-09:19/12 16:43 15:31-15:59/28	07:21 06:16 17:43 18:35	06:16 06:39-06:53/14 18:35	06:03 06:28-07:05/37 20:31 19:00-19:58/58	05:09 06:19-06:46/27 21:21 05:43-06:04/21	19:39-20:09/30 21:49	
24	08:15 09:09-09:19/10 16:45 15:34-15:59/25	07:19 06:13 17:45 18:37	06:13 06:36-06:53/17 18:37	06:01 06:26-07:04/38 20:33 19:01-19:59/58	05:07 06:20-06:45/25 21:23 05:43-06:04/21	19:39-20:09/30 21:49	
25	08:14 09:13-09:15/2 16:47 15:36-15:58/22	07:16 06:11 17:47 18:39	06:11 06:34-06:54/20 18:39	05:59 06:24-07:01/37 20:34 19:02-20:01/59	05:06 06:21-06:45/24 21:24 05:44-06:04/20	19:40-20:09/29 21:49	
26	08:13 15:43-15:58/15 16:49 17:49	07:14 06:08 17:49 18:41	06:08 06:32-06:54/22 18:41	05:57 06:21-07:00/39 20:36 19:04-20:03/59	05:05 06:23-06:44/21 21:26 05:44-06:04/20	19:41-20:08/27 21:49	
27	08:11 15:45-15:57/12 16:51 17:51	07:12 06:06 17:51 18:42	06:06 06:29-06:53/24 18:42	05:55 06:19-07:00/41 20:38 19:07-20:04/57	05:04 06:24-06:43/19 21:27 05:45-06:04/19	19:42-20:08/26 21:49	
28	08:10 15:47-15:55/8 16:53 18:44	07:10 06:04 17:53 18:44	06:04 06:27-06:53/26 18:44	05:53 06:17-07:01/44 20:40 19:12-20:05/53	05:03 06:25-06:42/17 21:28 05:45-06:03/18	19:43-20:07/24 21:49	
29	08:08 16:55	07:01 07:24-07:51/27 18:44	07:01 07:24-07:51/27 18:44	05:50 06:16-07:01/45 20:42 19:13-20:06/53	05:01 06:26-06:41/15 21:30 05:46-06:03/17	19:44-20:06/22 21:49	
30	08:07 16:56	06:59 07:22-07:51/29 18:42	06:59 07:22-07:51/29 18:42	05:48 06:14-07:02/48 20:43 19:14-20:07/53	05:00 06:28-06:39/11 21:31 05:46-06:02/16	19:45-20:05/20 21:48	
31	08:05 16:58	06:56 07:20-07:49/29 18:54-19:18/24	06:56 07:20-07:49/29 18:54-19:18/24	04:59 06:31-06:36/5 21:32 05:46-06:02/16	04:59 06:31-06:36/5 21:32 05:46-06:02/16	19:46-20:04/18 21:48	
	Sonnenscheinstunden Anzahl Minuten mit Schatten	253 1382	275 0	367 278	419 2665	491 2729	506 102

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
--------------	-----------------------	-------------------------	-------------------	----------------------------------	-----------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 3 - W3

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55	05:33 06:14-07:08/54 19:39-20:22/43	06:26 06:53-07:27/34	07:18	07:14	08:08 08:42-09:02/20
2	21:48	21:14 06:03-06:08/5	20:09 18:43-19:38/55	18:57	16:48	16:05 14:49-15:30/41
3	04:56	05:35 06:14-07:09/55	06:28 06:55-07:28/33	07:19	07:16	08:09 08:43-09:01/18
4	21:48	21:12 19:36-20:22/46	20:07 18:43-19:34/51	18:55	16:46	16:04 14:47-15:29/42
5	04:56	05:37 06:13-07:09/56	06:29 06:56-07:29/33	07:21	07:18	08:11 08:45-09:02/17
6	21:47	21:11 19:34-20:22/48	20:05 18:42-19:31/49	18:52	16:44	16:04 14:46-15:28/42
7	04:57	05:38 06:13-07:10/57	06:31 06:58-07:31/33	07:23	07:20	08:12 08:46-09:02/16
8	21:47	21:09 19:32-20:22/50	20:02 18:42-19:30/48	18:50	16:42	16:03 14:43-15:27/44
9	04:58	05:40 06:14-07:11/57	06:33 07:00-07:33/33	07:25	07:22	08:14 08:48-09:02/14
10	21:46	21:07 19:30-20:21/51	20:00 18:41-19:28/47	18:47	16:40	16:03 14:43-15:27/44
11	04:59	05:42 06:13-07:11/58	06:35 07:01-07:34/33	07:27	07:24	08:15 08:49-09:02/13
12	21:46	21:05 19:30-20:21/51	19:57 18:42-19:27/45	18:45	16:39	16:02 14:42-15:26/44
13	05:00 05:59-06:04/5	05:43 06:14-07:11/57	06:36 07:03-07:35/32	07:28	07:26	08:16 08:51-09:03/12
14	21:45	21:03 19:28-20:20/52	19:55 18:42-19:26/44	18:43	16:37	16:02 14:42-15:26/44
15	05:01 05:58-06:06/8	05:45 06:14-07:11/57	06:38 07:05-07:35/30	07:30	07:28	08:18 08:52-09:02/10
16	21:44 20:01-20:05/4	21:01 19:28-20:19/51	19:53 18:42-19:24/42	18:40	16:35	16:01 14:42-15:25/43
17	05:02 05:57-06:07/10	05:47 06:16-07:11/55	06:40 07:06-07:35/29	07:32	07:29	08:19 08:53-09:02/9
18	21:44 19:59-20:08/9	20:59 19:27-20:19/52	19:50 18:43-19:21/38	18:38	16:33	16:01 14:41-15:24/43
19	05:03 05:56-06:08/12	05:48 06:17-07:10/53	06:41 07:08-07:36/28	07:34	07:31	08:20 08:55-09:03/8
20	21:43 19:57-20:10/13	20:57 19:25-20:17/52	19:48 18:44-19:17/33	18:36	16:32	16:01 14:41-15:24/43
21	05:04 05:56-06:09/13	05:50 06:19-07:10/51	06:43 07:10-07:39/29	07:35	07:33	08:21 08:56-09:03/7
22	21:42 19:56-20:11/15	20:55 19:24-20:17/53	19:45 18:44-19:12/28	18:33	16:30	16:00 14:42-15:24/42
23	05:05 05:55-06:10/15	05:52 06:21-07:11/50	06:45 07:11-07:40/29	07:37	07:35	08:22 08:57-09:03/6
24	21:41 19:55-20:12/17	20:53 19:23-20:15/52	19:43 18:46-19:10/24	18:31	16:28	16:00 14:42-15:24/42
25	05:06 06:38-06:46/8 19:54-20:13/19	05:53 06:22-07:10/48	06:47 07:13-07:42/29	07:39	07:37	08:23 08:58-09:03/5
26	21:40 05:55-06:11/16	20:51 19:22-20:15/53	19:41 18:48-19:08/20	18:29	16:27	16:00 14:42-15:24/42
27	05:07 06:36-06:48/12 19:53-20:14/21	05:55 06:24-07:09/45	06:48 07:15-07:43/28	07:41	07:39	15:20-15:28/8
28	21:39 05:54-06:11/17	20:49 19:21-20:14/53	19:38 18:51-19:04/13	18:26	16:25	16:00 14:42-15:24/42
29	05:09 06:34-06:50/16 19:52-20:15/23	05:57 06:25-07:08/43	06:50 07:16-07:42/26	07:43	07:41	15:18-15:30/12
30	21:38 05:54-06:12/18	20:47 19:18-20:13/55	19:36	18:24	16:24	16:00 14:43-15:24/41
31	05:10 06:33-06:51/18 19:51-20:16/25	05:59 06:27-07:08/41	06:52 07:18-07:43/25	07:45	07:42	15:16-15:31/15
32	21:37 05:53-06:12/19	20:45 19:13-20:12/59	19:33	18:22	16:22	16:00 14:43-15:24/41
33	05:11 06:33-06:53/20 19:50-20:16/26	06:00 06:29-07:08/39	06:53 07:20-07:43/23	07:46	07:44	08:46-08:49/3
34	21:36 05:54-06:13/19	20:43 19:10-20:09/59	19:31	18:20	16:21	15:10-15:32/12
35	05:12 06:31-06:54/23 19:50-20:18/28	06:02 06:30-07:08/38	06:55 07:21-07:41/20	07:48	07:46	08:43-08:53/10
36	21:35 05:54-06:14/20	20:41 19:08-20:07/59	19:28	18:17	16:19	15:08-15:33/25
37	05:14 06:30-06:55/25 19:49-20:18/29	06:04 06:32-07:09/37	06:57 07:23-07:41/18	07:50	07:48	08:42-08:54/12
38	21:34 05:53-06:14/21	20:39 19:07-20:05/58	19:26	18:15	16:18	15:06-15:34/28
39	05:15 06:29-06:55/26 19:49-20:19/30	06:05 06:33-07:10/37	06:59 07:25-07:40/15	07:52	07:50	08:41-08:56/15
40	21:32 05:53-06:14/21	20:36 19:05-20:03/58	19:24	18:13	16:17	15:03-15:35/32
41	05:17 06:30-06:57/27 19:49-20:20/31	06:07 06:35-07:11/36	07:00 07:26-07:38/12	07:54	07:51	08:41-08:57/16
42	21:31 05:54-06:14/20	20:34 19:04-20:02/58	19:21	18:11	16:15	15:02-15:35/33
43	05:18 06:29-06:57/28 19:48-20:20/32	06:09 06:37-07:12/35	07:02 07:28-07:36/8	07:56	07:53	08:41-08:58/17
44	21:30 05:53-06:14/21	20:32 18:59-20:00/61	19:19	18:09	16:14	15:01-15:36/35
45	05:19 06:28-06:57/29 19:47-20:20/33	06:11 06:38-07:13/35	07:04 07:30-07:32/2	07:57	07:55	08:41-08:59/18
46	21:28 05:53-06:14/21	20:30 18:55-19:58/63	19:16	18:07	16:13	14:58-15:35/37
47	05:21 06:28-06:59/31 19:48-20:21/33	06:12 06:40-07:14/34	07:06	07:59	07:57	08:41-09:00/19
48	21:27 05:54-06:15/21	20:28 18:53-19:58/65	19:14	18:04	16:12	14:56-15:36/40
49	05:22 06:27-06:59/32 19:47-20:21/34	06:14 06:42-07:17/35	07:07	07:01	07:58	08:40-08:59/19
50	21:25 05:54-06:14/20	20:25 18:50-19:56/66	19:11	17:02	16:11	14:55-15:36/41
51	05:24 06:27-07:02/35 05:55-06:14/19	06:16 06:43-07:17/34	07:09	07:03	08:00	08:40-09:00/20
52	21:24 06:22-06:25/3 19:46-20:21/35	20:23 18:49-19:54/65	19:09	17:00	16:10	14:53-15:35/42
53	05:25 06:19-07:03/44 19:46-20:22/36	06:17 06:45-07:19/34	07:11	07:05	08:02	08:41-09:01/20
54	21:22 05:56-06:14/18	20:21 18:48-19:52/64	19:07	16:58	16:09	14:52-15:34/42
55	05:26 06:18-07:04/46 19:46-20:22/36	06:19 06:46-07:21/35	07:12	07:07	08:03	08:41-09:01/20
56	21:21 05:58-06:14/16	20:18 18:46-19:49/63	19:04	16:56	16:08	14:51-15:33/42
57	05:29 06:16-07:06/50 19:46-20:22/36	06:21 06:48-07:23/35	07:14	07:09	08:05	08:41-09:01/20
58	21:19 05:59-06:12/13	20:16 18:45-19:46/61	19:02	16:54	16:07	14:50-15:32/42
59	05:30 06:15-07:06/51 19:45-20:22/37	06:23 06:50-07:25/35	07:16	07:11	08:06	08:41-09:01/20
60	21:17 06:00-06:11/11	20:14 18:45-19:42/57	18:59	16:52	16:06	14:50-15:31/41
61	05:32 06:15-07:08/53 19:45-20:22/37	06:24 06:51-07:25/34		07:12		08:32 09:06-09:11/5
62	21:16 06:02-06:10/8	20:12 18:44-19:40/56		16:50		16:09 14:51-15:32/41
Sonnenscheinstunden	509	458	382	330	262	237
Anzahl Minuten mit Schatten	1618	3109	1119	0	766	1469

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 4 - W4

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32 09:40-10:00/20 16:10	08:03 17:00	07:07 17:55	06:54 07:20-07:54/34 19:51 19:09-19:25/16	05:46 06:15-07:10/55 20:45 19:37-20:00/23	04:58 05:30-06:20/50 21:34
2	08:32 09:40-09:59/19 16:11	08:02 17:02	07:05 17:56	06:52 07:18-07:54/36 19:53 19:08-19:27/19	05:44 06:13-07:06/53 20:47 19:39-20:00/21	04:58 05:30-06:19/49 21:35
3	08:32 09:41-10:00/19 16:13	08:00 17:04	07:03 17:58	06:49 07:15-07:54/39 19:55 19:06-19:28/22	05:42 06:11-07:04/53 20:49 19:39-19:59/20	04:57 05:29-06:17/48 21:36
4	08:32 09:43-10:00/17 16:14	07:58 17:06	07:01 18:00	06:47 07:12-07:52/40 19:57 19:05-19:30/25	05:40 06:09-07:02/53 20:50 19:40-19:58/18	04:56 05:29-06:17/48 21:37
5	08:32 09:43-10:00/17 16:15	07:57 18:02	06:58 18:02	06:44 07:10-07:52/42 19:59 19:05-19:32/27	05:38 06:06-07:00/54 20:52 19:41-19:57/16	04:55 05:29-06:17/48 21:38
6	08:31 09:44-09:59/15 16:16	07:55 17:10	06:56 18:04	06:42 07:07-07:50/43 20:00 19:04-19:33/29	05:37 06:04-06:58/54 20:54 19:42-19:55/13	04:54 05:27-06:16/49 21:39
7	08:31 09:45-09:59/14 16:18	07:53 17:12	06:54 18:06	06:40 07:05-07:49/44 20:02 19:04-19:35/31	05:35 06:03-06:57/54 20:56 19:45-19:53/8	04:54 05:27-06:17/50 21:40
8	08:30 09:46-09:58/12 16:19	07:51 17:14	06:51 18:08	06:37 07:03-07:48/45 20:04 19:04-19:37/33	05:33 06:01-06:55/54 20:57	04:53 05:26-06:16/50 21:41
9	08:30 09:48-09:57/9 16:20	07:49 17:16	06:49 18:10	06:35 07:01-07:46/45 20:06 19:03-19:38/35	05:31 05:59-06:54/55 20:59	04:53 05:26-06:16/50 21:42
10	08:29 09:51-09:56/5 16:22	07:47 17:18	06:47 18:11	06:33 06:58-07:41/43 20:08 19:04-19:40/36	05:29 05:57-06:54/57 21:01	04:52 05:25-06:16/51 21:43
11	08:28 16:23	07:46 17:20	06:44 18:13	06:30 06:56-07:38/42 20:09 19:04-19:42/38	05:27 05:55-06:52/57 21:02	04:52 05:25-06:16/51 21:43
12	08:28 16:25	07:44 17:22	06:42 18:15	06:28 06:54-07:38/44 20:11 19:05-19:43/38	05:26 05:54-06:50/56 21:04	04:51 05:25-06:16/51 21:44
13	08:27 16:26	07:42 17:24	06:40 18:17	06:26 06:51-07:36/45 20:13 19:06-19:45/39	05:24 05:53-06:50/57 21:06	04:51 05:25-06:16/51 21:45
14	08:26 16:28	07:40 17:26	06:37 18:19	06:23 06:49-07:36/47 20:15 19:08-19:47/39	05:22 05:51-06:48/57 21:07	04:51 05:24-06:15/51 21:46
15	08:25 16:30	07:38 17:28	06:35 18:21	06:21 06:47-07:35/48 20:17 19:12-19:49/37	05:21 05:50-06:48/58 21:09	04:51 05:24-06:15/51 21:46
16	08:24 16:31	07:36 17:30	06:32 18:22	06:19 06:45-07:35/50 20:18 19:14-19:50/36	05:19 05:48-06:47/59 21:11	04:50 05:24-06:15/51 21:47
17	08:23 16:33	07:34 17:32	06:30 18:24	06:17 06:43-07:33/50 20:20 19:14-19:52/38	05:17 05:46-06:47/61 21:12	04:50 05:25-06:16/51 21:47
18	08:22 16:35	07:31 17:33	06:28 18:26	06:14 06:40-07:32/52 20:22 19:16-19:54/38	05:16 05:45-06:47/62 21:14	04:50 05:25-06:16/51 21:48
19	08:21 16:36	07:29 17:35	06:25 18:28	06:12 06:39-07:30/51 20:24 19:20-19:56/36	05:14 05:43-06:45/62 21:15	04:50 05:25-06:16/51 21:48
20	08:20 16:38	07:27 17:37	06:23 18:30	06:10 06:37-07:29/52 20:26 19:23-19:58/35	05:13 05:43-06:44/61 21:17	04:50 05:26-06:17/51 21:48
21	08:19 16:40	07:25 17:39	06:20 18:32	06:08 06:35-07:26/51 20:27 19:24-19:59/35	05:11 05:42-06:44/62 21:19	04:51 05:26-06:18/52 21:49
22	08:18 16:42	07:23 17:41	06:18 18:33	06:05 06:33-07:24/51 20:29 19:25-20:01/36	05:10 05:39-06:42/63 21:20	04:51 05:26-06:18/52 21:49
23	08:17 16:43	07:21 17:43	06:16 18:35	06:03 06:31-07:21/50 20:31 19:25-20:01/36	05:09 05:37-06:42/65 21:22	04:51 05:26-06:17/51 21:49
24	08:15 16:45	07:19 17:45	06:13 18:37	06:01 06:30-07:20/50 20:33 19:26-20:01/35	05:07 05:36-06:41/65 21:23	04:51 05:27-06:17/50 21:49
25	08:14 16:47	07:16 17:47	06:11 06:38-06:48/10 18:39	05:59 06:28-07:18/50 20:34 19:27-20:02/35	05:06 05:35-06:41/66 21:24	04:52 05:27-06:18/51 21:49
26	08:13 16:49	07:14 17:49	06:08 06:34-06:51/17 18:41	05:57 06:24-07:16/52 20:36 19:29-20:02/33	05:05 05:35-06:40/65 21:26	04:52 05:27-06:17/50 21:49
27	08:11 16:51	07:12 17:51	06:06 06:32-06:52/20 18:42	05:55 06:22-07:15/53 20:38 19:31-20:02/31	05:04 05:34-06:39/65 21:27	04:52 05:27-06:18/51 21:49
28	08:10 16:53	07:10 18:44	06:04 06:29-06:53/24 17:53	05:53 06:20-07:14/54 20:40 19:35-20:02/27	05:03 05:34-06:38/64 21:29	04:53 05:27-06:18/51 21:49
29	08:08 16:55	 19:46	07:01 07:27-07:53/26 19:46	05:50 06:18-07:13/55 20:42 19:37-20:01/24	05:01 05:33-06:36/63 21:30	04:54 05:28-06:19/51 21:49
30	08:07 16:56	 19:48	06:59 07:25-07:54/29 19:48	05:48 06:16-07:12/56 20:43 19:37-20:01/24	05:00 06:27-06:34/7 21:31	04:54 05:29-06:20/51 21:48
31	08:05 16:58	 19:50	06:56 07:23-07:54/31 19:50	05:47 06:15-07:11/55 19:50 19:11-19:23/12	04:59 05:31-06:21/50 21:32	04:54 05:29-06:20/51 21:48
Sonnenscheinstunden	253	275	367	419	491	506
Anzahl Minuten mit Schatten	147	0	174	2377	1936	1513

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
--------------	-----------------------	-------------------------	-------------------	----------------------------------	-----------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 4 - W4

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55 05:29-06:20/51 21:48	05:33 06:05-07:01/56 21:14	06:26 06:55-07:37/42 20:09	07:18 07:14 08:08 18:57 16:48 16:05		
2	04:56 05:30-06:21/51 21:48	05:35 06:06-07:03/57 21:12	06:28 06:57-07:40/43 20:07	07:19 07:16 08:09 18:55 16:46 16:04		09:33-09:38/5
3	04:56 05:31-06:21/50 21:47	05:37 06:07-07:03/56 21:11	06:29 06:58-07:43/45 20:05	07:21 07:18 08:11 18:52 16:44 16:04		09:32-09:41/9
4	04:57 05:31-06:21/50 21:47	05:38 06:10-07:05/55 21:09	06:31 07:00-07:45/45 20:02	07:23 07:20 08:12 18:50 16:42 16:03		09:31-09:42/11
5	04:58 05:32-06:22/50 21:46	05:40 06:12-07:06/54 21:07	06:33 07:02-07:46/44 20:00	07:25 07:22 08:14 18:48 16:41 16:03		09:30-09:44/14
6	04:59 05:33-06:23/50 21:46	05:42 06:13-07:07/54 21:05	06:35 07:03-07:46/43 19:57	07:27 07:24 08:15 18:45 16:39 16:02		09:30-09:45/15
7	05:00 05:34-06:23/49 21:45	05:43 06:15-07:09/54 21:03	06:36 07:05-07:47/42 19:55	07:28 07:26 08:16 18:43 16:37 16:02		09:30-09:47/17
8	05:01 05:36-06:24/48 21:44	05:45 06:16-07:10/54 21:01	06:38 07:07-07:48/41 19:53	07:30 07:28 08:18 18:40 16:35 16:01		09:30-09:47/17
9	05:02 05:36-06:24/48 21:44	05:47 06:20-07:12/52 20:59	06:40 07:08-07:47/39 19:50	07:32 07:29 08:19 18:38 16:33 16:01		09:29-09:48/19
10	05:03 05:37-06:26/49 21:43	05:48 06:20-07:13/53 20:57	06:41 07:11-07:47/36 19:48	07:34 07:31 08:20 18:36 16:32 16:01		09:30-09:49/19
11	05:04 05:38-06:27/49 21:42	05:50 06:22-07:16/54 20:55	06:43 07:13-07:47/34 19:45	07:35 07:33 08:21 18:33 16:30 16:00		09:30-09:50/20
12	05:05 05:39-06:29/50 21:41	05:52 06:24-07:19/55 20:53	06:45 07:14-07:46/32 19:43	07:37 07:35 08:22 18:31 16:28 16:00		09:30-09:51/21
13	05:06 06:37-06:41/4 21:40	05:53 06:24-07:20/56 20:51	06:47 07:16-07:45/29 19:41	07:39 07:37 08:23 18:29 16:27 16:00		09:30-09:51/21
14	05:07 05:41-06:44/63 21:39	05:55 06:26-07:22/56 20:49	06:48 07:18-07:45/27 19:38	07:41 07:39 08:24 18:27 16:25 16:00		09:31-09:52/21
15	05:09 05:42-06:46/64 21:38	05:57 06:28-07:22/54 20:47	06:50 07:19-07:43/24 19:36	07:43 07:41 08:25 18:24 16:24 16:00		09:31-09:52/21
16	05:10 05:42-06:47/65 21:37	05:59 06:30-07:23/53 20:45	06:52 07:21-07:42/21 19:33	07:45 07:42 08:26 18:22 16:22 16:00		09:31-09:53/22
17	05:11 05:44-06:49/65 21:36	06:00 06:32-07:24/52 20:43	06:53 07:22-07:40/18 19:31	07:46 07:44 08:27 18:20 16:21 16:00		09:32-09:54/22
18	05:13 05:44-06:50/66 21:35	06:02 06:34-07:25/51 20:41	06:55 07:24-07:37/13 19:29	07:48 07:46 08:28 18:18 16:19 16:01		09:32-09:54/22
19	05:14 05:45-06:51/66 21:34	06:04 06:36-07:26/50 20:39	06:57 07:25-07:33/13 19:26	07:50 07:48 08:28 18:15 16:18 16:01		09:32-09:55/23
20	05:15 05:46-06:51/65 21:32	06:05 06:36-07:26/50 20:36	06:59 07:26-07:34/13 19:24	07:52 07:50 08:29 18:13 16:17 16:01		09:33-09:55/22
21	05:17 05:49-06:53/64 21:31	06:07 06:38-07:29/51 20:34	07:00 07:27-07:35/13 19:21	07:54 07:51 08:30 18:11 16:15 16:02		09:33-09:55/22
22	05:18 05:52-06:53/61 21:30	06:09 06:40-07:31/51 20:32	07:02 07:28-07:36/13 19:19	07:56 07:53 08:30 18:09 16:14 16:02		09:34-09:56/22
23	05:20 05:52-06:54/62 21:28	06:11 06:41-07:33/52 20:30	07:04 07:29-07:37/13 19:16	07:57 07:55 08:31 18:07 16:13 16:03		09:34-09:56/22
24	05:21 05:53-06:55/62 21:27	06:12 06:43-07:34/51 20:28	07:06 07:31-07:39/13 19:14	07:59 07:57 08:31 18:04 16:12 16:03		09:34-09:56/22
25	05:22 05:54-06:56/62 21:25	06:14 06:44-07:36/52 20:25	07:07 07:32-07:40/18 19:12	07:01 07:58 08:31 17:02 16:11 16:04		09:36-09:58/22
26	05:24 05:56-06:57/61 21:24	06:16 06:46-07:36/50 20:23	07:09 07:34-07:42/18 19:09	07:03 08:00 08:32 17:00 16:10 16:05		09:36-09:58/22
27	05:26 05:57-06:58/61 21:22	06:17 06:47-07:37/50 20:21	07:11 07:36-07:44/18 19:07	07:05 08:02 08:32 16:58 16:09 16:05		09:36-09:58/22
28	05:27 06:00-06:58/58 21:21	06:19 06:48-07:36/48 20:19	07:12 07:37-07:45/18 19:04	07:07 08:03 08:32 16:56 16:08 16:06		09:37-09:58/21
29	05:29 06:01-06:59/58 21:19	06:21 06:50-07:37/47 20:16	07:14 07:39-07:47/18 19:02	07:09 08:05 08:32 16:54 16:07 16:07		09:37-09:59/22
30	05:30 06:02-06:59/57 21:18	06:23 06:52-07:37/45 20:14	07:16 07:41-07:49/18 18:59	07:11 08:06 08:32 16:52 16:06 16:08		09:38-09:59/21
31	05:32 06:04-07:01/57 21:16	06:24 06:53-07:37/44 20:12	07:18 07:43-07:51/18 18:57	07:12 16:50 16:09 16:50 16:09 16:09		09:39-09:59/20
Sonnenscheinstunden	509	458	382	330	262	237
Anzahl Minuten mit Schatten	1766	2397	947	0	0	579

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 5 - W5

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1	08:32	08:03	07:07	08:43-09:38/55	06:54	05:46	04:58	20:40-21:00/20		
	16:10	17:00	17:55		19:51	20:45	21:34			
2	08:32	08:02	07:05	08:42-09:37/55	06:52	05:44	04:58	20:40-21:00/20		
	16:11	17:02	17:56		19:53	20:47	21:35			
3	08:32	08:00	07:03	08:42-09:37/55	06:49	05:42	04:57	20:42-21:02/20		
	16:13	17:04	17:58		19:55	20:49	21:36			
4	08:32	07:58	07:01	08:43-09:37/54	06:47	05:40	04:56	20:43-21:03/20		
	16:14	17:06	18:00		19:57	20:50	21:37			
5	08:32	07:57	06:58	08:42-09:36/54	06:44	05:38	04:55	20:46-21:04/18		
	16:15	17:08	18:02		19:59	20:52	21:38			
6	08:31	07:55	06:56	08:43-09:35/52	06:42	05:37	04:54	20:46-21:05/19		
	16:16	17:10	18:04		20:00	20:54	21:39			
7	08:31	07:53	06:54	08:42-09:34/52	06:40	05:35	04:54	20:46-21:05/19		
	16:18	17:12	18:06	17:36-17:39/3	20:02	20:56	21:40			
8	08:30	07:51	06:51	08:43-09:33/50	06:37	05:33	04:53	20:47-21:06/19		
	16:19	17:14	18:08	17:34-17:41/7	20:04	20:57	21:41			
9	08:30	07:49	06:49	08:44-09:33/49	06:35	05:31	04:53	20:48-21:08/20		
	16:20	17:16	18:10	17:33-17:44/11	20:06	20:59	21:42			
10	08:29	07:48	06:47	08:43-09:31/48	06:33	05:29	04:52	20:48-21:08/20		
	16:22	17:18	18:11	17:32-17:45/13	20:08	21:01	21:43			
11	08:29	07:46	06:44	08:44-09:30/46	06:30	05:27	04:52	20:50-21:09/19		
	16:23	17:20	18:13	17:32-17:47/15	20:09	21:03	21:44			
12	08:28	07:44	09:04-09:19/15	06:42	08:45-09:28/43	06:28	05:26	20:30-20:33/3	04:51	20:51-21:10/19
	16:25	17:22	18:15	17:31-17:48/17	20:11	21:04	21:44			
13	08:27	07:42	09:00-09:23/23	06:40	08:46-09:26/40	06:26	05:24	20:30-20:35/5	04:51	20:51-21:10/19
	16:26	17:24	18:17	17:32-17:51/19	20:13	21:06	21:45			
14	08:26	07:40	08:58-09:25/27	06:37	08:48-09:25/37	06:23	05:22	20:29-20:36/7	04:51	20:51-21:10/19
	16:28	17:26	18:19	17:33-17:53/20	20:15	21:08	21:46			
15	08:25	07:38	08:55-09:28/33	06:35	08:48-09:22/34	06:21	05:21	20:29-20:38/9	04:51	20:52-21:11/19
	16:30	17:28	18:21	17:33-17:54/21	20:17	21:09	21:46			
16	08:24	07:36	08:54-09:30/36	06:32	08:51-09:19/28	06:19	05:19	20:28-20:39/11	04:50	20:52-21:11/19
	16:31	17:30	18:22	17:35-17:57/22	20:18	21:11	21:47			
17	08:23	07:34	08:52-09:31/39	06:30	08:53-09:15/22	06:17	05:17	20:28-20:41/13	04:50	20:53-21:12/19
	16:33	17:32	18:24	17:36-17:58/22	20:20	21:12	21:47			
18	08:22	07:32	08:51-09:33/42	06:28	08:57-09:11/14	06:14	05:16	20:28-20:42/14	04:50	20:53-21:12/19
	16:35	17:33	18:26	17:41-18:00/19	20:22	21:14	21:48			
19	08:21	07:29	08:49-09:33/44	06:25	17:41-18:01/20	06:12	05:14	20:28-20:43/15	04:50	20:53-21:13/20
	16:36	17:35	18:28		20:24	21:16	21:48			
20	08:20	07:27	08:48-09:34/46	06:23	17:43-18:03/20	06:10	05:13	20:29-20:45/16	04:50	20:53-21:13/20
	16:38	17:37	18:30		20:26	21:17	21:48			
21	08:19	07:25	08:48-09:35/47	06:20	17:46-18:03/17	06:08	05:11	20:28-20:46/18	04:51	20:54-21:14/20
	16:40	17:39	18:32		20:27	21:19	21:49			
22	08:18	07:23	08:47-09:36/49	06:18	17:48-18:01/13	06:05	05:10	20:29-20:47/18	04:51	20:54-21:14/20
	16:42	17:41	18:33		20:29	21:20	21:49			
23	08:17	07:21	08:45-09:36/51	06:16	17:50-18:00/10	06:03	05:09	20:30-20:49/19	04:51	20:54-21:14/20
	16:43	17:43	18:35		20:31	21:22	21:49			
24	08:15	07:19	08:45-09:37/52	06:13	17:53-17:56/3	06:01	05:07	20:31-20:50/19	04:51	20:54-21:13/19
	16:45	17:45	18:37		20:33	21:23	21:49			
25	08:14	07:16	08:45-09:37/52	06:11		05:59	05:06	20:32-20:52/20	04:52	20:55-21:14/19
	16:47	17:47	18:39		20:35	21:24	21:49			
26	08:13	07:14	08:44-09:38/54	06:08		05:57	05:05	20:33-20:53/20	04:52	20:54-21:14/20
	16:49	17:49	18:41		20:36	21:26	21:49			
27	08:11	07:12	08:43-09:37/54	06:06		05:55	05:04	20:34-20:54/20	04:52	20:55-21:14/19
	16:51	17:51	18:42		20:38	21:27	21:49			
28	08:10	07:10	08:43-09:37/54	06:04		05:53	05:03	20:34-20:56/22	04:53	20:54-21:14/20
	16:53	17:53	18:44		20:40	21:29	21:49			
29	08:08		07:01		05:50	05:01	20:35-20:57/22	04:54	20:55-21:14/19	
	16:55		19:46		20:42	21:30	21:49			
30	08:07		06:59		05:48	05:00	20:36-20:58/22	04:54	20:54-21:13/19	
	16:56		19:48		20:43	21:31	21:48			
31	08:05		06:56			04:59	20:38-20:59/21			
	16:58		19:50			21:32				
Sonnenscheinstunden	253	275	367	419	491	506				
Anzahl Minuten mit Schatten	0	718	1060	0	314	582				

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 5 - W5

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:55	20:54-21:13/19	05:33	20:41-20:43/2	06:26	07:18	09:25-10:07/42	07:14	08:08			
	21:48		21:14		20:09	18:57	18:11-18:29/18	16:48	16:05			
2	04:56	20:54-21:13/19	05:35		06:28	07:20	09:24-10:08/44	07:16	08:09			
	21:48		21:12		20:07	18:55	18:10-18:26/16	16:46	16:04			
3	04:56	20:53-21:12/19	05:37		06:29	07:21	09:22-10:08/46	07:18	08:11			
	21:47		21:11		20:05	18:52	18:10-18:24/14	16:44	16:04			
4	04:57	20:53-21:12/19	05:38		06:31	07:23	09:21-10:09/48	07:20	08:12			
	21:47		21:09		20:02	18:50	18:10-18:22/12	16:42	16:03			
5	04:58	20:53-21:12/19	05:40		06:33	07:25	09:20-10:10/50	07:22	08:14			
	21:46		21:07		20:00	18:48	18:11-18:19/8	16:41	16:03			
6	04:59	20:53-21:11/18	05:42		06:35	07:27	09:19-10:11/52	07:24	08:15			
	21:46		21:05		19:57	18:45	18:12-18:17/5	16:39	16:02			
7	05:00	20:53-21:11/18	05:43		06:36	07:28	09:19-10:11/52	07:26	08:16			
	21:45		21:03		19:55	18:43		16:37	16:02			
8	05:01	20:52-21:10/18	05:45		06:38	07:30	09:17-10:10/53	07:28	08:18			
	21:45		21:01		19:53	18:40		16:35	16:01			
9	05:02	20:50-21:10/20	05:47		06:40	07:32	09:17-10:11/54	07:30	08:19			
	21:44		20:59		19:50	18:38		16:33	16:01			
10	05:03	20:49-21:09/20	05:48		06:41	07:34	09:17-10:11/54	07:31	08:20			
	21:43		20:57		19:48	18:36		16:32	16:01			
11	05:04	20:48-21:08/20	05:50		06:43	07:36	09:16-10:11/55	07:33	08:21			
	21:42		20:55		19:45	18:33		16:30	16:00			
12	05:05	20:48-21:08/20	05:52		06:45	07:37	09:16-10:11/55	07:35	08:22			
	21:41		20:53		19:43	18:31		16:28	16:00			
13	05:06	20:45-21:07/22	05:53		06:47	07:39	09:16-10:11/55	07:37	08:23			
	21:40		20:51		19:41	18:29		16:27	16:00			
14	05:07	20:44-21:06/22	05:55		06:48	07:41	09:16-10:11/55	07:39	08:24			
	21:39		20:49		19:38	18:27		16:25	16:00			
15	05:09	20:43-21:05/22	05:57		06:50	07:43	09:16-10:10/54	07:41	08:25			
	21:38		20:47		19:36	18:24		16:24	16:00			
16	05:10	20:42-21:03/21	05:59		06:52	07:45	09:16-10:09/53	07:43	08:26			
	21:37		20:45		19:33	18:22		16:22	16:00			
17	05:11	20:42-21:02/20	06:00		06:53	07:46	09:16-10:08/52	07:44	08:27			
	21:36		20:43		19:31	18:20		16:21	16:00			
18	05:12	20:42-21:02/20	06:02		06:55	07:48	09:16-10:08/52	07:46	08:28			
	21:35		20:41		19:29	18:18		16:19	16:01			
19	05:14	20:41-21:01/20	06:04		06:57	07:50	09:17-10:07/50	07:48	08:28			
	21:34		20:39		19:26	18:15		16:18	16:01			
20	05:15	20:40-20:59/19	06:05		06:59	18:37-18:45/8	07:52	09:17-10:06/49	07:50	08:29		
	21:32		20:37		19:24	18:13		16:17	16:01			
21	05:17	20:40-20:59/19	06:07		07:00	18:34-18:47/13	07:54	09:18-10:05/47	07:51	08:30		
	21:31		20:34		19:21	18:11		16:15	16:02			
22	05:18	20:39-20:57/18	06:09		07:02	18:31-18:47/16	07:56	09:19-10:04/45	07:53	08:30		
	21:30		20:32		19:19	18:09		16:14	16:02			
23	05:19	20:39-20:56/17	06:11		07:04	18:28-18:48/20	07:57	09:20-10:03/43	07:55	08:31		
	21:28		20:30		19:16	18:07		16:13	16:03			
24	05:21	20:39-20:55/16	06:12		07:06	18:25-18:46/21	07:59	09:21-10:02/41	07:57	08:31		
	21:27		20:28		19:14	18:04		16:12	16:03			
25	05:22	20:38-20:53/15	06:14		07:07	09:42-09:51/9	07:01	08:22-09:00/38	07:58	08:32		
	21:25		20:25		19:12	18:24-18:43/19	17:02		16:11	16:04		
26	05:24	20:38-20:51/13	06:16		07:09	09:37-09:57/20	07:03	08:24-08:59/35	08:00	08:32		
	21:24		20:23		19:09	18:20-18:41/21	17:00		16:10	16:05		
27	05:26	20:39-20:51/12	06:17		07:11	09:33-10:00/27	07:05	08:25-08:57/32	08:02	08:32		
	21:22		20:21		19:07	18:17-18:39/22	16:58		16:09	16:05		
28	05:27	20:38-20:49/11	06:19		07:13	09:30-10:02/32	07:07	08:28-08:54/26	08:03	08:32		
	21:21		20:19		19:04	18:15-18:36/21	16:56		16:08	16:06		
29	05:29	20:39-20:48/9	06:21		07:14	09:28-10:04/36	07:09	08:30-08:51/21	08:05	08:32		
	21:19		20:16		19:02	18:13-18:34/21	16:54		16:07	16:07		
30	05:30	20:39-20:46/7	06:23		07:16	09:26-10:05/39	07:11	08:34-08:47/13	08:06	08:32		
	21:18		20:14		18:59	18:12-18:31/19	16:52		16:06	16:08		
31	05:32	20:41-20:45/4	06:24				07:13			08:32		
	21:16		20:12				16:50			16:09		
Sonnenscheinstunden	509		458		382		330		262		237	
Anzahl Minuten mit Schatten	536		2		364		1439		0		0	

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
--------------	-----------------------	-------------------------	-------------------	----------------------------------	-----------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 6 - W6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03 08:59-09:31/32	07:07 17:04-17:28/24	06:54	05:46	04:58 05:35-06:03/28
	16:10	17:00	17:55	19:51	20:45	21:34 20:35-21:00/25
2	08:32	08:02 08:59-09:31/32	07:05 17:04-17:29/25	06:52	05:44	04:58 05:35-06:04/29
	16:11	17:02	17:56	19:53	20:47	21:35 20:35-21:01/26
3	08:32	08:00 08:58-09:32/34	07:03 17:07-17:32/25	06:49	05:42 20:18-20:19/1	04:57 05:33-06:04/31
	16:13	17:04	17:58	19:55	20:49	21:36 20:37-21:02/25
4	08:32	07:58 08:58-09:32/34	07:01 17:10-17:33/23	06:47	05:40 20:16-20:21/5	04:56 05:32-06:04/32
	16:14	17:06	18:00	19:57	20:50	21:37 20:37-21:03/26
5	08:32	07:57 08:58-09:32/34	06:58 17:12-17:35/23	06:44	05:38 20:14-20:22/8	04:55 05:29-06:05/34
	16:15	17:08	18:02	19:59	20:52	21:38 20:38-21:04/26
6	08:31	07:55 08:58-09:32/34	06:56 17:14-17:38/24	06:42	05:37 20:13-20:24/11	04:54 05:30-06:05/35
	16:16	17:10	18:04	20:00	20:54	21:39 20:39-21:04/25
7	08:31	07:53 08:58-09:32/34	06:54 17:15-17:38/23	06:40	05:35 20:13-20:26/13	04:54 05:30-06:05/35
	16:18	17:12	18:06	20:02	20:56	21:40 20:39-21:04/25
8	08:30	07:51 08:59-09:33/34	06:51 17:18-17:38/20	06:37	05:33 20:12-20:27/15	04:53 05:29-06:05/36
	16:19	17:14	18:08	20:04	20:57	21:41 20:40-21:05/25
9	08:30	07:49 08:59-09:33/34	06:49 17:21-17:37/16	06:35	05:31 20:12-20:28/16	04:53 05:28-06:06/38
	16:20	17:16	18:10	20:06	20:59	21:42 20:42-21:06/24
10	08:29	07:47 08:59-09:32/33	06:47 17:22-17:35/13	06:33	05:29 20:11-20:30/19	04:52 05:27-06:05/38
	16:22	17:18	18:11	20:08	21:01	21:43 20:44-21:05/21
11	08:29	07:46 08:59-09:31/32	06:44 17:26-17:33/7	06:30	05:27 20:12-20:32/20	04:52 05:27-06:06/39
	16:23	17:20	18:13	20:09	21:03	21:44 20:45-21:06/21
12	08:28	07:44 09:00-09:31/31	06:42	06:28	05:26 20:12-20:33/21	04:51 05:27-06:06/39
	16:25	17:22	18:15	20:11	21:04	21:44 20:46-21:06/20
13	08:27	07:42 09:01-09:30/29	06:40	06:26	05:24 20:13-20:35/22	04:51 05:27-06:07/40
	16:26	17:24	18:17	20:13	21:06	21:45 20:46-21:06/20
14	08:26	07:40 09:02-09:29/27	06:37	06:23	05:22 20:13-20:36/23	04:51 05:27-06:06/39
	16:28	17:26	18:19	20:15	21:08	21:46 20:46-21:06/20
15	08:25	07:38 09:03-09:28/25	06:35	06:21	05:21 20:14-20:38/24	04:51 05:27-06:06/39
	16:30	17:28	18:21	20:17	21:09	21:46 20:47-21:06/19
16	08:24	07:36 09:05-09:27/22	06:32	06:19	05:19 20:14-20:39/25	04:50 05:26-06:06/40
	16:31	17:30	18:22	20:18	21:11	21:47 20:47-21:07/20
17	08:23	07:34 09:07-09:25/18	06:30	06:17	05:17 20:15-20:41/26	04:50 05:26-06:07/41
	16:33	17:32	18:24	20:20	21:12	21:47 20:48-21:07/19
18	08:22	07:31 09:10-09:22/12	06:28	06:14	05:16 20:15-20:42/27	04:50 05:26-06:07/41
	16:35	17:33	18:26	20:22	21:14	21:48 20:48-21:07/19
19	08:21	07:29 17:04-17:09/5	06:25	06:12	05:14 20:16-20:43/27	04:50 05:26-06:07/41
	16:36	17:35	18:28	20:24	21:16	21:48 20:48-21:07/19
20	08:20	07:27 17:04-17:09/5	06:23	06:10	05:13 20:17-20:45/28	04:50 05:27-06:08/41
	16:38	17:37	18:30	20:26	21:17	21:48 20:48-21:07/19
21	08:19	07:25 17:03-17:12/9	06:20	06:08	05:11 05:48-05:55/7	04:51 05:27-06:08/41
	16:40	17:39	18:32	20:27	21:19 20:18-20:46/28	21:49 20:49-21:08/19
22	08:18	07:23 17:02-17:14/12	06:18	06:05	05:10 05:45-05:56/11	04:51 05:27-06:08/41
	16:42	17:41	18:33	20:29	21:20 20:20-20:47/27	21:49 20:49-21:08/19
23	08:17	09:08-09:17/9	07:21 17:00-17:15/15	06:16	06:03 05:09 05:44-05:58/14	04:51 05:27-06:08/41
	16:43	17:43	18:35	20:31	21:22 20:23-20:49/26	21:49 20:49-21:08/19
24	08:15	09:06-09:20/14	07:19 17:00-17:17/17	06:13	06:01 05:07 05:43-05:59/16	04:51 05:28-06:09/41
	16:45	17:45	18:37	20:33	21:23 20:24-20:50/26	21:49 20:49-21:08/19
25	08:14	09:04-09:22/18	07:16 17:00-17:20/20	06:11	05:59 05:06 05:42-06:00/18	04:52 05:28-06:09/41
	16:47	17:47	18:39	20:34	21:24 20:26-20:52/26	21:49 20:50-21:09/19
26	08:13	09:03-09:24/21	07:14 17:00-17:21/21	06:08	05:57 05:05 05:41-06:01/20	04:52 05:28-06:08/40
	16:49	17:49	18:41	20:36	21:26 20:28-20:53/25	21:49 20:49-21:09/20
27	08:11	09:02-09:25/23	07:12 17:01-17:23/22	06:06	05:55 05:04 05:40-06:02/22	04:52 05:29-06:09/40
	16:51	17:51	18:42	20:38	21:27 20:31-20:54/23	21:49 20:50-21:09/19
28	08:10	09:01-09:27/26	07:10 17:02-17:26/24	06:04	05:53 05:03 05:40-06:02/22	04:53 05:30-06:09/39
	16:53	17:53	18:44	20:40	21:29 20:31-20:56/25	21:49 20:49-21:09/20
29	08:08	09:00-09:28/28		05:50	05:01 05:39-06:03/24	04:54 05:30-06:10/40
	16:55		07:01	20:42	21:30 20:32-20:57/25	21:49 20:50-21:10/20
30	08:07	09:00-09:29/29		05:48	05:00 05:38-06:03/25	04:54 05:31-06:09/38
	16:56		07:01	20:43	21:31 20:33-20:58/25	21:48 20:49-21:09/20
31	08:05	09:00-09:30/30			04:59 05:36-06:03/27	
	16:58		07:01		21:32 20:34-20:59/25	
Sonnenscheinstunden	253	275	367	419	491	506
Anzahl Minuten mit Schatten	198	676	223	0	818	1776

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
--------------	-----------------------	-------------------------	-------------------	----------------------------------	-----------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 6 - W6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Juli		August		Septemb Oktober		November		Dezember	
1	04:55	05:31-06:10/39	05:33	20:22-20:43/21	06:26	07:18	07:14	08:28-09:01/33	08:08	
	21:48	20:49-21:10/21	21:14		20:09	18:57	16:48		16:05	
2	04:56	05:32-06:10/38	05:35	20:22-20:42/20	06:28	07:20	18:05-18:09/4	07:16	08:28-09:02/34	08:09
	21:48	20:50-21:10/20	21:12		20:07	18:55	16:46		16:04	
3	04:56	05:33-06:11/38	05:37	20:21-20:39/18	06:29	07:21	18:02-18:12/10	07:18	08:28-09:02/34	08:11
	21:47	20:47-21:10/23	21:11		20:05	18:52	16:44		16:04	
4	04:57	05:33-06:10/37	05:38	20:22-20:38/16	06:31	07:23	17:59-18:14/15	07:20	08:28-09:02/34	08:12
	21:47	20:46-21:10/24	21:09		20:02	18:50	16:42		16:03	
5	04:58	05:35-06:11/36	05:40	20:22-20:36/14	06:33	07:25	17:57-18:15/18	07:22	08:29-09:03/34	08:14
	21:46	20:46-21:11/25	21:07		20:00	18:48	16:41		16:03	
6	04:59	05:36-06:11/35	05:42	20:22-20:35/13	06:35	07:27	17:54-18:15/21	07:24	08:29-09:03/34	08:15
	21:46	20:45-21:11/26	21:05		19:57	18:45	16:39		16:02	
7	05:00	05:37-06:11/34	05:43	20:22-20:32/10	06:36	07:28	17:50-18:14/24	07:26	08:29-09:03/34	08:16
	21:45	20:45-21:11/26	21:03		19:55	18:43	16:37		16:02	
8	05:01	05:39-06:12/33	05:45	20:24-20:31/7	06:38	07:30	17:48-18:12/24	07:28	08:29-09:02/33	08:18
	21:45	20:44-21:10/26	21:01		19:53	18:40	16:35		16:01	
9	05:02	05:40-06:12/32	05:47	20:26-20:30/4	06:40	07:32	17:46-18:09/23	07:29	08:30-09:02/32	08:19
	21:44	20:44-21:10/26	20:59		19:50	18:38	16:33		16:01	
10	05:03	05:42-06:12/30	05:48		06:41	07:34	17:43-18:07/24	07:31	08:30-09:02/32	08:20
	21:43	20:44-21:09/25	20:57		19:48	18:36	16:32		16:01	
11	05:04	05:43-06:12/29	05:50		06:43	07:36	17:39-18:05/26	07:33	08:31-09:01/30	08:21
	21:42	20:44-21:08/24	20:55		19:45	18:33	16:30		16:00	
12	05:05	05:44-06:12/28	05:52		06:45	07:37	17:38-18:02/24	07:35	08:31-09:01/30	08:22
	21:41	20:43-21:08/25	20:53		19:43	18:31	16:28		16:00	
13	05:06	05:46-06:11/25	05:53		06:47	07:39	17:36-18:00/24	07:37	08:32-09:00/28	08:23
	21:40	20:42-21:07/25	20:51		19:41	18:29	16:27		16:00	
14	05:07	05:47-06:11/24	05:55		06:48	07:41	17:33-17:57/24	07:39	08:33-08:59/26	08:24
	21:39	20:41-21:06/25	20:49		19:38	18:27	16:25		16:00	
15	05:09	05:48-06:11/23	05:57		06:50	07:43	17:33-17:55/22	07:41	08:35-08:58/23	08:25
	21:38	20:40-21:05/25	20:47		19:36	18:24	16:24		16:00	
16	05:10	05:49-06:10/21	05:59		06:52	07:45	17:32-17:52/20	07:42	08:36-08:57/21	08:26
	21:37	20:39-21:03/24	20:45		19:33	18:22	16:22		16:00	
17	05:11	05:50-06:11/21	06:00		06:53	07:46	17:32-17:50/18	07:44	08:38-08:56/18	08:27
	21:36	20:38-21:02/24	20:43		19:31	18:20	16:21		16:00	
18	05:12	05:51-06:10/19	06:02		06:55	07:48	17:32-17:48/16	07:46	08:40-08:54/14	08:28
	21:35	20:36-21:02/26	20:41		19:29	18:18	16:19		16:01	
19	05:14	05:52-06:09/17	06:04		06:57	07:50	17:32-17:46/14	07:48	08:43-08:52/9	08:28
	21:34	20:34-21:01/27	20:39		19:26	18:15	16:18		16:01	
20	05:15	05:53-06:08/15	06:05		06:59	07:52	17:33-17:43/10	07:50		08:29
	21:32	20:33-20:59/26	20:36		19:24	18:13	16:17		16:01	
21	05:17	05:55-06:08/13	06:07		07:00	07:54	17:34-17:41/7	07:51		08:30
	21:31	20:33-20:59/26	20:34		19:21	18:11	16:15		16:02	
22	05:18	05:56-06:06/10	06:09		07:02	07:56	17:36-17:39/3	07:53		08:30
	21:30	20:30-20:57/27	20:32		19:19	18:09	16:14		16:02	
23	05:19	05:59-06:03/4	06:11		07:04	07:57	09:44-09:46/2	07:55		08:31
	21:28	20:28-20:56/28	20:30		19:16	18:07	16:13		16:03	
24	05:21	20:27-20:55/28	06:12		07:06	07:59	09:38-09:52/14	07:57		08:31
	21:27		20:28		19:14	18:04	16:12		16:03	
25	05:22	20:26-20:53/27	06:14		07:07	07:01	08:36-08:55/19	07:58		08:31
	21:25		20:25		19:12	17:02	16:11		16:04	
26	05:24	20:25-20:51/26	06:16		07:09	07:03	08:34-08:56/22	08:00		08:32
	21:24		20:23		19:09	17:00	16:10		16:05	
27	05:26	20:25-20:51/26	06:17		07:11	07:05	08:32-08:58/26	08:02		08:32
	21:22		20:21		19:07	16:58	16:09		16:05	
28	05:27	20:24-20:49/25	06:19		07:12	07:07	08:31-08:59/28	08:03		08:32
	21:21		20:19		19:04	16:56	16:08		16:06	
29	05:29	20:24-20:48/24	06:21		07:14	07:09	08:30-09:00/30	08:05		08:32
	21:19		20:16		19:02	16:54	16:07		16:07	
30	05:30	20:23-20:46/23	06:23		07:16	07:11	08:29-09:00/31	08:06		08:32
	21:18		20:14		18:59	16:52	16:06		16:08	
31	05:32	20:23-20:45/22	06:24			07:12	08:29-09:01/32			08:32
	21:16		20:12			16:50				16:09
Sonnenscheinstunden	509		458		382	330		262		237
Anzahl Minuten mit Schatten	1376		123		0	575		533		0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
--------------	-----------------------	-------------------------	-------------------	----------------------------------	-----------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 7 - W7

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32	08:03	07:07 07:51-08:18/27	06:54	05:46	04:58 05:28-06:00/32
	16:10	17:00	17:55 16:57-17:27/30	19:51	20:45	21:34 20:44-21:00/16
2	08:32	08:02	07:05 07:50-08:17/27	06:52	05:44	04:58 05:28-06:01/33
	16:11	17:02	17:56 16:56-17:29/33	19:53	20:47	21:35 20:43-21:00/17
3	08:32	08:00	07:03 07:50-08:17/27	06:49	05:42	04:57 05:27-06:00/33
	16:13	17:04	17:58 16:57-17:32/35	19:55	20:49	21:36 20:44-21:02/18
4	08:32	07:58	07:01 07:51-08:17/26	06:47	05:40	04:56 05:26-06:00/34
	16:14	17:06	18:00 16:57-17:33/36	19:57	20:50	21:37 20:44-21:03/19
5	08:32	07:57	06:58 07:50-08:15/25	06:44	05:38	04:55 05:26-06:00/34
	16:15	17:08	18:02 16:59-17:35/36	19:59	20:52	21:38 20:45-21:04/19
6	08:31	07:55	06:56 07:51-08:14/23	06:42	05:37	04:54 05:25-06:00/35
	16:16	17:10	18:04 17:00-17:38/38	20:00	20:54	21:39 20:44-21:05/21
7	08:31	07:53	06:54 07:51-08:13/22	06:40	05:35	04:54 05:25-06:00/35
	16:18	17:12	18:06 17:01-17:39/38	20:02	20:56	21:40 20:44-21:05/21
8	08:30	07:51	06:51 07:53-08:11/18	06:37	05:33	04:53 05:24-05:59/35
	16:19	17:14	18:08 17:03-17:41/38	20:04	20:57	21:41 20:45-21:06/21
9	08:30	07:49	06:49 07:55-08:09/14	06:35	05:31	04:53 05:24-05:59/35
	16:20	17:16	18:10 17:07-17:44/37	20:06	20:59	21:42 20:45-21:08/23
10	08:29	07:47	06:47 07:58-08:05/7	06:33	05:29	04:52 05:23-05:58/35
	16:22	17:18	18:11 17:10-17:44/34	20:08	21:01	21:43 20:45-21:08/23
11	08:28	07:46	06:44 17:11-17:44/33	06:30	05:27	04:52 05:23-05:58/35
	16:23	17:20	18:13	20:09	21:02	21:44 20:46-21:09/23
12	08:28	07:44	06:42 17:12-17:43/31	06:28	05:26	04:51 05:23-05:58/35
	16:25	17:22	18:15	20:11	21:04	21:44 20:46-21:10/24
13	08:27	07:42	06:40 17:15-17:43/28	06:26	05:24	04:51 05:23-05:58/35
	16:26	17:24	18:17	20:13	21:06	21:45 20:46-21:10/24
14	08:26	07:40	06:37 17:18-17:43/25	06:23	05:22	04:51 05:22-05:57/35
	16:28	17:26	18:19	20:15	21:07	21:46 20:46-21:10/24
15	08:25	07:38	06:35 17:21-17:41/20	06:21	05:21 05:49-05:56/7	04:51 05:22-05:57/35
	16:30	17:28	18:21	20:17	21:09	21:46 20:46-21:11/25
16	08:24	07:36	06:32 17:23-17:40/17	06:19	05:19 05:46-05:57/11	04:50 05:22-05:56/34
	16:31	17:30	18:22	20:18	21:11	21:47 20:47-21:11/24
17	08:23	07:34	06:30 17:24-17:38/14	06:17	05:17 05:45-05:58/13	04:50 05:22-05:56/34
	16:33	17:31	18:24	20:20	21:12	21:47 20:47-21:12/25
18	08:22	07:31	06:28 17:28-17:36/8	06:14	05:16 05:44-06:00/16	04:50 05:22-05:55/33
	16:35	17:33	18:26	20:22	21:14	21:48 20:47-21:12/25
19	08:21	07:29	06:25	06:12	05:14 05:43-06:00/17	04:50 05:22-05:55/33
	16:36	17:35	18:28	20:24	21:16	21:48 20:47-21:13/26
20	08:20	07:27	06:23	06:10	05:13 05:42-06:01/19	04:50 05:23-05:56/33
	16:38	17:37	18:30	20:26	21:17	21:48 20:48-21:13/25
21	08:19	07:25 08:02-08:08/6	06:20	06:08	05:11 05:41-06:01/20	04:51 05:23-05:56/33
	16:40	17:39	18:32	20:27	21:19	21:49 20:48-21:14/26
22	08:18	07:23 07:58-08:12/14	06:18	06:05	05:10 05:38-06:01/23	04:51 05:23-05:56/33
	16:42	17:41 17:03-17:12/9	18:33	20:29	21:20	21:49 20:49-21:14/25
23	08:17	07:21 07:56-08:13/17	06:16	06:03	05:09 05:37-06:01/24	04:51 05:23-05:56/33
	16:43	17:43 17:00-17:15/15	18:35	20:31	21:22	21:49 20:48-21:14/26
24	08:15	07:19 07:54-08:15/21	06:13	06:01	05:07 05:36-06:01/25	04:51 05:24-05:57/33
	16:45	17:45 16:59-17:17/18	18:37	20:33	21:23 20:49-20:50/1	21:49 20:48-21:13/25
25	08:14	07:16 07:53-08:16/23	06:11	05:59	05:06 05:35-06:02/27	04:52 05:24-05:57/33
	16:47	17:47 16:58-17:20/22	18:39	20:34	21:24 20:47-20:52/5	21:49 20:49-21:14/25
26	08:13	07:14 07:53-08:17/24	06:08	05:57	05:05 05:34-06:02/28	04:52 05:24-05:58/34
	16:49	17:49 16:57-17:21/24	18:41	20:36	21:26 20:46-20:53/7	21:49 20:49-21:14/25
27	08:11	07:12 07:51-08:17/26	06:06	05:55	05:04 05:33-06:02/29	04:52 05:25-06:00/35
	16:51	17:51 16:56-17:23/27	18:42	20:38	21:27 20:46-20:54/8	21:49 20:50-21:14/24
28	08:10	07:10 07:51-08:17/26	06:04	05:53	05:02 05:32-06:02/30	04:53 05:25-06:00/35
	16:53	17:53 16:56-17:26/30	18:44	20:40	21:29 20:45-20:56/11	21:49 20:49-21:14/25
29	08:08		07:01	05:50	05:01 05:31-06:01/30	04:54 05:26-06:01/35
	16:55		19:46	20:42	21:30 20:45-20:57/12	21:49 20:50-21:14/24
30	08:07		06:59	05:48	05:00 05:30-06:01/31	04:54 05:26-06:01/35
	16:56		19:48	20:43	21:31 20:44-20:58/14	21:48 20:49-21:13/24
31	08:05		06:56		04:59 05:29-06:01/32	
	16:58		19:50		21:32 20:44-20:59/15	
Sonnenscheinstunden	253	275	367	419	491	506
Anzahl Minuten mit Schatten	0	302	747	0	455	1714

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
--------------	-----------------------	-------------------------	-------------------	----------------------------------	-----------------------------------

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 7 - W7

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55 05:27-06:02/35	05:33	06:26	07:18 17:53-18:23/30	07:14	08:08
	21:48 20:50-21:13/23	21:14	20:09	18:57	16:48	16:05
2	04:55 05:28-06:03/35	05:35	06:28	07:19 17:50-18:22/32	07:16	08:09
	21:48 20:50-21:13/23	21:12	20:07	18:55	16:46	16:04
3	04:56 05:29-06:04/35	05:37	06:29	07:21 17:49-18:22/33	07:18	08:11
	21:47 20:50-21:12/22	21:11	20:05	18:52	16:44	16:04
4	04:57 05:29-06:04/35	05:38	06:31	07:23 08:34-08:45/11	07:20	08:12
	21:47 20:50-21:12/22	21:09	20:02	18:50 17:47-18:21/34	16:42	16:03
5	04:58 05:30-06:05/35	05:40	06:33	07:25 08:31-08:47/16	07:22	08:14
	21:46 20:50-21:12/22	21:07	20:00	18:47 17:42-18:19/37	16:40	16:03
6	04:59 05:31-06:06/35	05:42	06:35	07:27 08:29-08:49/20	07:24	08:15
	21:46 20:51-21:11/20	21:05	19:57	18:45 17:39-18:17/38	16:39	16:02
7	05:00 05:32-06:06/34	05:43	06:36	07:28 08:28-08:50/22	07:26	08:16
	21:45 20:51-21:11/20	21:03	19:55	18:43 17:36-18:14/38	16:37	16:02
8	05:01 05:33-06:07/34	05:45	06:38	07:30 08:26-08:50/24	07:28	08:18
	21:45 20:51-21:10/19	21:01	19:53	18:40 17:35-18:12/37	16:35	16:01
9	05:02 05:34-06:08/34	05:47	06:40	07:32 08:25-08:50/25	07:29	08:19
	21:44 20:51-21:10/19	20:59	19:50	18:38 17:33-18:09/36	16:33	16:01
10	05:03 05:35-06:08/33	05:48	06:41	07:34 08:25-08:51/26	07:31	08:20
	21:43 20:52-21:09/17	20:57	19:48	18:36 17:32-18:07/35	16:32	16:01
11	05:04 05:36-06:09/33	05:50	06:43	07:35 08:24-08:51/27	07:33	08:21
	21:42 20:52-21:08/16	20:55	19:45	18:33 17:31-18:05/34	16:30	16:00
12	05:05 05:37-06:09/32	05:52	06:45	07:37 08:24-08:51/27	07:35	08:22
	21:41 20:52-21:08/16	20:53	19:43	18:31 17:30-18:02/32	16:28	16:00
13	05:06 05:38-06:09/31	05:53	06:47	07:39 08:24-08:51/27	07:37	08:23
	21:40 20:53-21:07/14	20:51	19:41	18:29 17:30-18:00/30	16:27	16:00
14	05:07 05:39-06:10/31	05:55	06:48	07:41 08:24-08:50/26	07:39	08:24
	21:39 20:53-21:06/13	20:49	19:38	18:27 17:29-17:57/28	16:25	16:00
15	05:09 05:40-06:10/30	05:57	06:50	07:43 08:24-08:50/26	07:41	08:25
	21:38 20:53-21:05/12	20:47	19:36	18:24 17:29-17:55/26	16:24	16:00
16	05:10 05:41-06:10/29	05:59	06:52	07:45 08:24-08:48/24	07:42	08:26
	21:37 20:54-21:03/9	20:45	19:33	18:22 17:29-17:52/23	16:22	16:00
17	05:11 05:43-06:11/28	06:00	06:53	07:46 08:25-08:47/22	07:44	08:27
	21:36 20:54-21:02/8	20:43	19:31	18:20 17:30-17:50/20	16:21	16:00
18	05:12 05:44-06:11/27	06:02	06:55	07:48 08:26-08:45/19	07:46	08:28
	21:35 20:56-21:02/6	20:41	19:28	18:17 17:31-17:48/17	16:19	16:01
19	05:14 05:45-06:11/26	06:04	06:57	07:50 08:27-08:44/17	07:48	08:28
	21:34 20:57-21:01/4	20:39	19:26	18:15 17:32-17:45/13	16:18	16:01
20	05:15 05:46-06:11/25	06:05	06:59	07:52 08:30-08:41/11	07:50	08:29
	21:32	20:36	19:24	18:13 17:35-17:42/7	16:17	16:01
21	05:17 05:48-06:11/23	06:07	07:00	07:54	07:51	08:30
	21:31	20:34	19:21	18:11	16:15	16:02
22	05:18 05:49-06:11/22	06:09	07:02	07:56	07:53	08:30
	21:30	20:32	19:19	18:09	16:14	16:02
23	05:19 05:51-06:10/19	06:11	07:04	07:57	07:55	08:31
	21:28	20:30	19:16	18:07	16:13	16:03
24	05:21 05:53-06:11/18	06:12	07:06	07:59	07:57	08:31
	21:27	20:28	19:14	18:04	16:12	16:03
25	05:22 05:54-06:10/16	06:14	07:07 18:12-18:17/5	07:01	07:58	08:31
	21:25	20:25	19:12	17:02	16:11	16:04
26	05:24 05:55-06:10/15	06:16	07:09 18:09-18:20/11	07:03	08:00	08:32
	21:24	20:23	19:09	17:00	16:10	16:05
27	05:25 05:57-06:08/11	06:17	07:11 18:05-18:22/17	07:05	08:02	08:32
	21:22	20:21	19:07	16:58	16:09	16:05
28	05:27 05:58-06:08/10	06:19	07:12 18:02-18:22/20	07:07	08:03	08:32
	21:21	20:19	19:04	16:56	16:08	16:06
29	05:29 06:01-06:05/4	06:21	07:14 17:59-18:22/23	07:09	08:05	08:32
	21:19	20:16	19:02	16:54	16:07	16:07
30	05:30	06:23	07:16 17:57-18:23/26	07:11	08:06	08:32
	21:18	20:14	18:59	16:52	16:06	16:08
31	05:32	06:24		07:12		08:32
	21:16	20:12		16:50		16:09
Sonnenscheinstunden	509	458	382	330	262	237
Anzahl Minuten mit Schatten	1080	0	102	950	0	0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 8 - W8

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32 09:15-09:28/13 16:10	08:03 17:00	07:07 17:55	06:54 19:51	05:46 06:16-06:52/36 20:45 19:45-20:15/30	04:58 05:32-06:20/48 21:34 20:26-20:39/13
2	08:32 09:14-09:28/14 16:11	08:02 16:27-16:31/4 17:02	07:05 17:56	06:52 19:53	05:44 06:14-06:52/38 20:47 19:47-20:18/31	04:58 05:31-06:19/48 21:35 20:27-20:39/12
3	08:32 09:14-09:30/16 16:13	08:00 16:25-16:33/8 17:04	07:03 17:58	06:49 19:55	05:42 06:12-06:51/39 20:49 19:47-20:19/32	04:57 05:30-06:19/49 21:36 20:28-20:38/10
4	08:32 09:15-09:31/16 16:14	07:58 16:24-16:35/11 17:06	07:01 18:00	06:47 19:57	05:40 06:09-06:50/41 20:50 19:48-20:21/33	04:56 05:29-06:18/49 21:37 20:29-20:37/8
5	08:32 09:14-09:31/17 16:15	07:57 16:24-16:37/13 17:08	06:58 18:02	06:44 19:59	05:38 06:08-06:49/41 20:52 19:49-20:22/33	04:55 05:30-06:19/49 21:38 20:31-20:37/6
6	08:31 09:13-09:32/19 16:16	07:55 16:23-16:39/16 17:10	06:56 18:04	06:42 20:00	05:37 06:05-06:47/42 20:54 19:50-20:24/34	04:54 05:30-06:18/49 21:39 20:33-20:34/1
7	08:31 09:14-09:33/19 16:18	07:53 16:23-16:41/18 17:12	06:54 18:06	06:40 20:02	05:35 06:05-06:47/42 20:56 19:55-20:26/31	04:54 05:29-06:18/49 21:40
8	08:30 09:14-09:34/20 16:19	07:51 16:23-16:44/21 17:14	06:51 18:08	06:37 20:04	05:33 06:03-06:44/41 20:57 19:56-20:27/31	04:53 05:28-06:17/49 21:41
9	08:30 09:13-09:35/22 16:20	07:49 16:24-16:46/22 17:16	06:49 18:10	06:35 20:06	05:31 06:01-06:40/39 20:59 19:57-20:28/31	04:53 05:28-06:18/50 21:42
10	08:29 09:14-09:36/22 16:22	07:47 16:24-16:48/24 17:18	06:47 18:11	06:33 20:08	05:29 06:00-06:39/39 21:01 19:58-20:30/32	04:52 05:27-06:17/50 21:43
11	08:28 09:14-09:37/23 16:23	07:46 16:25-16:50/25 17:20	06:44 18:13	06:30 20:09	05:27 05:58-06:38/40 21:02 20:03-20:32/29	04:52 05:27-06:17/50 21:43
12	08:28 09:14-09:37/23 16:25	07:44 16:26-16:52/26 17:22	06:42 18:15	06:28 20:11	05:26 05:56-06:36/40 21:04 20:04-20:33/29	04:51 05:27-06:17/50 21:44
13	08:27 09:14-09:38/24 16:26	07:42 16:28-16:54/26 17:24	06:40 18:17	06:26 20:13	05:24 05:55-06:35/40 21:06 20:05-20:35/30	04:51 05:27-06:17/50 21:45
14	08:26 09:14-09:39/25 16:28	07:40 16:29-16:57/28 17:26	06:37 18:19	06:23 20:15	05:22 05:53-06:34/41 21:07 20:06-20:36/30	04:51 05:26-06:16/50 21:46
15	08:25 09:14-09:39/25 16:30	07:38 16:33-16:59/26 17:28	06:35 18:21	06:21 20:17	05:21 05:53-06:34/41 21:09 20:07-20:38/31	04:51 05:26-06:16/50 21:46
16	08:24 09:15-09:40/25 16:31	07:36 16:37-17:01/24 17:30	06:32 18:22	06:19 20:18	05:19 05:50-06:33/43 21:11 20:08-20:39/31	04:50 05:26-06:16/50 21:47
17	08:23 09:15-09:41/26 16:33	07:34 16:38-17:03/25 17:32	06:30 18:24	06:17 20:20	05:17 05:49-06:33/44 21:12 20:09-20:40/31	04:50 05:26-06:16/50 21:47
18	08:22 09:14-09:40/26 16:35	07:31 16:39-17:05/26 17:33	06:28 18:26	06:14 20:22	05:16 05:49-06:33/44 21:14 20:10-20:40/30	04:50 05:25-06:16/51 21:48
19	08:21 09:15-09:41/26 16:36	07:29 16:42-17:07/25 17:35	06:25 18:28	06:12 20:24	05:14 05:47-06:31/44 21:15 20:11-20:40/29	04:50 05:25-06:16/51 21:48
20	08:20 09:16-09:42/26 16:38	07:27 16:44-17:09/25 17:37	06:23 18:30	06:10 06:41-06:45/4 20:26 19:54-19:58/4	05:13 05:45-06:31/46 21:17 20:13-20:41/28	04:50 05:26-06:16/50 21:48
21	08:19 09:15-09:41/26 16:40	07:25 16:47-17:09/22 17:39	06:20 18:32	06:08 06:37-06:49/12 20:27 19:51-19:59/8	05:11 05:45-06:31/46 21:19 20:17-20:40/23	04:51 05:26-06:17/51 21:49
22	08:18 09:16-09:42/26 16:42	07:23 16:49-17:09/20 17:41	06:18 18:33	06:05 06:35-06:50/15 20:29 19:49-20:01/12	05:10 05:42-06:29/47 21:20 20:18-20:41/23	04:51 05:26-06:17/51 21:49
23	08:17 09:16-09:41/25 16:43	07:21 16:52-17:07/15 17:43	06:16 18:35	06:03 06:33-06:51/18 20:31 19:47-20:02/15	05:09 05:41-06:29/48 21:22 20:19-20:41/22	04:51 05:26-06:17/51 21:49
24	08:15 09:17-09:41/24 16:45	07:19 16:54-17:06/12 17:45	06:13 18:37	06:01 06:32-06:52/20 20:33 19:46-20:04/18	05:07 05:40-06:29/49 21:23 20:20-20:41/21	04:51 05:27-06:18/51 21:49
25	08:14 09:18-09:41/23 16:47	07:16 17:47	06:11 18:39	05:59 06:30-06:53/23 20:34 19:45-20:05/20	05:06 05:40-06:28/48 21:24 20:21-20:41/20	04:52 05:27-06:18/51 21:49
26	08:13 09:19-09:41/22 16:49	07:14 17:49	06:08 18:41	05:57 06:27-06:52/25 20:36 19:45-20:07/22	05:05 05:39-06:27/48 21:26 20:22-20:41/19	04:52 05:28-06:18/50 21:49
27	08:11 09:20-09:40/20 16:51	07:12 17:51	06:06 18:42	05:55 06:25-06:52/27 20:38 19:45-20:09/24	05:04 05:39-06:26/47 21:27 20:23-20:41/18	04:52 05:29-06:19/50 21:49
28	08:10 09:22-09:40/18 16:53	07:10 17:53	06:04 18:44	05:53 06:22-06:52/30 20:40 19:45-20:11/26	05:03 05:37-06:25/48 21:29 20:24-20:41/17	04:53 05:29-06:19/50 21:49
29	08:08 09:23-09:38/15 16:55	07:07 19:46	05:50 06:21-06:53/32 19:46	05:01 05:35-06:23/48 20:42 19:45-20:12/27	04:54 05:30-06:20/50 21:30 20:24-20:40/16	04:54 05:30-06:20/50 21:49
30	08:07 09:25-09:36/11 16:56	07:05 19:48	05:48 06:19-06:53/34 20:43 19:45-20:14/29	05:00 05:34-06:22/48 21:31 20:25-20:40/15	04:54 05:31-06:20/49 21:48	04:54 05:31-06:20/49 21:48
31	08:05 09:29-09:33/4 16:58	07:03 19:50	06:56 19:50	05:46 19:50	04:59 05:33-06:21/48 21:32 20:25-20:39/14	04:59 05:33-06:21/48 21:48
Sonnenscheinstunden	253	275	367	419	491	506
Anzahl Minuten mit Schatten	641	462	0	445	2170	1546

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 8 - W8

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	Septemb	Okt	November	Dezember
1	04:55 05:31-06:21/50	05:33 06:07-06:47/40	06:26 07:18		07:14 15:54-16:17/23	08:08 08:56-09:19/23
	21:48	21:14 20:14-20:43/29	20:09 18:57		16:48	16:05
2	04:56 05:32-06:22/50	05:35 06:09-06:49/40	06:28 07:19		07:16 15:53-16:15/22	08:09 08:56-09:18/22
	21:48	21:12 20:11-20:42/31	20:07 18:55		16:46	16:04
3	04:56 05:33-06:23/50	05:37 06:10-06:49/39	06:29 07:21		07:18 15:53-16:13/20	08:11 08:57-09:19/22
	21:47	21:11 20:08-20:39/31	20:05 18:52		16:44	16:04
4	04:57 05:33-06:23/50	05:38 06:12-06:51/39	06:31 07:23		07:20 15:53-16:11/18	08:12 08:58-09:18/20
	21:47	21:09 20:07-20:38/31	20:02 18:50		16:42	16:03
5	04:58 05:34-06:23/49	05:40 06:14-06:55/41	06:33 07:25		07:22 15:53-16:09/16	08:14 08:59-09:19/20
	21:46	21:07 20:05-20:36/31	20:00 18:48		16:41	16:03
6	04:59 05:35-06:24/49	05:42 06:15-06:57/42	06:35 07:27		07:24 15:54-16:07/13	08:15 08:59-09:18/19
	21:46	21:05 20:03-20:35/32	19:57 18:45		16:39	16:02
7	05:00 05:36-06:25/49	05:43 06:16-06:58/42	06:36 07:28		07:26 15:55-16:06/11	08:16 09:01-09:19/18
	21:45	21:03 19:59-20:32/33	19:55 18:43		16:37	16:02
8	05:01 05:36-06:25/49	05:45 06:18-06:59/41	06:38 07:30		07:28 15:56-16:04/8	08:18 09:02-09:18/16
	21:44	21:01 19:58-20:31/33	19:53 18:40		16:35	16:01
9	05:02 05:37-06:26/49	05:47 06:19-07:00/41	06:40 07:32		07:29 15:58-16:02/4	08:19 09:02-09:18/16
	21:44	20:59 19:57-20:30/33	19:50 18:38		16:33	16:01
10	05:03 05:38-06:26/48	05:48 06:21-07:00/39	06:41 07:34		07:31	08:20 09:04-09:18/14
	21:43	20:57 19:55-20:27/32	19:48 18:36		16:32	16:01
11	05:04 05:39-06:28/49	05:50 06:23-07:00/37	06:43 07:36		07:33 09:00-09:05/5	08:21 09:05-09:18/13
	21:42	20:55 19:55-20:26/31	19:45 18:33		16:30	16:00
12	05:05 05:41-06:29/48	05:52 06:25-07:01/36	06:45 07:37		07:35 08:56-09:08/12	08:22 09:06-09:18/12
	21:41	20:53 19:54-20:23/29	19:43 18:31		16:28	16:00
13	05:06 05:42-06:30/48	05:53 06:27-07:00/33	06:47 07:39		07:37 08:55-09:10/15	08:23 09:07-09:17/10
	21:40	20:51 19:54-20:22/28	19:41 18:29		16:27	16:00
14	05:07 05:43-06:31/48	05:55 06:29-07:01/32	06:48 07:41		07:39 08:54-09:12/18	08:24 09:08-09:17/9
	21:39	20:49 19:54-20:20/26	19:38 18:27		16:25	16:00
15	05:09 05:45-06:33/48	05:57 06:30-07:00/30	06:50 07:43		07:41 08:53-09:13/20	08:25 09:09-09:17/8
	21:38	20:47 19:52-20:18/26	19:36 18:24		16:24	16:00
16	05:10 05:46-06:34/48	05:59 06:33-07:00/27	06:52 07:45		07:42 08:52-09:14/22	08:26 09:11-09:17/6
	21:37	20:45 19:53-20:16/23	19:33 18:22		16:22	16:00
17	05:11 05:49-06:36/47	06:00 06:35-07:00/25	06:53 07:46	17:31-17:36/5	07:44 08:52-09:15/23	08:27 09:12-09:16/4
	21:36	20:43 19:52-20:13/21	19:31 18:20		16:21	16:00
18	05:12 05:49-06:37/48	06:02 06:36-06:58/22	06:55 07:48	17:24-17:38/14	07:46 08:51-09:15/24	08:28 09:14-09:15/1
	21:35	20:41 19:52-20:12/20	19:29 18:17		16:19	16:01
19	05:14 05:50-06:38/48	06:04 06:37-06:58/21	06:57 07:50	17:21-17:39/18	07:48 08:51-09:16/25	08:28
	21:34	20:39 19:53-20:10/17	19:26 18:15		16:18	16:01
20	05:15 05:50-06:38/48	06:05 06:38-06:56/18	06:59 07:52	17:19-17:40/21	07:50 08:51-09:17/26	08:29
	21:32	20:36 19:53-20:07/14	19:24 18:13		16:17	16:01
21	05:17 05:52-06:40/48	06:07 06:40-06:55/15	07:00 07:54	17:17-17:40/23	07:51 08:52-09:17/25	08:30
	21:31	20:34 19:54-20:06/12	19:21 18:11		16:15	16:02
22	05:18 05:54-06:40/46	06:09 06:42-06:53/11	07:02 07:56	17:14-17:39/25	07:53 08:52-09:18/26	08:30
	21:30	20:32 19:56-20:04/8	19:19 18:09		16:14	16:02
23	05:19 05:55-06:40/45	06:11 19:59-20:00/1	07:04 07:57	17:11-17:37/26	07:55 08:52-09:18/26	08:31
	21:28	20:30 19:16	18:07		16:13	16:03
24	05:21 05:56-06:42/46	06:12	07:06 07:59	17:09-17:35/26	07:57 08:53-09:18/25	08:31
	21:27	20:28 19:14	18:04		16:12	16:03
25	05:22 05:58-06:42/44	06:14	07:07 07:01	16:07-16:32/25	07:58 08:52-09:18/26	08:31
	21:25	20:25 19:12	17:02		16:11	16:04
26	05:24 05:59-06:43/44	06:16	07:09 07:03	16:05-16:30/25	08:00 08:53-09:18/25	08:32 09:17-09:20/3
	21:24	20:23 19:09	17:00		16:10	16:05
27	05:26 06:00-06:43/43	06:17	07:11 07:05	16:02-16:28/26	08:02 08:53-09:19/26	08:32 09:16-09:21/5
	21:22	20:21 19:07	16:58		16:09	16:05
28	05:27 06:02-06:44/42	06:19	07:12 07:07	15:58-16:26/28	08:03 08:54-09:19/25	08:32 09:16-09:22/6
	21:21	20:19 19:04	16:56		16:08	16:06
29	05:29 06:03-06:45/42	06:21	07:14 07:09	15:57-16:24/27	08:05 08:54-09:18/24	08:32 09:15-09:24/9
	21:19	20:16 19:02	16:54		16:07	16:07
30	05:30 06:04-06:45/41	06:23	07:16 07:11	15:56-16:21/25	08:06 08:55-09:19/24	08:32 09:15-09:25/10
	21:18	20:14 18:59	16:52		16:06	16:08
31	05:32 06:06-06:46/40	06:24	07:12 15:54-16:19/25			08:32 09:15-09:26/11
	21:16	20:12 16:50				16:09
Sonnenscheinstunden	509	458	382	330	262	237
Anzahl Minuten mit Schatten	1972	1283	0	339	577	297

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 9 - W9

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32 16:10	08:03 16:16-16:29/13 17:00	07:07 17:55	06:54 19:51	05:46 06:12-06:40/28 20:45	04:58 05:28-06:06/38 21:34 20:17-21:00/43
2	08:32 16:11	08:02 08:33-08:40/7 17:02 16:15-16:31/16	07:05 17:56	06:52 19:53	05:44 06:10-06:39/29 20:47	04:58 05:28-06:05/37 21:35 20:17-21:00/43
3	08:32 16:13	08:00 08:31-08:43/12 17:04 16:14-16:33/19	07:03 17:58	06:49 19:55	05:42 06:08-06:38/30 20:49	04:57 05:27-06:04/37 21:36 20:18-21:02/44
4	08:32 16:14	07:58 08:29-08:44/15 17:06 16:13-16:35/22	07:01 18:00	06:47 19:57	05:40 06:06-06:37/31 20:50	04:56 05:26-06:02/36 21:37 20:18-21:03/45
5	08:32 16:15	07:57 08:28-08:45/17 17:08 16:13-16:37/24	06:58 18:02	06:44 19:59	05:38 06:04-06:36/32 20:52	04:55 05:26-06:02/36 21:38 20:19-21:04/45
6	08:31 16:16	07:55 08:27-08:46/19 17:10 16:13-16:39/26	06:56 18:04	06:42 20:00	05:37 06:02-06:33/31 20:54	04:54 05:25-06:01/36 21:39 20:19-21:04/45
7	08:31 16:18	07:53 08:26-08:47/21 17:12 16:13-16:41/28	06:54 18:06	06:40 20:02	05:35 06:01-06:30/29 20:56	04:54 05:25-06:01/36 21:40 20:19-21:04/45
8	08:30 16:19	07:51 08:27-08:49/22 17:14 16:13-16:44/31	06:51 18:08	06:37 20:04	05:33 05:59-06:29/30 20:57 20:19-20:27/8	04:53 05:24-06:00/36 21:41 20:20-21:06/46
9	08:30 16:20	07:49 08:27-08:49/22 17:16 16:13-16:46/33	06:49 18:10	06:35 20:06	05:31 05:57-06:28/31 20:59 20:17-20:28/11	04:53 05:24-06:00/36 21:42 20:21-21:08/47
10	08:29 16:22	07:47 08:26-08:48/22 17:18 16:14-16:48/34	06:47 18:11	06:33 20:08	05:29 05:56-06:27/31 21:01 20:16-20:30/14	04:52 05:23-05:59/36 21:43 20:21-21:08/47
11	08:28 16:23	07:46 08:26-08:48/22 17:20 16:14-16:50/36	06:44 18:13	06:30 20:09	05:27 05:54-06:25/31 21:02 20:15-20:32/17	04:52 05:23-05:59/36 21:43 20:22-21:09/47
12	08:28 16:25	07:44 08:26-08:48/22 17:22 16:15-16:52/37	06:42 18:15	06:28 20:11	05:26 05:52-06:24/32 21:04 20:14-20:33/19	04:51 05:23-05:59/36 21:44 20:22-21:10/48
13	08:27 16:26	07:42 08:27-08:48/21 17:24 16:16-16:54/38	06:40 18:17	06:26 20:13	05:24 05:51-06:24/33 21:06 20:14-20:35/21	04:51 05:23-05:59/36 21:45 20:22-21:09/47
14	08:26 16:28	07:40 08:27-08:47/20 17:26 16:18-16:57/39	06:37 18:19	06:23 20:15	05:22 05:49-06:22/33 21:07 20:13-20:35/22	04:51 05:23-05:59/36 21:46 20:23-21:10/47
15	08:25 16:30	07:38 08:28-08:47/19 17:28 16:20-16:59/39	06:35 18:21	06:21 20:17	05:21 05:48-06:22/34 21:09 20:13-20:36/23	04:51 05:22-05:58/36 21:46 20:23-21:11/48
16	08:24 16:31	07:36 08:29-08:45/16 17:30 16:23-17:01/38	06:32 18:22	06:19 20:18	05:19 05:46-06:21/35 21:11 20:12-20:37/25	04:50 05:22-05:58/36 21:47 20:24-21:11/47
17	08:23 16:33	07:34 08:31-08:44/13 17:31 16:26-17:03/37	06:30 18:24	06:17 20:20	05:17 05:45-06:20/35 21:12 20:12-20:39/27	04:50 05:22-05:58/36 21:47 20:24-21:12/48
18	08:22 16:35	07:31 08:34-08:41/7 17:33 16:29-17:05/36	06:28 18:26	06:14 20:22	05:16 05:44-06:20/36 21:14 20:11-20:42/31	04:50 05:22-05:58/36 21:48 20:25-21:12/47
19	08:21 16:36	07:29 16:30-17:07/37 17:35	06:25 18:28	06:12 20:24	05:14 05:42-06:18/36 21:15 20:11-20:43/32	04:50 05:22-05:58/36 21:48 20:25-21:13/48
20	08:20 16:38	07:27 16:32-17:09/37 17:37	06:23 18:30	06:10 20:26	05:13 05:41-06:17/36 21:17 20:12-20:45/33	04:50 05:23-05:59/36 21:48 20:25-21:13/48
21	08:19 16:40	07:25 16:35-17:10/35 17:39	06:20 18:32	06:08 20:27	05:11 05:40-06:15/35 21:19 20:11-20:46/35	04:51 05:23-05:59/36 21:49 20:26-21:14/48
22	08:18 16:42	07:23 16:38-17:10/32 17:41	06:18 18:33	06:05 06:32-06:34/2 20:29	05:10 05:38-06:13/35 21:20 20:12-20:47/35	04:51 05:23-05:59/36 21:49 20:26-21:14/48
23	08:17 16:43	07:21 16:40-17:09/29 17:43	06:16 18:35	06:03 06:28-06:37/9 20:31	05:09 05:37-06:12/35 21:22 20:12-20:49/37	04:51 05:23-05:59/36 21:49 20:26-21:14/48
24	08:15 16:45	07:19 16:43-17:09/26 17:45	06:13 18:37	06:01 06:26-06:39/13 20:33	05:07 05:36-06:11/35 21:23 20:13-20:50/37	04:51 05:24-06:00/36 21:49 20:26-21:13/47
25	08:14 16:47	07:16 16:45-17:08/23 17:47	06:11 18:39	05:59 06:24-06:40/16 20:34	05:06 05:35-06:11/36 21:24 20:13-20:52/39	04:52 05:24-06:00/36 21:49 20:26-21:14/48
26	08:13 16:49	07:14 16:47-17:06/19 17:49	06:08 18:41	05:57 06:22-06:39/17 20:36	05:05 05:34-06:10/36 21:26 20:14-20:53/39	04:52 05:24-06:00/36 21:49 20:26-21:14/48
27	08:11 16:51	07:12 16:50-17:05/15 17:51	06:06 18:42	05:55 06:19-06:40/21 20:38	05:04 05:33-06:09/36 21:27 20:15-20:53/38	04:52 05:25-06:01/36 21:49 20:26-21:14/48
28	08:10 16:53	07:10 16:59-17:01/2 17:53	06:04 18:44	05:53 06:17-06:40/23 20:40	05:02 05:32-06:08/36 21:29 20:15-20:54/39	04:53 05:25-06:01/36 21:49 20:26-21:14/48
29	08:08 16:55	07:08 17:53	06:01 19:44	05:50 06:16-06:40/24 20:42	05:01 05:31-06:08/37 21:30 20:16-20:55/39	04:54 05:26-06:02/36 21:49 20:26-21:14/48
30	08:07 16:56	16:20-16:24/4	06:59 19:48	05:48 06:14-06:40/26 20:43	05:00 05:30-06:07/37 21:31 20:16-20:58/42	04:54 05:27-06:02/35 21:48 20:26-21:13/47
31	08:05 16:58	16:17-16:26/9	06:56 19:50	05:46 20:43	04:59 05:29-06:06/37 21:32 20:17-20:59/42	04:54 05:27-06:02/35 21:48 20:26-21:13/47
Sonnenscheinstunden	253	275	367	419	491	506
Anzahl Minuten mit Schatten	13	1098	0	151	1743	2486

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 9 - W9

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:55 05:27-06:03/36	05:33 06:03-06:35/32	06:26 07:18		07:14 07:55-08:18/23	08:08
	21:48 20:26-21:13/47	21:14 20:25-20:43/18	20:09 18:57		16:48 15:43-16:17/34	16:05
2	04:55 05:28-06:04/36	05:35 06:05-06:36/31	06:28 07:19		07:16 07:55-08:17/22	08:09
	21:48 20:26-21:13/47	21:12 20:26-20:42/16	20:07 18:55		16:46 15:43-16:15/32	16:04
3	04:56 05:29-06:05/36	05:37 06:06-06:37/31	06:29 07:21		07:18 07:56-08:17/21	08:11
	21:47 20:25-21:12/47	21:11 20:27-20:39/12	20:05 18:52		16:44 15:42-16:13/31	16:04
4	04:57 05:29-06:05/36	05:38 06:08-06:39/31	06:31 07:23		07:20 07:56-08:17/21	08:12
	21:47 20:25-21:12/47	21:09 20:28-20:38/10	20:02 18:50		16:42 15:42-16:11/29	16:03
5	04:58 05:30-06:06/36	05:40 06:10-06:40/30	06:33 07:25		07:22 07:58-08:17/19	08:14
	21:46 20:25-21:10/45	21:07 20:30-20:36/6	20:00 18:47		16:40 15:43-16:09/26	16:03
6	04:59 05:31-06:07/36	05:42 06:11-06:41/30	06:35 07:27		07:24 07:59-08:16/17	08:15
	21:46 20:26-21:10/44	21:05	19:57 18:45		16:39 15:43-16:07/24	16:02
7	05:00 05:32-06:08/36	05:43 06:13-06:45/32	06:36 07:28		07:26 08:00-08:15/15	08:16
	21:45 20:26-21:10/44	21:03	19:55 18:43		16:37 15:44-16:06/22	16:02
8	05:01 05:33-06:09/36	05:45 06:14-06:45/31	06:38 07:30		07:28 08:02-08:13/11	08:18
	21:44 20:26-21:10/44	21:01	19:53 18:40		16:35 15:45-16:04/19	16:01
9	05:02 05:34-06:11/37	05:47 06:16-06:47/31	06:40 07:32		07:29 08:05-08:10/5	08:19
	21:44 20:25-21:10/45	20:59	19:50 18:38		16:33 15:46-16:02/16	16:01
10	05:03 05:35-06:12/37	05:48 06:17-06:47/30	06:41 07:34		07:31 15:47-16:00/13	08:20
	21:43 20:25-21:09/44	20:57	19:48 18:36		16:32	16:01
11	05:04 05:36-06:14/38	05:50 06:19-06:48/29	06:43 07:35		07:33 15:49-15:58/9	08:21
	21:42 20:25-21:08/43	20:55	19:45 18:33		16:30	16:00
12	05:05 05:37-06:14/37	05:52 06:21-06:48/27	06:45 07:37		07:35 15:52-15:56/4	08:22
	21:41 20:25-21:08/43	20:53	19:43 18:31		16:28	16:00
13	05:06 05:38-06:15/37	05:53 06:22-06:48/26	06:47 07:39		07:37	08:23
	21:40 20:25-21:07/42	20:51	19:41 18:29		16:27	16:00
14	05:07 05:39-06:16/37	05:55 06:24-06:48/24	06:48 07:41 17:29-17:35/6		07:39	08:24
	21:39 20:25-21:05/40	20:49	19:38 18:27 17:26-17:27/1		16:25	16:00
15	05:09 05:40-06:16/36	05:57 06:25-06:47/22	06:50 07:43 17:21-17:38/17		07:41	08:25
	21:38 20:24-21:03/39	20:47	19:36 18:24		16:24	16:00
16	05:10 05:41-06:17/36	05:59 06:27-06:47/20	06:52 07:45 17:18-17:39/21		07:42	08:26
	21:37 20:23-21:02/39	20:45	19:33 18:22		16:22	16:00
17	05:11 05:43-06:19/36	06:00 06:29-06:47/18	06:53 07:46 17:15-17:40/25		07:44	08:27
	21:36 20:23-21:02/39	20:43	19:31 18:20		16:21	16:00
18	05:12 05:44-06:20/36	06:02 06:30-06:45/15	06:55 07:48 17:13-17:40/27		07:46	08:28
	21:35 20:23-21:02/39	20:41	19:28 18:17		16:19	16:01
19	05:14 05:45-06:20/35	06:04 06:32-06:44/12	06:57 07:50 17:10-17:40/30		07:48	08:28
	21:34 20:23-21:01/38	20:39	19:26 18:15		16:18	16:01
20	05:15 05:46-06:21/35	06:05 06:33-06:42/9	06:59 07:52 17:07-17:40/33		07:50	08:29
	21:32 20:22-20:59/37	20:36	19:24 18:13		16:17	16:01
21	05:17 05:48-06:23/35	06:07	07:00 07:54 17:04-17:40/36		07:51	08:30
	21:31 20:23-20:59/36	20:34	19:21 18:11		16:15	16:02
22	05:18 05:49-06:24/35	06:09	07:02 07:56 17:02-17:39/37		07:53	08:30
	21:30 20:22-20:57/35	20:32	19:19 18:09		16:14	16:02
23	05:19 05:50-06:25/35	06:11	07:04 07:57 17:00-17:37/37		07:55	08:31
	21:28 20:22-20:56/34	20:30	19:16 18:07		16:13	16:03
24	05:21 05:52-06:28/36	06:12	07:06 07:59 09:03-09:11/8		07:57	08:31
	21:27 20:22-20:55/33	20:28	19:14 18:04 16:59-17:34/35		16:12	16:03
25	05:22 05:53-06:29/36	06:14	07:07 07:01 08:00-08:14/14		07:58	08:31
	21:25 20:22-20:53/31	20:25	19:12 17:02 15:55-16:32/37		16:11	16:04
26	05:24 05:55-06:31/36	06:16	07:09 07:03 07:59-08:15/16		08:00	08:32
	21:24 20:22-20:50/28	20:23	19:09 17:00 15:51-16:30/39		16:10	16:05
27	05:25 05:56-06:31/35	06:17	07:11 07:05 07:57-08:16/19		08:02	08:32
	21:22 20:22-20:49/27	20:21	19:07 16:58 15:49-16:28/39		16:09	16:05
28	05:27 05:58-06:31/33	06:19	07:12 07:07 07:57-08:17/20		08:03	08:32
	21:21 20:22-20:46/24	20:19	19:04 16:56 15:47-16:26/39		16:08	16:06
29	05:29 05:59-06:33/34	06:21	07:14 07:09 07:56-08:17/21		08:05	08:32
	21:19 20:23-20:46/23	20:16	19:02 16:54 15:46-16:24/38		16:07	16:07
30	05:30 06:00-06:33/33	06:23	07:16 07:11 07:56-08:18/22		08:06	08:32
	21:18 20:23-20:45/22	20:14	18:59 16:52 15:45-16:21/36		16:06	16:08
31	05:32 06:02-06:34/32	06:24	07:12 07:07 07:55-08:18/23		08:06	08:32
	21:16 20:24-20:45/21	20:12	16:50 15:44-16:19/35		16:09	16:09
Sonnenscheinstunden	509	458	382	330	262	237
Anzahl Minuten mit Schatten	2272	573	0	711	413	0

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 10 - W10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:32 15:08-15:33/25 16:10	08:03 08:31-08:41/10 17:00 15:38-16:29/51	07:07 06:54 17:55 19:51	06:54 05:46 20:45		04:58 05:28-06:01/33 21:34 19:56-20:59/63
2	08:32 15:09-15:35/26 16:11	08:02 08:29-08:42/13 17:02 15:40-16:30/50	07:05 06:52 17:56 19:53	06:52 05:44 20:47	20:12-20:15/3	04:58 05:29-06:02/33 21:35 19:56-20:59/63
3	08:32 15:09-15:36/27 16:13	08:00 08:27-08:43/16 17:04 15:43-16:31/48	07:03 06:49 17:58 19:55	06:49 05:42 20:49	20:07-20:19/12	04:57 05:28-06:02/34 21:36 19:57-21:01/64
4	08:32 15:09-15:37/28 16:14	07:58 08:25-08:43/18 17:06 15:46-16:31/45	07:01 06:47 18:00 19:57	06:47 05:40 20:50	20:03-20:21/18	04:56 05:27-06:02/35 21:37 19:57-21:02/65
5	08:32 15:10-15:39/29 16:15	07:57 08:23-08:44/21 17:08 15:48-16:31/43	06:58 06:44 18:02 19:59	06:44 05:38 20:52	20:00-20:22/22	04:55 05:27-06:03/35 21:38 19:58-21:03/65
6	08:31 15:10-15:40/30 16:16	07:55 08:23-08:44/21 17:10 15:52-16:31/39	06:56 06:42 18:04 20:00	06:42 05:37 20:54	19:58-20:23/25	04:54 05:27-06:03/36 21:39 19:58-21:03/65
7	08:31 15:11-15:42/31 16:18	07:53 08:23-08:44/21 17:12 15:53-16:30/37	06:54 06:40 18:06 20:02	06:40 05:35 20:56	19:58-20:25/27	04:54 05:27-06:03/36 21:40 19:57-21:03/66
8	08:30 15:11-15:43/32 16:19	07:51 08:25-08:45/20 17:14 15:55-16:30/35	06:51 06:37 18:08 20:04	06:37 05:33 20:57	19:56-20:26/30	04:53 05:27-06:03/36 21:41 19:58-21:04/66
9	08:30 15:11-15:44/33 16:20	07:49 08:25-08:45/20 17:16 15:59-16:30/31	06:49 06:35 18:10 20:06	06:35 05:31 20:59	19:55-20:27/32	04:53 05:27-06:04/37 21:42 19:59-21:05/66
10	08:29 15:12-15:47/35 16:22	07:47 08:25-08:43/18 17:18 16:02-16:29/27	06:47 06:33 18:11 20:08	06:33 05:29 21:01	19:54-20:27/33	04:52 05:27-06:03/36 21:43 19:59-21:05/66
11	08:28 15:12-15:48/36 16:23	07:46 08:25-08:42/17 17:20 16:05-16:28/23	06:44 06:30 18:13 20:09	06:30 05:27 21:02	19:54-20:29/35	04:52 05:27-06:04/37 21:43 19:59-21:06/67
12	08:28 15:12-15:50/38 16:25	07:44 08:27-08:41/14 17:22 16:13-16:26/13	06:42 06:28 18:15 20:11	06:28 05:26 21:04	19:53-20:29/36	04:51 05:27-06:04/37 21:44 20:00-21:06/66
13	08:27 15:12-15:51/39 16:26	07:42 08:28-08:40/12 17:24 16:17-16:23/6	06:40 06:26 18:17 20:13	06:26 05:24 21:06	19:53-20:31/38	04:51 05:27-06:05/37 21:45 19:59-21:07/68
14	08:26 15:13-15:53/40 16:28	07:40 08:32-08:36/4 17:26	06:37 06:23 18:19 20:15	06:23 05:22 21:07	19:52-20:32/40	04:51 05:27-06:04/37 21:46 20:00-21:08/68
15	08:25 15:13-15:55/42 16:30	07:38 17:28 18:21 20:17	06:35 06:21 18:21 20:17	06:21 05:21 21:09	19:53-20:36/43	04:51 05:27-06:04/37 21:46 20:00-21:09/69
16	08:24 15:14-15:57/43 16:31	07:36 17:30 18:22 20:18	06:32 06:19 18:22 20:18	06:19 05:19 21:11	19:52-20:39/47	04:50 05:27-06:05/38 21:47 20:01-21:10/69
17	08:23 15:13-15:58/45 16:33	07:34 17:31 18:24 20:20	06:30 06:17 18:24 20:20	06:17 05:17 21:12	19:52-20:41/49	04:50 05:27-06:05/38 21:47 20:01-21:10/69
18	08:22 15:14-16:00/46 16:35	07:31 17:33 18:26 20:22	06:28 06:14 18:26 20:22	06:14 05:16 21:14	19:52-20:42/50	04:50 05:28-06:05/37 21:48 20:01-21:11/70
19	08:21 15:15-16:02/47 16:36	07:29 17:35 18:28 20:24	06:25 06:12 18:28 20:24	06:12 05:14 21:15	19:52-20:43/51	04:50 05:28-06:05/37 21:48 20:01-21:11/70
20	08:20 15:16-16:05/49 16:38	07:27 17:37 18:30 20:25	06:23 06:10 18:30 20:25	06:10 05:13 21:17	05:42-05:52/10 19:52-20:45/53	04:50 05:28-06:05/37 21:48 20:01-21:11/70
21	08:19 15:16-16:06/50 16:40	07:25 17:39 18:32 20:27	06:20 06:08 18:32 20:27	06:08 05:11 21:19	05:40-05:54/14 19:52-20:46/54	04:51 05:29-06:06/37 21:49 20:02-21:12/70
22	08:18 15:17-16:08/51 16:42	07:23 17:41 18:33 20:29	06:18 06:05 18:33 20:29	06:05 05:10 21:20	05:38-05:55/17 19:52-20:47/55	04:51 05:29-06:06/37 21:49 20:02-21:12/70
23	08:17 15:18-16:10/52 16:43	07:21 17:43 18:35 20:31	06:16 06:03 18:35 20:31	06:03 05:09 21:22	05:37-05:56/19 19:53-20:49/56	04:51 05:29-06:06/37 21:49 20:02-21:12/70
24	08:15 15:20-16:12/52 16:45	07:19 17:45 18:37 20:33	06:13 06:01 18:37 20:33	06:01 05:07 21:23	05:36-05:57/21 19:53-20:50/57	04:51 05:29-06:06/37 21:49 20:02-21:12/70
25	08:14 15:20-16:14/54 16:47	07:16 17:47 18:39 20:34	06:11 05:59 18:39 20:34	05:59 05:06 21:24	05:35-05:58/23 19:54-20:50/56	04:52 05:29-06:07/38 21:49 20:03-21:12/69
26	08:13 15:23-16:17/54 16:49	07:14 17:49 18:41 20:36	06:08 05:57 18:41 20:36	05:57 05:05 21:26	05:34-05:59/25 19:54-20:51/57	04:52 05:29-06:07/38 21:49 20:03-21:12/69
27	08:11 15:25-16:18/53 16:51	07:12 17:51 18:42 20:38	06:06 05:55 18:42 20:38	05:55 05:04 21:27	05:33-05:59/26 19:55-20:52/57	04:52 05:30-06:08/38 21:49 20:03-21:12/69
28	08:10 15:30-16:20/50 16:53	07:10 17:53 18:44 20:40	06:04 05:53 18:44 20:40	05:53 05:02 21:29	05:32-06:00/28 19:55-20:52/57	04:53 05:30-06:07/37 21:49 20:03-21:11/68
29	08:08 15:32-16:23/51 16:55	07:07 17:50 19:46 20:42	06:01 05:50 19:46 20:42	05:50 05:01 21:30	05:31-06:00/29 19:56-20:52/56	04:54 05:31-06:08/37 21:49 20:04-21:11/67
30	08:07 08:34-08:37/3 16:56	15:35-16:25/50 19:48 20:43	06:59 05:48 19:48 20:43	05:48 05:00 21:31	05:30-06:01/31 19:56-20:56/60	04:54 05:30-06:08/38 21:48 20:03-21:10/67
31	08:05 08:33-08:40/7 16:58	15:36-16:26/50 19:50	06:56 19:50	05:46 21:32	05:29-06:01/32 19:56-20:57/61	
Sonnenscheinstunden	253	275	367	419	491	506
Anzahl Minuten mit Schatten	1298	673	0	0	1545	3121

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat Sonnenaufgang (SS:MM) Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattende/Minuten mit Schatten
 Sonnenuntergang (SS:MM) Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM) Schattende/Minuten mit Schatten

Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
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-
Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Kalender pro WEA

Berechnung: GBWEA: 10 - W10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HAMBURG / SASEL]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.38 2.33 3.28 5.21 6.82 6.54 6.22 6.27 4.44 3.10 1.68 1.06

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
302 339 467 706 786 617 554 815 1,348 1,328 721 398 8,381
Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	Septemb	Oktober	November	Dezember
1	04:55 05:31-06:08/37	05:33 20:03-20:39/36	06:26 07:18		07:14 07:54-08:13/19	08:08 14:54-15:30/36
	21:48 20:03-21:10/67	21:14	20:09 18:57		16:48 15:31-15:59/28	16:05
2	04:55 05:32-06:09/37	05:35 20:04-20:39/35	06:28 07:19		07:16 07:54-08:13/19	08:09 14:54-15:29/35
	21:48 20:04-21:10/66	21:12	20:07 18:55		16:46 15:28-15:59/31	16:04
3	04:56 05:32-06:09/37	05:37 20:04-20:37/33	06:29 07:21		07:18 07:53-08:14/21	08:11 14:55-15:28/33
	21:47 20:03-21:10/67	21:11	20:05 18:52		16:44 15:25-16:00/35	16:04
4	04:57 05:32-06:08/36	05:38 20:06-20:37/31	06:31 07:23		07:20 07:53-08:14/21	08:12 14:55-15:27/32
	21:47 20:03-21:10/67	21:09	20:02 18:50		16:42 15:23-16:00/37	16:03
5	04:58 05:33-06:09/36	05:40 20:06-20:35/29	06:33 07:25		07:22 07:54-08:15/21	08:14 14:56-15:27/31
	21:46 20:04-21:10/66	21:07	20:00 18:47		16:40 15:21-16:00/39	16:03
6	04:59 05:33-06:09/36	05:42 20:07-20:34/27	06:35 07:27		07:24 07:54-08:14/20	08:15 14:56-15:26/30
	21:46 20:04-21:10/66	21:05	19:57 18:45		16:39 15:17-16:01/44	16:02
7	05:00 05:34-06:09/35	05:43 20:08-20:32/24	06:36 07:28		07:26 07:56-08:14/18	08:16 14:57-15:26/29
	21:45 20:04-21:09/65	21:03	19:55 18:43		16:37 15:16-16:01/45	16:02
8	05:01 05:34-06:09/35	05:45 20:10-20:31/21	06:38 07:30		07:28 07:58-08:14/16	08:18 14:57-15:25/28
	21:44 20:04-21:09/65	21:01	19:53 18:40		16:35 15:13-16:01/48	16:01
9	05:02 05:35-06:10/35	05:47 20:13-20:30/17	06:40 07:32		07:29 08:00-08:13/13	08:19 14:58-15:24/26
	21:44 20:04-21:09/65	20:59	19:50 18:38		16:33 15:11-16:01/50	16:01
10	05:03 05:36-06:10/34	05:48 20:17-20:27/10	06:41 07:34		07:31 08:02-08:12/10	08:20 14:58-15:24/26
	21:43 20:04-21:08/64	20:57	19:48 18:36		16:32 15:09-16:00/51	16:01
11	05:04 05:36-06:10/34	05:50	06:43 07:35		07:33 08:04-08:11/7	08:21 14:59-15:24/25
	21:42 20:04-21:07/63	20:55	19:45 18:33		16:30 15:08-15:58/50	16:00
12	05:05 05:37-06:09/32	05:52	06:45 07:37		07:35 08:06-08:09/3	08:22 15:00-15:24/24
	21:41 20:04-21:06/62	20:53	19:43 18:31		16:28 15:07-15:56/49	16:00
13	05:06 05:38-06:09/31	05:53	06:47 07:39		07:37 15:04-15:55/51	08:23 15:00-15:24/24
	21:40 20:04-21:05/61	20:51	19:41 18:29		16:27	16:00
14	05:07 05:39-06:09/30	05:55	06:48 07:41		07:39 15:01-15:53/52	08:24 15:01-15:24/23
	21:39 20:04-21:02/58	20:49	19:38 18:26		16:25	16:00
15	05:09 05:40-06:09/29	05:57	06:50 07:43		07:41 14:58-15:51/53	08:25 15:02-15:24/22
	21:38 20:04-21:01/57	20:47	19:36 18:24		16:24	16:00
16	05:10 05:41-06:08/27	05:58	06:52 07:45		07:42 14:56-15:49/53	08:26 15:02-15:24/22
	21:37 20:03-21:00/57	20:45	19:33 18:22		16:22	16:00
17	05:11 05:43-06:09/26	06:00	06:53 07:46		07:44 14:54-15:48/54	08:27 15:02-15:23/21
	21:36 20:03-21:00/57	20:43	19:31 18:20		16:21	16:00
18	05:12 05:44-06:08/24	06:02	06:55 07:48		07:46 14:54-15:46/52	08:28 15:03-15:23/20
	21:35 20:04-21:00/56	20:41	19:28 18:17		16:19	16:01
19	05:14 05:45-06:07/22	06:04	06:57 07:50		07:48 14:53-15:45/52	08:28 15:04-15:24/20
	21:34 20:03-21:00/57	20:39	19:26 18:15		16:18	16:01
20	05:15 05:46-06:06/20	06:05	06:59 07:52		07:50 14:52-15:43/51	08:29 15:05-15:25/20
	21:32 20:03-20:59/56	20:36	19:24 18:13		16:17	16:01
21	05:17 05:48-06:06/18	06:07	07:00 07:54		07:51 14:52-15:42/50	08:30 15:05-15:25/20
	21:31 20:03-20:59/56	20:34	19:21 18:11		16:15	16:02
22	05:18 05:49-06:04/15	06:09	07:02 07:56		07:53 14:52-15:41/49	08:30 15:06-15:26/20
	21:30 20:03-20:57/54	20:32	19:19 18:09		16:14	16:02
23	05:19 05:50-06:03/13	06:11	07:04 07:57		07:55 14:52-15:38/46	08:31 15:06-15:26/20
	21:28 20:02-20:56/54	20:30	19:16 18:07		16:13	16:03
24	05:21 05:53-06:01/8	06:12	07:05 07:59		07:57 14:51-15:37/46	08:31 15:06-15:26/20
	21:27 20:03-20:55/52	20:28	19:14 18:04		16:12	16:03
25	05:22 20:02-20:53/51	06:14	07:07 07:01		07:58 14:51-15:36/45	08:31 15:07-15:27/20
	21:25	20:25	19:11 17:02		16:11	16:04
26	05:24 20:02-20:51/49	06:16	07:09 07:03		08:00 14:52-15:35/43	08:32 15:07-15:28/21
	21:24	20:23	19:09 17:00		16:10	16:05
27	05:25 20:03-20:51/48	06:17	07:11 07:05		08:02 14:52-15:34/42	08:32 15:07-15:28/21
	21:22	20:21	19:07 16:58		16:09	16:05
28	05:27 20:02-20:49/47	06:19	07:12 07:07	08:00-08:07/7	08:03 14:53-15:33/40	08:32 15:08-15:29/21
	21:21	20:18	19:04 16:56		16:08	16:06
29	05:29 20:03-20:44/41	06:21	07:14 07:09	07:58-08:10/12	08:05 14:52-15:32/40	08:32 15:08-15:30/22
	21:19	20:16	19:02 16:54	15:45-15:53/8	16:07	16:07
30	05:30 20:03-20:42/39	06:23	07:16 07:11	07:56-08:11/15	08:06 14:53-15:31/38	08:32 15:08-15:31/23
	21:18	20:14	18:59	16:52 15:43-15:56/13	16:06	16:08
31	05:32 20:04-20:40/36	06:24		07:12 07:55-08:12/17		08:32 15:09-15:32/23
	21:16	20:12		16:50 15:34-15:57/23		16:09
Sonnenscheinstunden	509	458	382	330	262	237
Anzahl Minuten mit Schatten	2456	263	0	95	1552	758

Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

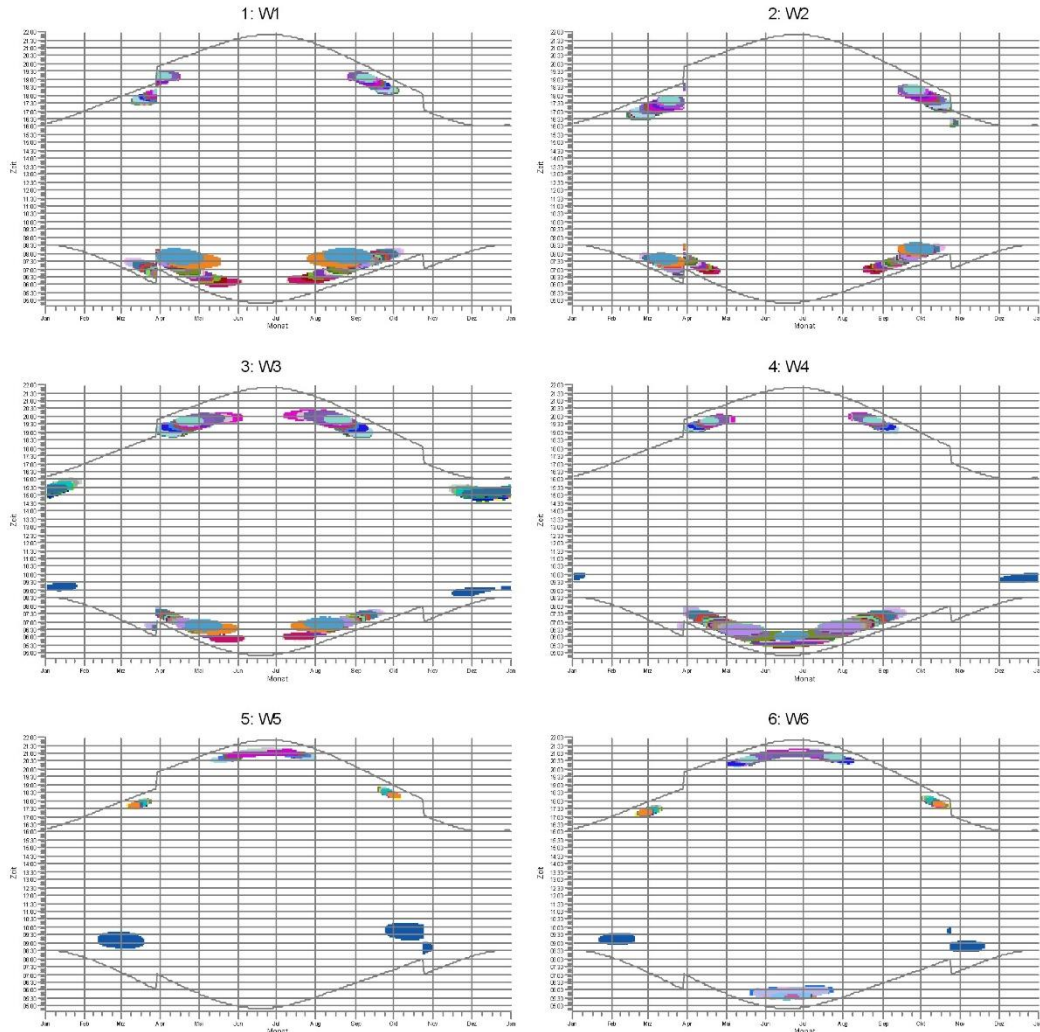
Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
20190529_Bostelwiebeck II

Lizenzierter Anwender:
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Dennis Kramer / dennis.kramer@i17-wind.de
Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Grafischer Kalender pro WEA

Berechnung: GB



Schattenrezepte

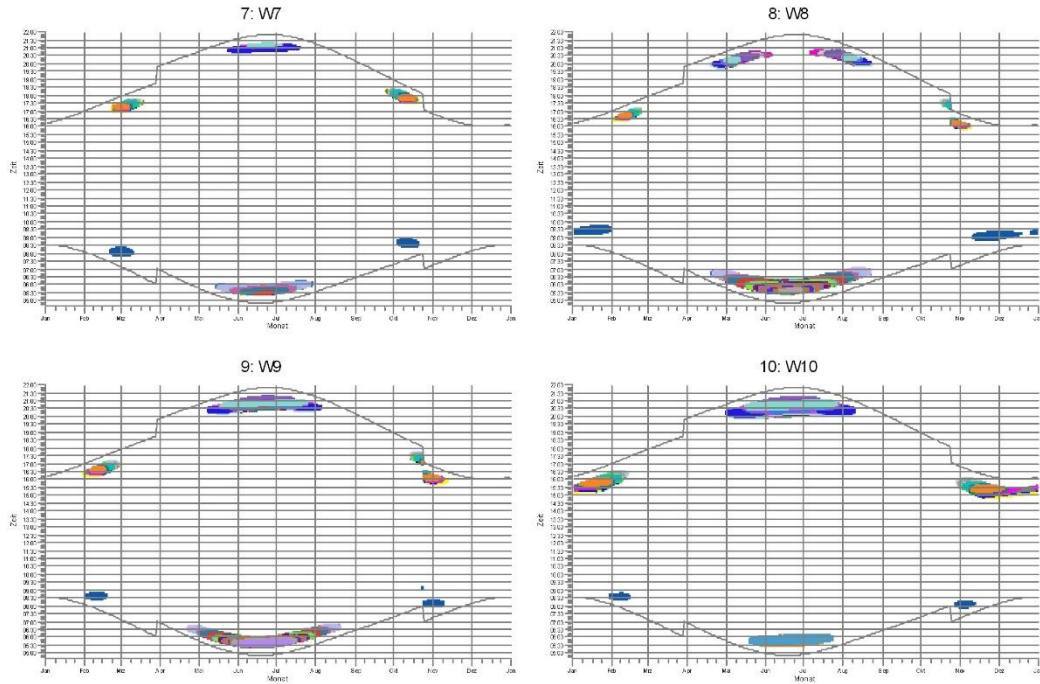
AI: 101	PI: 1016	AE: 1031	AP: 1046	AL: 1061	AK: 1076	AM: 1091	AN: 1106	AO: 1121	AP: 1136	AA: 1151
BI: 102	QI: 1017	AF: 1032	AQ: 1047	BL: 1062	AK: 1077	AM: 1092	AN: 1107	AO: 1122	AP: 1137	AA: 1152
CI: 103	RI: 1018	AG: 1033	AR: 1048	BM: 1063	BL: 1078	BN: 1093	BO: 1108	BP: 1123	BQ: 1138	BB: 1153
DI: 104	SI: 1019	AH: 1034	AS: 1049	BN: 1064	CM: 1079	CO: 1094	CP: 1109	CQ: 1124	CR: 1139	CC: 1154
EI: 105	TI: 1020	AI: 1035	AX: 1050	BN: 1065	CM: 1080	CO: 1095	CP: 1110	CQ: 1125	CR: 1140	CC: 1155
FI: 106	UI: 1021	AV: 1036	AY: 1051	BN: 1066	CM: 1081	CO: 1096	CP: 1111	CQ: 1126	CR: 1141	CC: 1156
GI: 107	VI: 1022	AW: 1037	AZ: 1052	BO: 1067	CM: 1082	CO: 1097	CP: 1112	CQ: 1127	CR: 1142	CC: 1157
HI: 108	WI: 1023	AX: 1038	BA: 1053	BP: 1068	CM: 1083	CO: 1098	CP: 1113	CQ: 1128	CR: 1143	CC: 1158
II: 109	XI: 1024	AY: 1039	BB: 1054	BQ: 1069	CM: 1084	CO: 1099	CP: 1114	CQ: 1129	CR: 1144	CC: 1159
KI: 1010	YI: 1025	AZ: 1040	BC: 1055	BR: 1070	CM: 1085	CO: 1100	CP: 1115	CQ: 1130	CR: 1145	CC: 1160
LI: 1011	ZI: 1026	AA: 1041	BD: 1056	BS: 1071	CM: 1086	CO: 1101	CP: 1116	CQ: 1131	CR: 1146	CC: 1161
MI: 1012	AA: 1027	AB: 1042	BE: 1057	BT: 1072	CM: 1087	CO: 1102	CP: 1117	CQ: 1132	CR: 1147	CC: 1162
NI: 1013	AB: 1028	AC: 1043	BF: 1058	BU: 1073	CM: 1088	CO: 1103	CP: 1118	CQ: 1133	CR: 1148	CC: 1163
OI: 1014	AC: 1029	AD: 1044	BG: 1059	BV: 1074	CM: 1089	CO: 1104	CP: 1119	CQ: 1134	CR: 1149	CC: 1164
PI: 1015	AD: 1030	AE: 1045	BH: 1060	BW: 1075	CM: 1090	CO: 1105	CP: 1120	CQ: 1135	CR: 1150	CC: 1165

Projekt:
20190529_Bostelwiebeck II

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Berechnet:
05.08.2019 09:53/3.2.744

SHADOW - Grafischer Kalender pro WEA

Berechnung: GB



Schattenspektren

A: 101	O: 1015	AC: 1029	AQ: 1043	AO: 1067	AP: 1081	CQ: 1095	DE: 10109	DS: 10123	ES: 10137	EU: 10151
B: 102	P: 1016	AD: 1030	AR: 1044	BP: 1068	CD: 1082	CR: 1096	DF: 10110	DT: 10124	EH: 10138	EV: 10152
C: 103	Q: 1017	AE: 1031	AS: 1045	BP: 1069	CE: 1083	CS: 1097	DG: 10111	DU: 10125	EI: 10139	EW: 10153
D: 104	R: 1018	AF: 1032	AT: 1046	BR: 1070	CF: 1084	CT: 1098	DH: 10112	DV: 10126	EL: 10140	EX: 10154
E: 105	S: 1019	AG: 1033	AU: 1047	BS: 1071	CG: 1085	CU: 1099	DI: 10113	DW: 10127	EK: 10141	EY: 10155
F: 106	T: 1020	AH: 1034	AV: 1048	BT: 1072	CH: 1086	CV: 10100	DO: 10114	DX: 10128	BL: 10142	EZ: 10156
G: 107	U: 1021	AI: 1035	BE: 1057	BU: 1073	CI: 1087	CW: 10101	DK: 10115	DZ: 10129	BM: 10143	FK: 10157
H: 108	V: 1022	AJ: 1036	BF: 1058	BV: 1074	CC: 1088	DX: 10102	DL: 10116	D2: 10130	BN: 10144	PL: 10158
I: 109	W: 1023	AK: 1037	BH: 1060	BW: 1075	CD: 1089	CY: 10103	DM: 10117	FA: 10131	PD: 10145	PC: 10159
J: 110	X: 1024	AL: 1038	BI: 1061	BX: 1076	CE: 1090	CZ: 10104	DN: 10118	FB: 10132	PE: 10146	PD: 10160
K: 111	Y: 1025	AM: 1039	BK: 1063	BY: 1077	CF: 1091	DA: 10105	DO: 10119	FC: 10133	FQ: 10147	FE: 10161
L: 112	Z: 1026	AN: 1040	BL: 1064	BZ: 1078	CG: 1092	DB: 10106	DP: 10120	FD: 10134	CR: 10148	FF: 10162
M: 113	AA: 1027	AO: 1041	BH: 1065	CA: 1079	CH: 1093	DC: 10107	DQ: 10121	FE: 10135	CS: 10149	
N: 114	AB: 1028	AP: 1042	BN: 1066	CB: 1080	CI: 1094	DD: 10108	DR: 10122	EF: 10136	CT: 10150	