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**Errichtung von drei
Windenergieanlagen des Typs
Nordex N163/6.X
in 26388 Wilhelmshaven,
OT Sengwarden**

**Schattenwurfprognose nach den
LAI-Hinweisen [2] für den Neubau und
Betrieb von 3 Windenergieanlagen**

Bericht Nr. M180777/02

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Inhaltsverzeichnis

Zusammenfassung	3
1 Situation und Aufgabenstellung	6
2 Zitierte Unterlagen	8
3 Örtliche Situation	9
3.1 Standort und Parameter der WEA	9
3.2 Maßgebliche Immissionsorte	9
4 Beurteilungsgrundlagen	11
4.1 Beurteilung von Schattenwurf nach den Vorgaben der WKA-Schattenwurfhinweise des LAI [2]	11
5 Schattenwurfberechnungen	12
5.1 Berechnungsverfahren	12
5.2 Berechnungsergebnisse	12
6 Schlussbetrachtung	16
 Anhang A: Lagepläne und Beschattungskarten	
Anhang B: Berechnungsergebnisse Zusatzbelastung	
Anhang C: Berechnungsergebnisse Gesamtbelastung	

Zusammenfassung

Die Bioenergie Nord GmbH plant in 26388 Wilhelmshaven, OT Sengwarden drei WEA des Typs Nordex N163/6.X mit jeweils 7 MW Nennleistung zu errichten und zu betreiben (geplante Standorte: Flurstücke 24/2, 107 und 111, Flur 17, Gemarkung Sengwarden).

Im Zuge des erforderlichen BImSchG Genehmigungsverfahrens [1] wurde für die geplanten Windenergieanlagen eine Schattenwurfberechnung erstellt. Es wurde vorliegend die Zusatzbelastung des Schattenwurfs der drei geplanten Neu-WEA, sowie die Gesamtbelastung durch die drei geplanten Neu-WEA, und zwanzig weitere WEA (VB 01 – VB 20) unterschiedlicher Typen betrachtet. Folgende Ergebnisse sind festzuhalten:

Astronomisch maximal mögliche Beschattungsdauern:

Immissionsort	Astron. Max. mögl. Beschattungsdauer			
	Zusatzbelastung		Gesamtbelastung	
	Stunden/ Jahr	Max. Schatten- dauer/Tag	Stunden/ Jahr	Max. Schatten- dauer/Tag
	[hh:mm]	[hh:mm]	[hh:mm]	[hh:mm]
IO1 Utwarfe 1	00:00	00:00	297:19	02:15
IO2 Utwarfe 2	00:00	00:00	256:54	02:08
IO3 Utwarfe 3	00:00	00:00	242:00	02:01
IO4 Utwarfe 4	00:00	00:00	243:17	01:59
IO5 Klein Buschhausen 3	00:00	00:00	73:22	00:59
IO6 Bohnenburg 20	00:00	00:00	87:39	01:00
IO7 Sengwarder Chausseehaus	00:00	00:00	152:49	01:31
IO8 Idschenhausen 1	00:00	00:00	46:26	00:36
IO9 Idschenhausen 2	00:00	00:00	51:02	00:33
IO10 Remmelhausen 4	00:00	00:00	11:52	00:17
IO11 Westerhausen 3	36:09	00:39	70:32	00:39
IO12 Westerhausen 4	44:44	00:38	82:54	00:44
IO13 Westerhausen 11	144:36	00:57	166:53	01:04
IO14 Westerhausen 12	146:22	00:58	164:08	01:02
IO15 Westerhausen 9A	221:20	02:26	352:23	02:26
IO16 Westerhausen 9	168:28	02:10	253:47	02:10
IO17 Rüschenstede 1	20:28	00:33	167:08	01:32
IO18 Langengroden 1	00:00	00:00	87:02	01:57
IO19 WA Sengwarden BP207	00:00	00:00	08:29	00:16
IO20 Langengrodener Weg 17	00:00	00:00	00:00	00:00
IO21 Am Sudring 15	00:00	00:00	00:00	00:00
IO22 Georg-Adden-Straße 55	00:00	00:00	00:00	00:00

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IO23 Hooksiel	00:00	00:00	00:00	00:00
IO24 Depenhausen/Pakens 1	92:28	01:38	122:46	01:38
IO25 Tain 3	40:01	00:42	94:05	01:13
IO26 Waterpott 1	40:16	00:40	109:11	01:17
IO27 Klein Depenhausen 1	75:18	00:49	122:21	01:19
IO28 Klein Westerhausen 1	108:16	01:09	122:54	01:09
IO29 Depenhausen 1	77:36	00:47	81:42	00:47
IO30 Purkswarfe 2	00:00	00:00	12:33	00:19
IO31 Purkswarfe 3	00:00	00:00	04:08	00:11
IO32 Putzwei 1	22:05	00:35	35:33	00:51
IO33 Westerhausen 5	232:06	02:02	265:31	02:02
IO34 Westerhausen 6	328:08	01:36	342:36	01:36
IO35 Westerhausen 7	259:45	01:36	275:15	01:36
IO36 Westerhausen 10	231:46	01:17	245:55	01:17
IO37 Westerhausen 1	83:41	01:14	102:47	01:14

Zusatzbelastung

Die durch die drei Neu-WEA an den maßgeblichen Immissionsorten hervorgerufenen astronomisch maximal möglichen Beschattungsdauern betragen bis zu 328 Stunden und 8 Minuten im Jahr am Immissionsort IO34; die maximale Schattendauer pro Tag beträgt bis zu 146 Minuten am Immissionsort IO15.

Die zulässigen jährlichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Stunden pro Jahr werden durch die drei Neu-WEA an den Immissionsorten IO11 bis IO16, IO24 bis IO29 und IO33 bis IO37 überschritten.

Die zulässigen täglichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Minuten pro Tag werden durch die drei Neu-WEA an den Immissionsorten IO11 bis IO17, IO24 bis IO29 und IO32 bis IO37 überschritten.

Gesamtbelastung

Die durch die drei Neu-WEA und zwanzig Vorbelastungs-WEA an den maßgeblichen Immissionsorten hervorgerufenen astronomisch maximal möglichen Beschattungsdauern betragen bis zu 352 Stunden und 23 Minuten im Jahr am Immissionsort IO15; die maximale Schattendauer pro Tag beträgt bis zu 146 Minuten am Immissionsort IO15.

Die zulässigen jährlichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Stunden pro Jahr werden durch die drei Neu-WEA und zwanzig VB-WEA an den Immissionsorten IO1 bis IO9, IO11 bis IO18, IO24 bis IO29 und IO32 bis IO37 überschritten.

Die zulässigen täglichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Minuten pro Tag werden durch die drei Neu-WEA und zwanzig VB-WEA an den Immissionsorten IO1 bis IO9, IO11 bis IO18, IO24 bis IO29 und IO32 bis IO37 überschritten.



B. Sc. Felix Bergholz

1 Situation und Aufgabenstellung

Die Bioenergie Nord GmbH plant in 26388 Wilhelmshaven, OT Sengwarden drei WEA des Typs Nordex N163/6.X zu errichten und zu betreiben (geplante Standorte: Flurstücke 24/2, 107 und 111, Flur 17, Gemarkung Sengwarden).

Für dieses Vorhaben soll von Müller-BBM eine immissionsschutzrechtliche Verträglichkeitsprüfung unter Berücksichtigung der aktuellen LAI-Hinweise zur Beurteilung der optischen Immissionen von Windkraftanlagen [2] durchgeführt werden.

Als Vorbelastung sind 20 bestehende WEA unterschiedlicher Typen zu berücksichtigen, die im Umfeld bzw. im Einwirkungsbereich der geplanten Neustandorte betrieben werden.

In der nachfolgenden Tabelle sind die Daten der berücksichtigten WEA zusammengestellt (vgl. Lageplan in Anhang A).

Tabelle 1. Anlagendaten

WEA Nr.	Typ	Nennleistung in kW	Nabenhöhe in m	Rotordurchmesser in m	UTM-Koordinaten (Zone 32)	
					Rechtswert	Hochwert
ZB1	Nordex 163/6.X	7.000	118	163	32.434.029	5.940.044
ZB2	Nordex 163/6.X	7.000	118	163	32.434.212	5.939.722
ZB3	Nordex 163/6.X	7.000	118	163	32.434.540	5.939.539
VB1	V112 3.3 MW	3.300	94	112	32.434.774	5.940.580
VB2	V112 3.3 MW	3.300	119	112	32.435.138	5.940.834
VB3	V112 3.3 MW	3.300	119	112	32.435.257	5.940.480
VB4	V112 3.3 MW	3.300	119	112	32.435.599	5.940.725
VB5	V112 3.3 MW	3.300	119	112	32.435.874	5.940.249
VB6	V112 3.3 MW	3.300	119	112	32.436.206	5.940.107
VB7	V112 3.3 MW	3.300	94	112	32.436.556	5.940.198
VB8	Micon_M1500-600	600	46	43	32.433.106	5.941.146
VB9	Micon_M750/250	250	36	31	32.433.437	5.941.235
VB10	E-82 E2 2.3 MW	2.300	108,4	82	32.432.205	5.941.014
VB11	E-82 E2 2.3 MW	2.300	108,4	82	32.432.241	5.940.674

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WEA Nr.	Typ	Nennleistung in kW	Nabenhöhe in m	Rotordurchmesser in m	UTM-Koordinaten (Zone 32)	
					Rechtswert	Hochwert
VB12	E-101 3 MW	3.000	99	101	32.432.356	5.940.371
VB13	E-101 3 MW	3.000	99	101	32.432.527	5.940.125
VB14	Siemens SWT 6MW	6.000	120	154	32.435.137	5.937.518
VB15	Micon NM900-52	900	49	52	32.434.680	5.937.333
VB16	Micon NM900-52	900	49	52	32.434.720	5.937.091
VB17	V112-3.3 MW	3.300	112	112	32.435.480	5.937.236
VB18	Nordex N117 2.4MW	2.400	91	117	32.435.622	5.937.556
VB19	Siemens SWT 6 MW	6.000	120	154	32.435.903	5.937.129
VB20	Vestas V39 500kW	500	41	39	32.431.787	5.939.386

Der vorliegende Bericht stellt die Ergebnisse der Untersuchung zu den optischen Immissionen der drei geplanten WEA des Typs Nordex N163/6.X an den Immissionsorten dar.

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2 Zitierte Unterlagen

- [1] Bundes-Immissionsschutzgesetz – Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnliche Vorgänge (Bundes-Immissionsschutzgesetz – BImSchG) in der Fassung der Bekanntmachung vom 17.05.2013 (BGBl. I S. 1274), das zuletzt durch Artikel 1 des Gesetzes vom 3. Juli 2024 (BGBl. 2024 I Nr. 225) geändert worden ist
- [2] Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windkraftanlagen – Aktualisierung 2019 (WKA-Schattenwurfhinweise) vom 23. Januar 2020, Bund/Länder-Arbeitsgemeinschaft Immissionsschutz.
- [3] windPro Softwarepaket zur Planung und Entwicklung von Windparkprojekten, Version 4.0.531, EMD International A/S, Niels Jernesvej 10, 9220 Aalborg, Dänemark.
- [4] Digitales Geländemodell (DGM): EMD/windPRO elevation model based on data from Landesamt für Geoinformation and Landesvermessung Niedersachsen (LGLN), Rasterweite 5 m.
- [5] Bioenergie Nord GmbH: aktueller Lageplan des Standorts Westerhausen mit Stand vom 25.04.2024 und Anlagendaten relevanter WEA in einem Radius von 2,25 km um die Potentialfläche, jeweils mit Stand vom 01.08.2024.

3 Örtliche Situation

3.1 Standort und Parameter der WEA

Die Windenergieanlagen sollen in 26388 Wilhelmshaven errichtet werden. Die Positionen der geplanten Neu-WEA sind im Lageplan im Anhang A dargestellt.

Die drei geplanten Neu-Windenergieanlagen sind Anlagen vom Typ Nordex N163/6.X mit einer Leistung von 7 MW und einer Nabenhöhe von 118 m. Die Anlagendaten der in dieser Untersuchung betrachteten WEA können der Tabelle 1 entnommen werden.

3.2 Maßgebliche Immissionsorte

Die Beurteilung des Vorhabens erfolgt für insgesamt 37 Immissionsorte, die alle nach unserer Einschätzung als maßgebliche Immissionsorte gemäß 1.2 der LAI-Hinweise [2] gelten.

In Tabelle 2 sind die ausgewählten Immissionsorte und deren Position aufgeführt.

Tabelle 2. Immissionsorte und Standortkoordinaten.

Immissionsort	UTM-Koordinaten (Zone 32)	
	Rechtswert	Hochwert
IO1 Utwarfe 1	436.131	5.940.572
IO2 Utwarfe 2	436.140	5.940.625
IO3 Utwarfe 3	436.153	5.940.685
IO4 Utwarfe 4	436.089	5.940.708
IO5 Klein Buschhausen 3	436.045	5.941.392
IO6 Bohnenburg 20	436.785	5.940.793
IO7 Sengwarder Chausseehaus	436.664	5.940.615
IO8 Idschenhausen 1	437.215	5.939.770
IO9 Idschenhausen 2	437.310	5.939.811
IO10 Remmelhausen 4	436.614	5.939.542
IO11 Westerhausen 3	435.587	5.939.724
IO12 Westerhausen 4	435.445	5.939.994
IO13 Westerhausen 11	434.919	5.940.137
IO14 Westerhausen 12	434.838	5.940.170
IO15 Westerhausen 9A	434.262	5.940.420
IO16 Westerhausen 9	434.230	5.940.481
IO17 Rüschenstede 1	434.591	5.941.001
IO18 Langengroden 1	435.289	5.941.414
IO19 WA Sengwarden BP207	436.605	5.939.173
IO20 Langengrodener Weg 17	435.491	5.942.055
IO21 Am Sudring 15	435.532	5.942.394
IO22 Georg-Adden-Straße 55	435.830	5.942.859
IO23 Hooksiel	436.324	5.943.054

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Immissionsort	UTM-Koordinaten (Zone 32)	
	Rechtswert	Hochwert
IO24 Depenhausen/Pakens 1	433.854	5.940.646
IO25 Tain 3	433.154	5.940.529
IO26 Waterpott 1	433.089	5.940.168
IO27 Klein Depenhausen 1	433.254	5.939.909
IO28 Klein Westerhausen 1	433.683	5.939.767
IO29 Depenhausen 1	433.437	5.939.318
IO30 Purkswarfe 2	433.950	5.939.029
IO31 Purkswarfe 3	434.370	5.939.047
IO32 Putzwei 1	434.854	5.939.246
IO33 Westerhausen 5	434.903	5.939.704
IO34 Westerhausen 6	434.704	5.939.918
IO35 Westerhausen 7	434.664	5.940.034
IO36 Westerhausen 10	434.732	5.940.032
IO37 Westerhausen 1	435.270	5.939.464

Die örtlichen Gegebenheiten sind dem Lageplan in Anhang A zu entnehmen.

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4 Beurteilungsgrundlagen

4.1 Beurteilung von Schattenwurf nach den Vorgaben der WKA-Schattenwurfhinweise des LAI [2]

Zur Beurteilung von optischen Immissionen in Form von periodischem Schattenwurf nach dem Bundes-Immissionsschutzgesetz (BImSchG [1]) sind die Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windkraftanlagen (WKA-Schattenwurfhinweise [2]), heranzuziehen.

Die Hinweise enthalten Konkretisierungen zu den Anforderungen, die sich aus § 5 Abs. 1 Nrn. 1 und 2 sowie § 22 Abs. 1 des Bundesimmissionsschutzgesetzes (BImSchG [1]) ergeben.

Der Schutz vor erheblichen Belästigungswirkungen durch periodische Lichteinwirkungen durch Windenergieanlagen ist nach Ziffer 1.3 der Schattenwurfhinweise sichergestellt, wenn die in den Hinweisen aufgeführten Vorgaben an den maßgeblichen Immissionsorten eingehalten werden.

Maßgebliche Immissionsorte sind schutzwürdige Räume, die als

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

genutzt werden. Auch direkt an Gebäuden beginnende Außenflächen, wie Terrassen oder Balkone, sind schutzwürdigen Räumen in diesem Sinne tagsüber gleichgestellt.

Der maßgebliche Immissionsort liegt gemäß Ziffer 1.3 der WKA-Schattenwurfhinweise [2] am maßgeblichen Immissionsort auf einer Bezugshöhe von 2 m über dem Grund.

Durch periodischen Schattenwurf entstehende Einwirkungen werden nicht als erheblich belästigend angesehen, wenn die astronomisch maximal mögliche Beschattungsdauer aller zu berücksichtigenden Windenergieanlagen am Immissionsort nicht mehr als 30 h pro Kalenderjahr und des Weiteren nicht mehr als 30 min pro Kalendertag beträgt.

Bei Überschreitungen der genannten Vorgaben für die astronomisch maximal mögliche Beschattungsdauer kommen technische Maßnahmen zur zeitlichen Beschränkung des Betriebes der Windenergieanlagen in Frage. Ein gängiges Mittel ist z. B. die Installation einer Abschaltautomatik.

5 Schattenwurfberechnungen

5.1 Berechnungsverfahren

Die Berechnung der optischen Immissionen erfolgt mithilfe des EDV-Programms windPro (EMD International A/S, Aalborg, Dänemark, Programmversion 4.0.531 [3]) nach den Berechnungs- und Beurteilungsgrundlagen der WKA-Schattenwurfhinweise [2].

Für die Berechnung wird ein digitales Geländemodell mit einer Auflösung von 5 m (DGM5) [4] verwendet. An dem Standort ergeben sich Höhenunterschiede von ca. 5 m. Es wurde überprüft, ob Gebäude die Sichtlinie zu einigen der Immissionsorte unterbrechen und damit zu Verringerungen der maximal möglichen Beschattungsdauer durch die WEA führen. Vorliegend wurde für keinen der untersuchten Immissionsorte eine Verringerung der Beschattungsdauer durch diesen Effekt festgestellt. Im Berechnungsmodell wird daher keine Verschattung durch Gebäude betrachtet.

Die Schattenwurfberechnungen basieren auf dem standort-, tages- und uhrzeit-abhängigen Sonnenstand. Der Berechnungszeitsprung bei der Ermittlung der Schattenwurfzeiten liegt bei 1 min [3]. Es sind tageweise Beschattungszeiten mit Anfangs- und Endzeit sowie Beschattungsdauer für alle vorliegend betrachteten Immissionsorte angegeben.

Unter Ansatz der in Abschnitt 3.1 aufgeführten Parameter der geplanten und bestehenden WEA werden die an den maßgeblichen Immissionsorten zu erwartenden astronomisch maximal möglichen Beschattungsdauern berechnet.

Hinweis:

Die vorliegend durchgeführte Berechnung dient in erster Linie zur Feststellung von zu erwartenden Beschattungsdauern an zu beurteilenden Immissionsorten und liefert in dieser Form keine konkreten Abschaltzeiten für ggf. zu installierende Abschalt-automatiken der Windenergieanlagen aufgrund von Überschreitungen der zulässigen optischen Immissionen.

5.2 Berechnungsergebnisse

Die Berechnung der optischen Immissionen erfolgte unter Ansatz der in Abschnitt 3.1 beschriebenen Parameter der Windenergieanlagen und für die in Abschnitt 3.2 aufgeführten Immissionsorte. Es wurde vorliegend die Zusatzbelastung und Gesamtbelastung des Schattenwurfs betrachtet. Die Zusatzbelastung beinhaltet die drei geplanten Neu-WEA. Die Gesamtbelastung beinhaltet darüber hinaus zwanzig weitere WEA unterschiedlicher Typen.

Die berechneten astronomisch maximal möglichen Beschattungsdauern für die Immissionsorte sind in Tabelle 3 zusammengestellt. Eine Darstellung der Berechnungsparameter und ausführliche Ergebnistabellen finden sich in Anhang B.

Tabelle 3. Ergebnisse der Schattenwurfberechnung für die untersuchten Immissionsorte.

Astronomisch maximal mögliche Beschattungsdauern:

Immissionsort	Astron. Max. mögl. Beschattungsdauer			
	Zusatzbelastung		Gesamtbelastung	
	Stunden/ Jahr	Max. Schatten- dauer/Tag	Stunden/ Jahr	Max. Schatten- dauer/Tag
	[hh:mm]	[hh:mm]	[hh:mm]	[hh:mm]
IO1 Utwarfe 1	00:00	00:00	297:19	02:15
IO2 Utwarfe 2	00:00	00:00	256:54	02:08
IO3 Utwarfe 3	00:00	00:00	242:00	02:01
IO4 Utwarfe 4	00:00	00:00	243:17	01:59
IO5 Klein Buschhausen 3	00:00	00:00	73:22	00:59
IO6 Bohnenburg 20	00:00	00:00	87:39	01:00
IO7 Sengwarder Chausseehaus	00:00	00:00	152:49	01:31
IO8 Idschenhausen 1	00:00	00:00	46:26	00:36
IO9 Idschenhausen 2	00:00	00:00	51:02	00:33
IO10 Remmelhausen 4	00:00	00:00	11:52	00:17
IO11 Westerhausen 3	36:09	00:39	70:32	00:39
IO12 Westerhausen 4	44:44	00:38	82:54	00:44
IO13 Westerhausen 11	144:36	00:57	166:53	01:04
IO14 Westerhausen 12	146:22	00:58	164:08	01:02
IO15 Westerhausen 9A	221:20	02:26	352:23	02:26
IO16 Westerhausen 9	168:28	02:10	253:47	02:10
IO17 Rüschentede 1	20:28	00:33	167:08	01:32
IO18 Langengroden 1	00:00	00:00	87:02	01:57
IO19 WA Sengwarden BP207	00:00	00:00	08:29	00:16
IO20 Langengrodener Weg 17	00:00	00:00	00:00	00:00
IO21 Am Sudring 15	00:00	00:00	00:00	00:00
IO22 Georg-Adden-Straße 55	00:00	00:00	00:00	00:00
IO23 Hooksiel	00:00	00:00	00:00	00:00
IO24 Depenhausen/Pakens 1	92:28	01:38	122:46	01:38
IO25 Tain 3	40:01	00:42	94:05	01:13
IO26 Waterpott 1	40:16	00:40	109:11	01:17
IO27 Klein Depenhausen 1	75:18	00:49	122:21	01:19
IO28 Klein Westerhausen 1	108:16	01:09	122:54	01:09
IO29 Depenhausen 1	77:36	00:47	81:42	00:47
IO30 Purkswarfe 2	00:00	00:00	12:33	00:19
IO31 Purkswarfe 3	00:00	00:00	04:08	00:11

Immissionsort	Astron. Max. mögl. Beschattungsdauer			
	Zusatzbelastung		Gesamtbelastung	
	Stunden/ Jahr	Max. Schatten- dauer/Tag	Stunden/ Jahr	Max. Schatten- dauer/Tag
	[hh:mm]	[hh:mm]	[hh:mm]	[hh:mm]
IO32 Putzwei 1	22:05	00:35	35:33	00:51
IO33 Westerhausen 5	232:06	02:02	265:31	02:02
IO34 Westerhausen 6	328:08	01:36	342:36	01:36
IO35 Westerhausen 7	259:45	01:36	275:15	01:36
IO36 Westerhausen 10	231:46	01:17	245:55	01:17
IO37 Westerhausen 1	83:41	01:14	102:47	01:14

Zusatzbelastung

Die durch die drei Neu-WEA an den maßgeblichen Immissionsorten hervorgerufenen astronomisch maximal möglichen Beschattungsdauern betragen bis zu 328 Stunden und 8 Minuten im Jahr am Immissionsort IO34; die maximale Schattendauer pro Tag beträgt bis zu 146 Minuten am Immissionsort IO15.

Die zulässigen jährlichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Stunden pro Jahr werden durch die drei Neu-WEA an den Immissionsorten IO11 bis IO16, IO24 bis IO29 und IO33 bis IO37 überschritten.

Die zulässigen täglichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Minuten pro Tag werden durch die drei Neu-WEA an den Immissionsorten IO11 bis IO17, IO24 bis IO29 und IO32 bis IO37 überschritten.

Die Immissionsorte IO 1 bis IO 10, IO18 bis IO23 sowie IO30 und IO31 sind nicht durch den Schattenwurf der drei geplanten Neu-WEA betroffen.

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Gesamtbelastung

Die durch die drei Neu-WEA und zwanzig Vorbelastungs-WEA an den maßgeblichen Immissionsorten hervorgerufenen astronomisch maximal möglichen Beschattungsdauern betragen bis zu 352 Stunden und 23 Minuten im Jahr am Immissionsort IO15; die maximale Schattendauer pro Tag beträgt bis zu 146 Minuten am Immissionsort IO15.

Die zulässigen jährlichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Stunden pro Jahr werden durch die drei Neu-WEA und zwanzig VB-WEA an den Immissionsorten IO1 bis IO9, IO11 bis IO18, IO24 bis IO29 und IO32 bis IO37 überschritten.

Die zulässigen täglichen Immissionswerte der WEA-Schattenwurf-Leitlinie [2] von maximal 30 Minuten pro Tag werden durch die drei Neu-WEA und zwanzig VB-WEA an den Immissionsorten IO1 bis IO9, IO11 bis IO18, IO24 bis IO29 und IO32 bis IO37 überschritten.

Die Immissionsorte IO20 bis IO23 sind nicht durch den Schattenwurf der vorliegend betrachteten WEA betroffen.

6 Schlussbetrachtung

Die vorliegende Untersuchung kommt zu dem Ergebnis, dass die Grenzwerte der astronomisch maximal möglichen Beschattungsdauern von 30 Minuten pro Tag und 30 Stunden pro Jahr gemäß den Vorgaben aus den LAI-Hinweisen [2] ohne Berücksichtigung einer Abschaltautomatik durch den Bau und Betrieb der drei geplanten Neu-WEA deutlich überschritten werden. Überschreitungen der genannten Grenzwerte durch die Zusatzbelastung wurden an 19 der 37 betrachteten Immissionsorte ermittelt.

Die Einhaltung der Grenzwerte der WKA-Schattenwurfhinweise [2] ist durch den Einbau einer Abschaltautomatik vor Inbetriebnahme der drei geplanten Neu-WEA sicherzustellen.

Anhang A

Lagepläne und Beschattungskarten

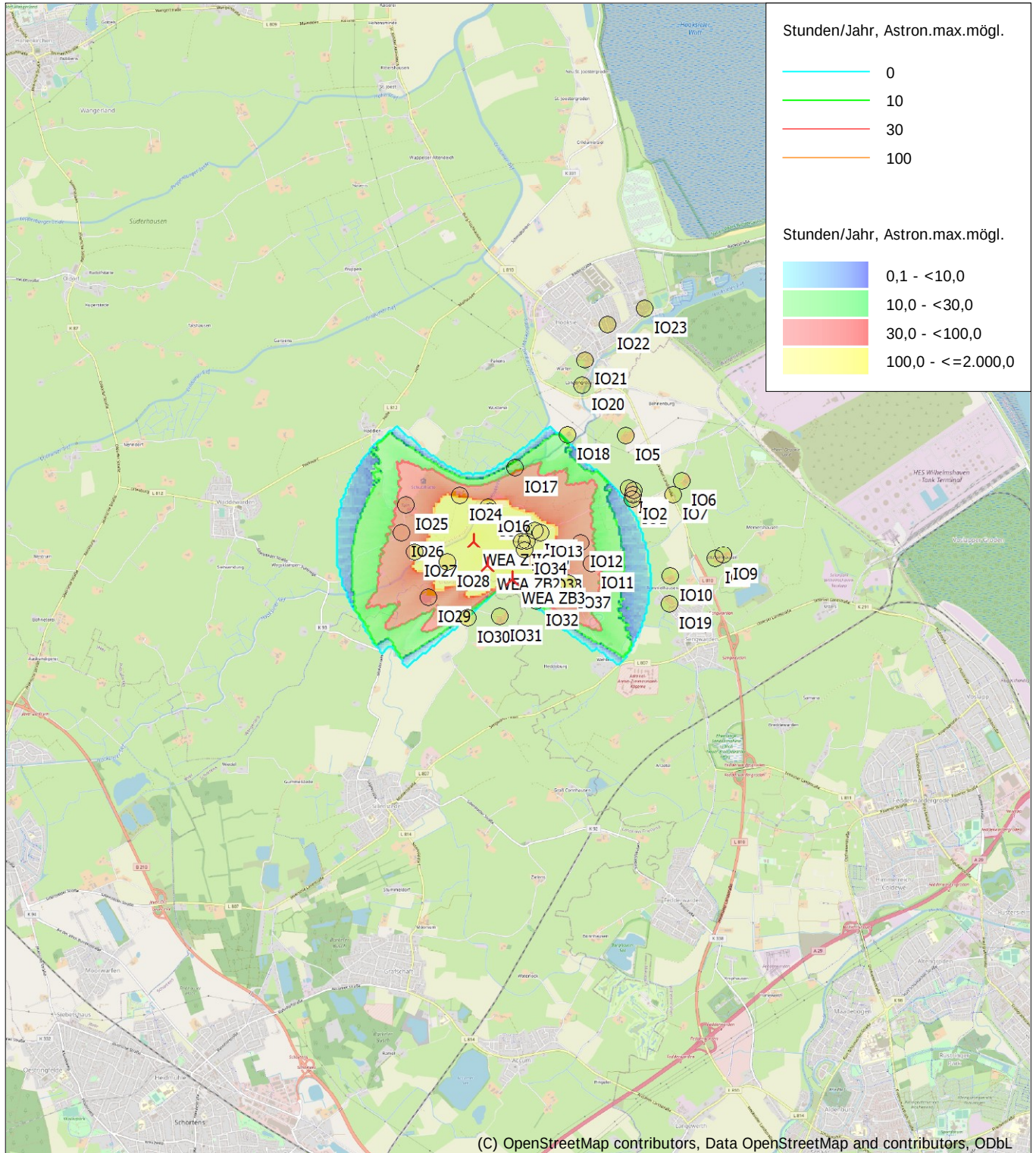
\\S-GKN-FS02.MBBM-GROUP.COM\ALLEFIRMEN\PROJ\180\180777\M180777_02_BER_1D.DOCX: 13. 11. 2024

Projekt:
M180777

Lizenzierter Anwender:
Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Karte

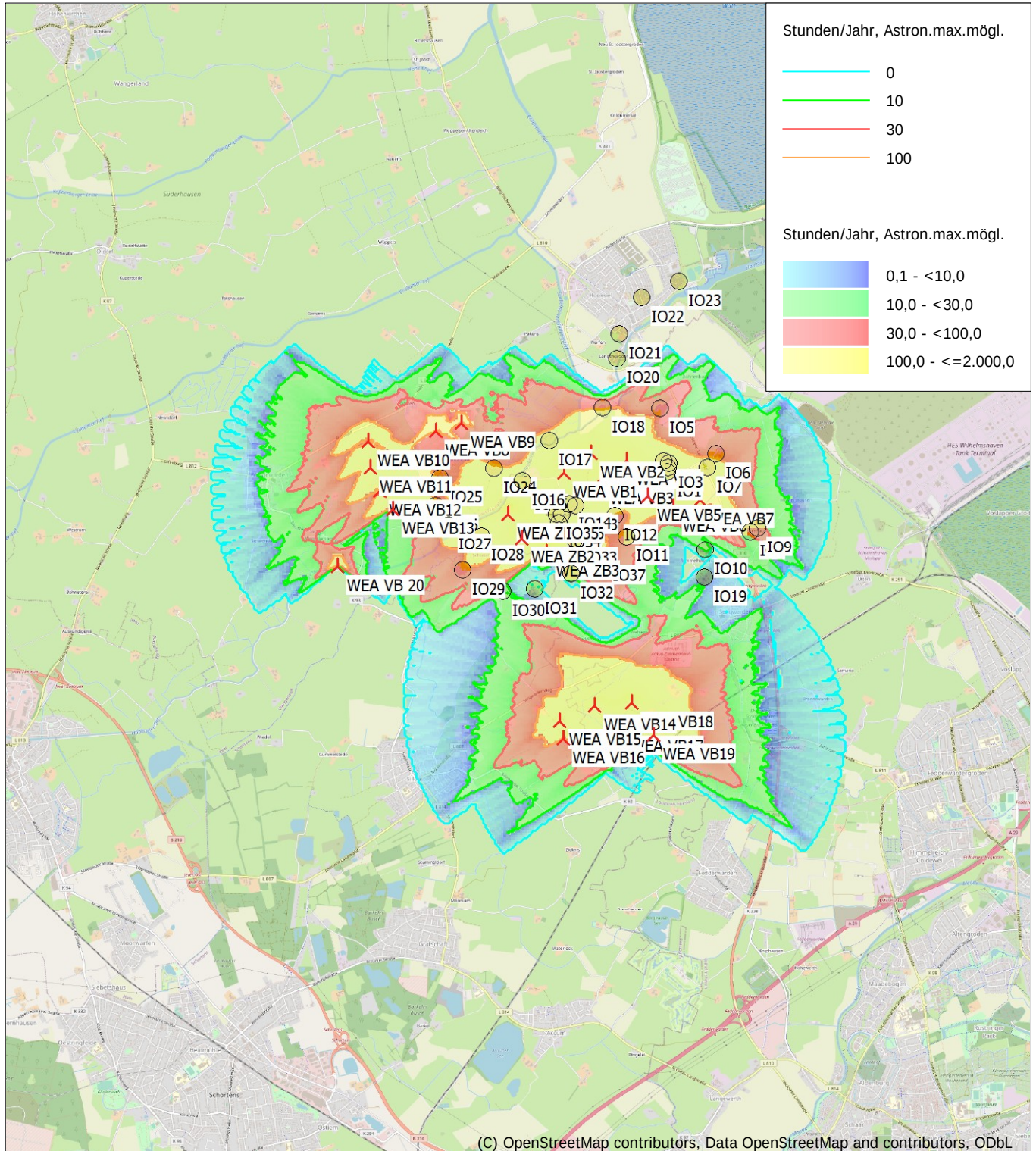
Berechnung: M180777_02 Zusatzbelastung



Karte: EMD OpenStreetMap , Maßstab 1:75.000, Mitte: UTM (north)-WGS84 Zone: 32 Ost: 434.700 Nord: 5.939.640
Neue WEA Schattenrezeptor
Höhe der Schattenkarte: Höhenraster-Objekt: M180777_02_EMDGrid_0.wpg (1)
Zeitschritt: 4 Minuten, Schrittweite: 14 Tag(e), Kartenauflösung: 30 m, Sichtbarkeit Auflösung: 15 m, Augenhöhe: 1,5 m

SHADOW - Karte

Berechnung: M180777_02 Gesamtbelastung



0 1 2 3 4 km

Karte: EMD OpenStreetMap , Maßstab 1:75.000, Mitte: UTM (north)-WGS84 Zone: 32 Ost: 434.250 Nord: 5.939.292
 Neue WEA Schattenrezeptor
 Höhe der Schattenkarte: Höhenraster-Objekt: M180777_02_EMDGrid_0.wpg (1)
 Zeitschritt: 4 Minuten, Schrittweite: 14 Tag(e), Kartenaufösung: 30 m, Sichtbarkeit Auflösung: 15 m, Augenhöhe: 1,5 m

Anhang B

Berechnungsergebnisse Zusatzbelastung

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SHADOW - Hauptergebnis

Berechnung: M180777_02 Zusatzbelastung Annahmen für Schattenwurfberechnung

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

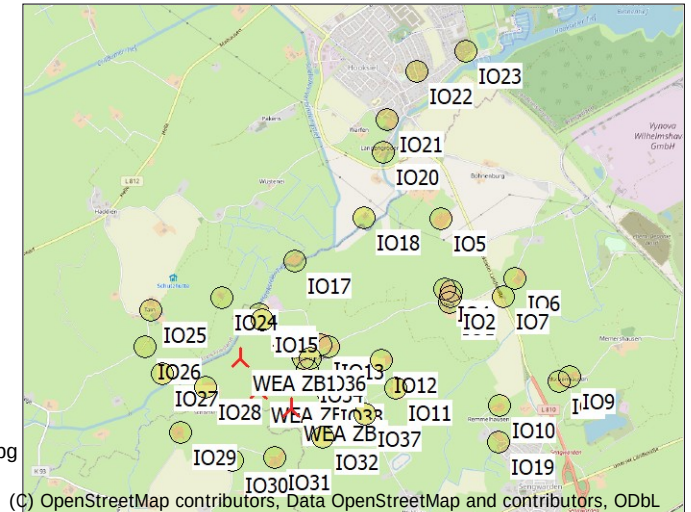
Die dargestellten Zeiten sind die astronomisch maximal mögliche
Beschattungsdauer, berechnet unter folgenden Annahmen:
Die Sonne scheint täglich von Sonnenauf- bis -untergang
Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
Die Windenergieanlage/n ist/sind immer in Betrieb

Eine WEA wird nicht berücksichtigt, wenn sie von keinem Teil der
Rezeptorfläche aus sichtbar ist. Die Sichtbarkeitsberechnung basiert auf
den folgenden Annahmen:
Verwendete Höhenlinien: Höhenraster-Objekt: M180777_02_EMDGrid_0.wpg
Rasterauflösung: 1,0 m

Alle Koordinatenangaben in:
UTM (north)-WGS84 Zone: 32

WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ						Schattendaten	
					Ak- tu- ell	Hersteller	Typ	Nenn- leistung	Rotor- durch- messer	NH	Beschatt.- Bereich	U/min
			[m]					[kW]	[m]	[m]	[m]	[U/min]
WEA ZB1	434.029	5.940.044	1,1	NORDEX N163/6.X 7000 163.0...	Ja	NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	10,7
WEA ZB2	434.212	5.939.722	0,7	NORDEX N163/6.X 7000 163.0...	Ja	NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	10,7
WEA ZB3	434.540	5.939.539	0,5	NORDEX N163/6.X 7000 163.0...	Ja	NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	10,7



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]
IO1	Utwarfe 1	436.131	5.940.572	3,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO10	Remmelhausen 4	436.614	5.939.542	2,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO11	Westerhausen 3	435.587	5.939.724	2,1	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO12	Westerhausen 4	435.445	5.939.994	2,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO13	Westerhausen 11	434.919	5.940.137	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO14	Westerhausen 12	434.838	5.940.170	3,7	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO15	Westerhausen 9A	434.262	5.940.420	1,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO16	Westerhausen 9	434.230	5.940.481	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO17	Rüschentede 1	434.591	5.941.001	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO18	Langengroden 1	435.289	5.941.414	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO19	WA Sengwarden BP207	436.605	5.939.173	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO2	Utwarfe 2	436.140	5.940.625	3,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO20	Langengrodener Weg 17	435.491	5.942.055	1,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO21	Am Sudring 15	435.532	5.942.394	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO22	Georg-Adden-Straße 55	435.830	5.942.859	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO23	Hooksiel	436.324	5.943.054	0,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO24	Depenhausen/Pakens 1	433.854	5.940.646	0,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO25	Tain 3	433.154	5.940.529	2,7	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO26	Waterpott 1	433.089	5.940.168	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO27	Klein Depenhausen 1	433.254	5.939.909	2,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO28	Klein Westerhausen 1	433.683	5.939.767	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO29	Depenhausen 1	433.437	5.939.318	1,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO3	Utwarfe 3	436.153	5.940.685	2,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO30	Purkswarfe 2	433.950	5.939.029	1,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO31	Purkswarfe 3	434.370	5.939.047	1,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO32	Putzwei 1	434.854	5.939.246	2,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO33	Westerhausen 5	434.903	5.939.704	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO34	Westerhausen 6	434.704	5.939.918	4,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO35	Westerhausen 7	434.664	5.940.034	4,0	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0

(Fortsetzung nächste Seite)...

SHADOW - Hauptergebnis

Berechnung: M180777_02 Zusatzbelastung

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
IO36	Westerhausen 10	434.732	5.940.032	4,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO37	Westerhausen 1	435.270	5.939.464	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO4	Utwarfe 4	436.089	5.940.708	3,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO5	Klein Buschhausen 3	436.045	5.941.392	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO6	Bohnenburg 20	436.785	5.940.793	1,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO7	Sengwarder Chausseehaus	436.664	5.940.615	1,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO8	Idschenhausen 1	437.215	5.939.770	3,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO9	Idschenhausen 2	437.310	5.939.811	2,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0

Berechnungsergebnisse

Schattenrezeptor

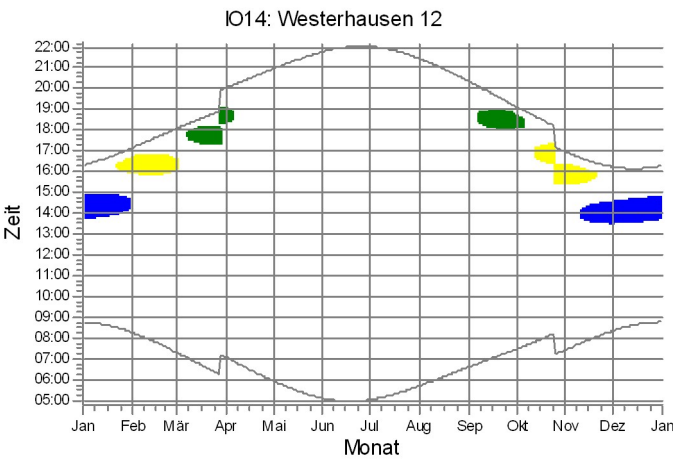
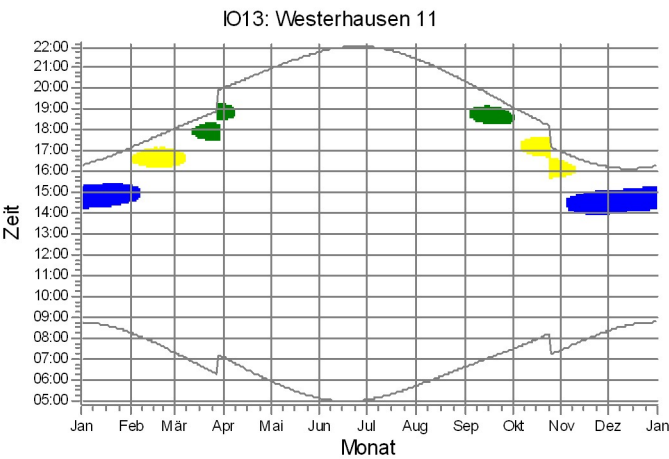
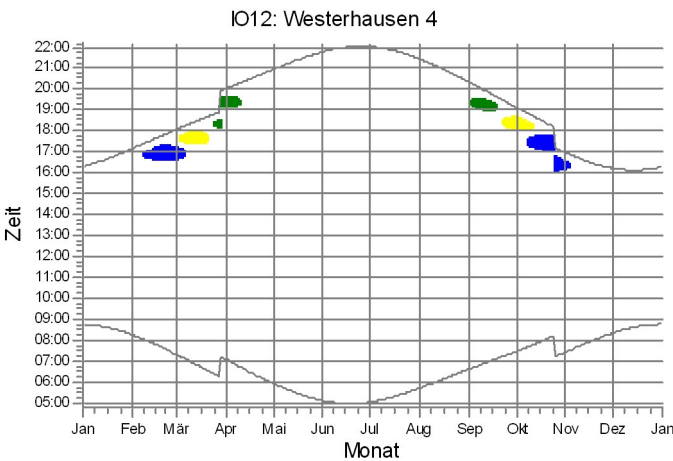
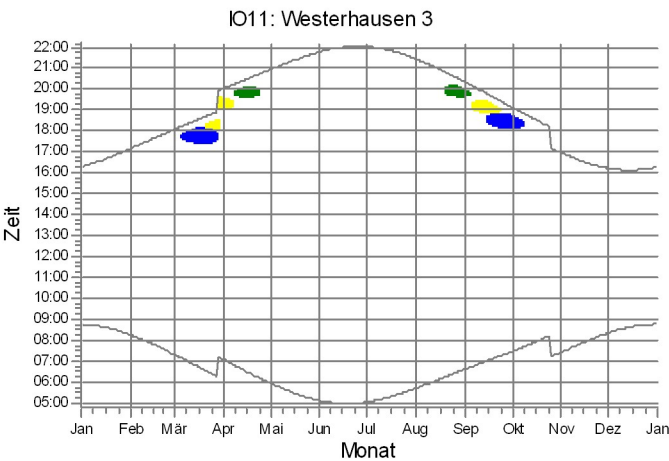
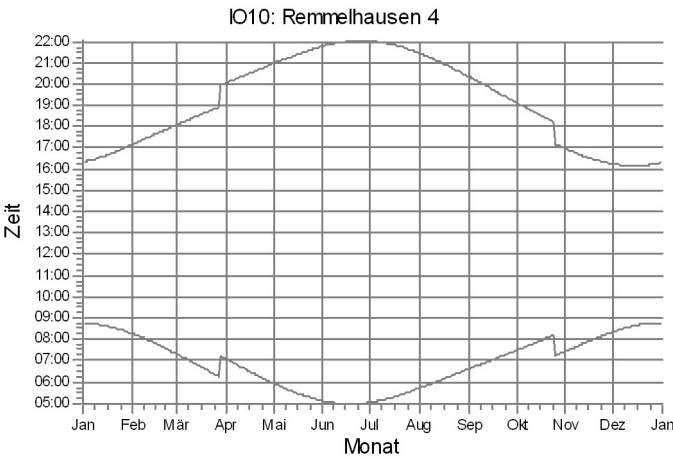
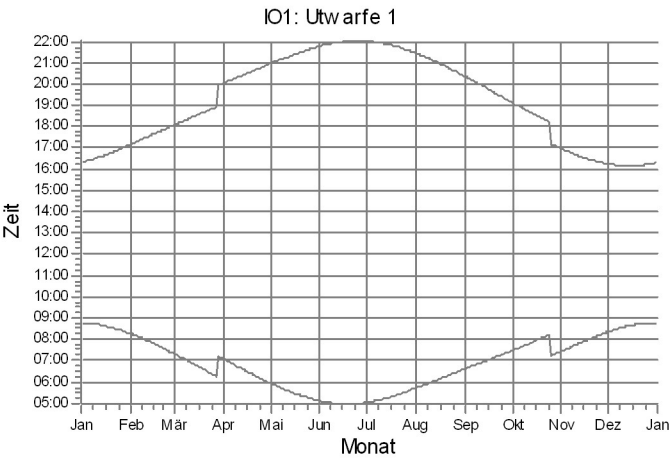
Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
IO1	Utwarfe 1	0:00	0	0:00
IO10	Remmelhausen 4	0:00	0	0:00
IO11	Westerhausen 3	36:09	94	0:39
IO12	Westerhausen 4	44:44	114	0:38
IO13	Westerhausen 11	144:36	203	0:57
IO14	Westerhausen 12	146:22	198	0:58
IO15	Westerhausen 9A	221:20	141	2:26
IO16	Westerhausen 9	168:28	120	2:10
IO17	Rüschstede 1	20:28	46	0:33
IO18	Langengroden 1	0:00	0	0:00
IO19	WA Sengwarden BP207	0:00	0	0:00
IO2	Utwarfe 2	0:00	0	0:00
IO20	Langengrodener Weg 17	0:00	0	0:00
IO21	Am Sudring 15	0:00	0	0:00
IO22	Georg-Adden-Straße 55	0:00	0	0:00
IO23	Hooksiel	0:00	0	0:00
IO24	Depenhausen/Pakens 1	92:28	82	1:38
IO25	Tain 3	40:01	83	0:42
IO26	Waterpott 1	40:16	96	0:40
IO27	Klein Depenhausen 1	75:18	138	0:49
IO28	Klein Westerhausen 1	108:16	128	1:09
IO29	Depenhausen 1	77:36	138	0:47
IO3	Utwarfe 3	0:00	0	0:00
IO30	Purkswarfe 2	0:00	0	0:00
IO31	Purkswarfe 3	0:00	0	0:00
IO32	Putzwei 1	22:05	50	0:35
IO33	Westerhausen 5	232:06	222	2:02
IO34	Westerhausen 6	328:08	292	1:36
IO35	Westerhausen 7	259:45	249	1:36
IO36	Westerhausen 10	231:46	242	1:17
IO37	Westerhausen 1	83:41	119	1:14
IO4	Utwarfe 4	0:00	0	0:00
IO5	Klein Buschhausen 3	0:00	0	0:00
IO6	Bohnenburg 20	0:00	0	0:00
IO7	Sengwarder Chausseehaus	0:00	0	0:00
IO8	Idschenhausen 1	0:00	0	0:00
IO9	Idschenhausen 2	0:00	0	0:00

Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]
WEA ZB1	NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)	578:16
WEA ZB2	NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)	500:59
WEA ZB3	NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)	564:49

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.

SHADOW - Grafischer Kalender
Berechnung: M180777_02 Zusatzbelastung

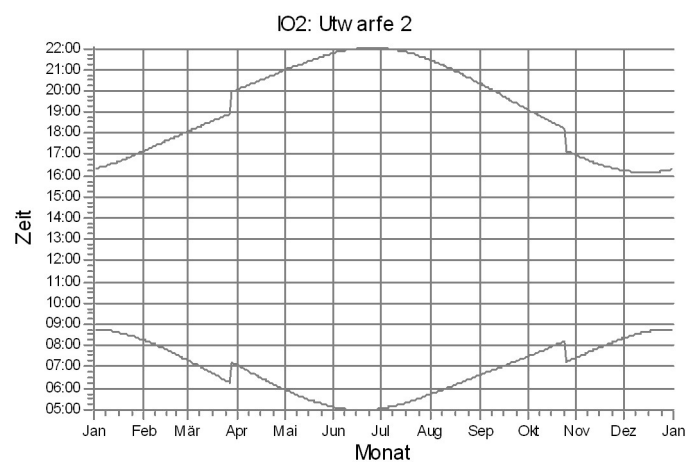
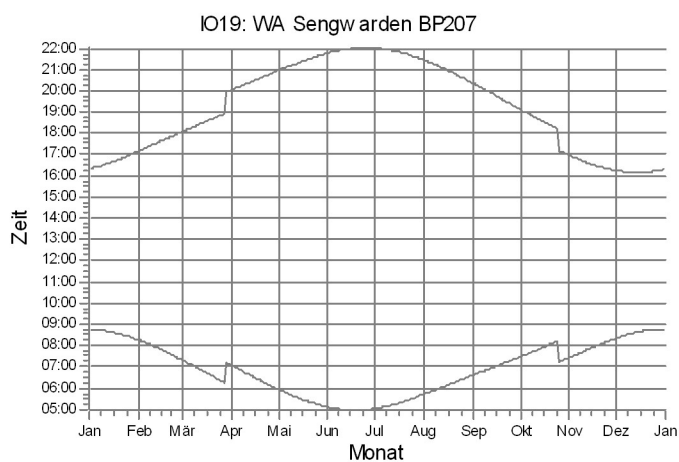
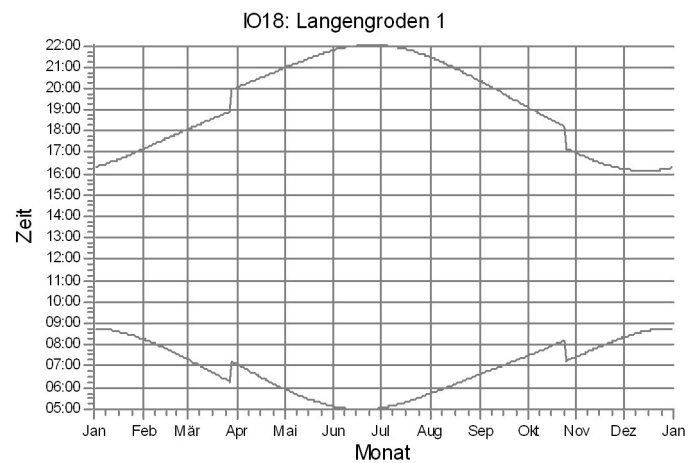
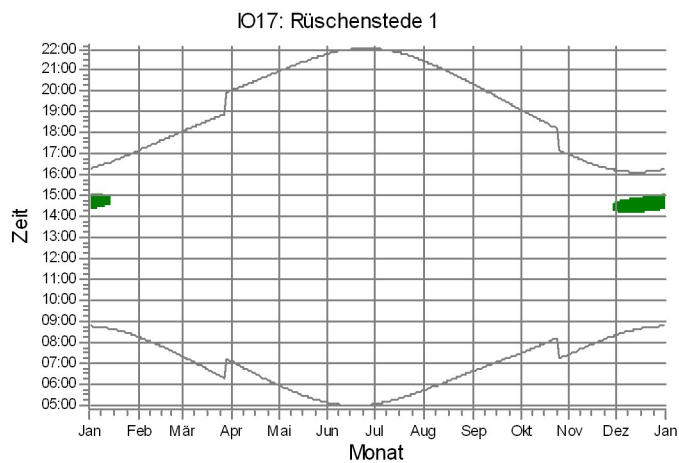
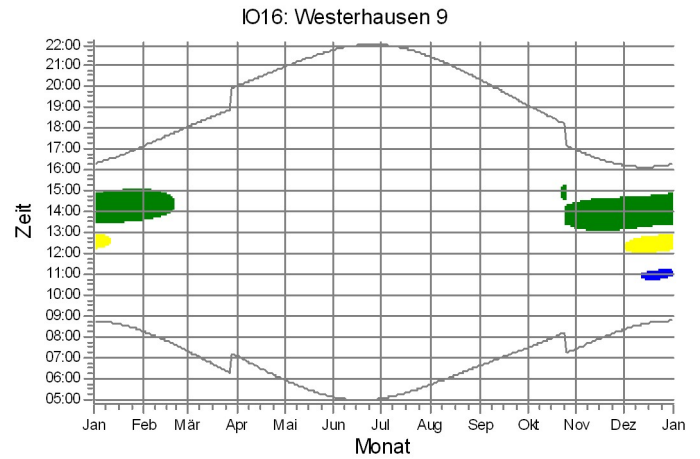
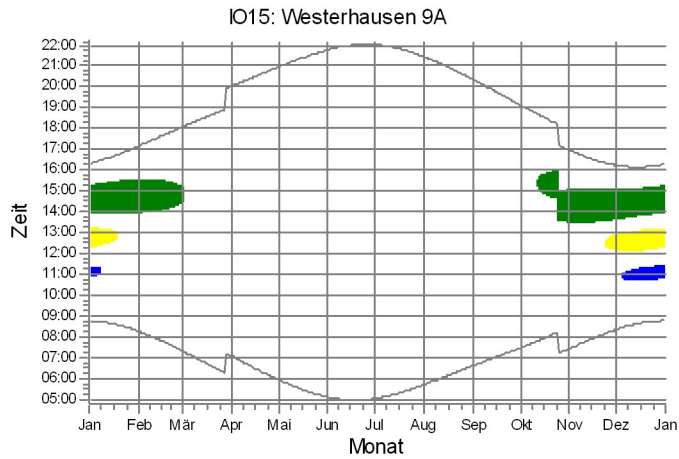


WEA

- WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)
- WEA ZB2: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)
- WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

SHADOW - Grafischer Kalender

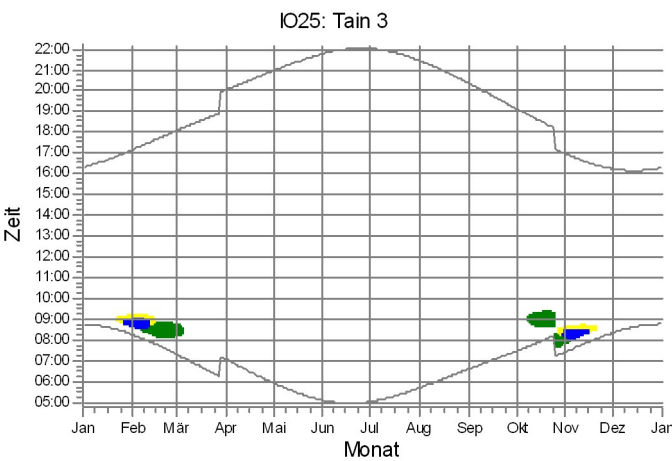
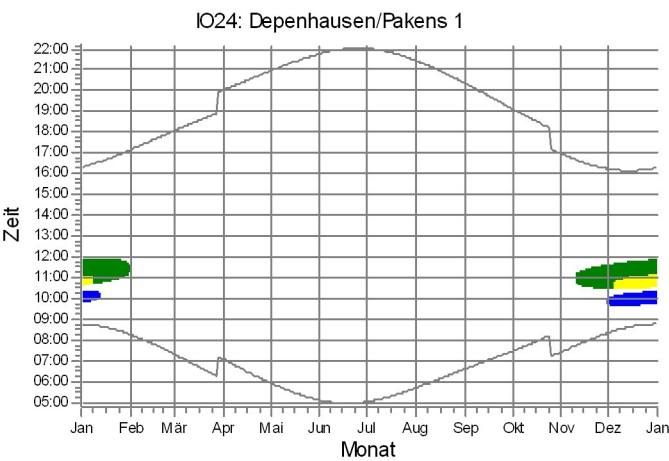
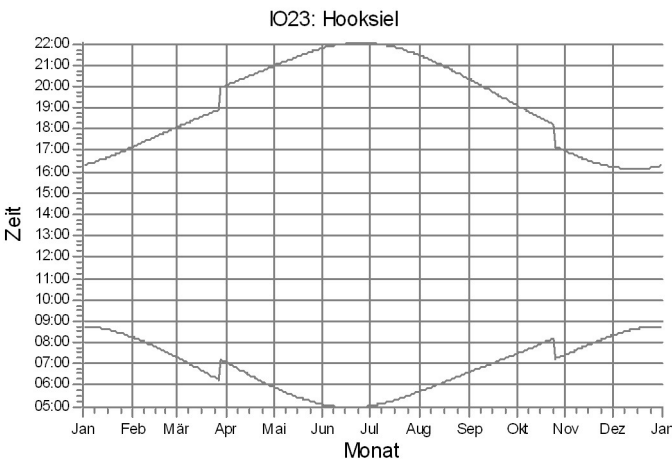
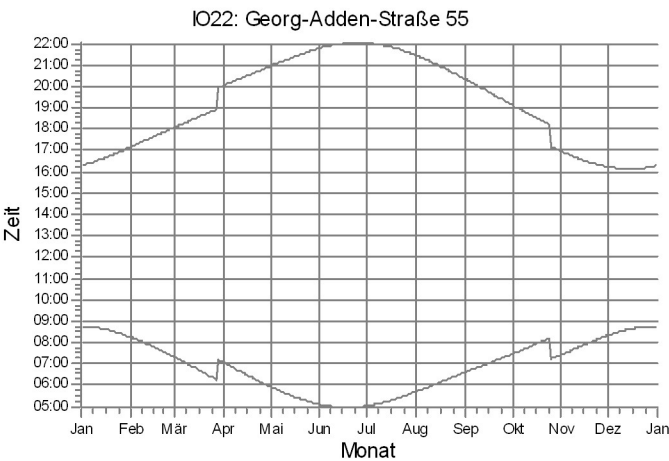
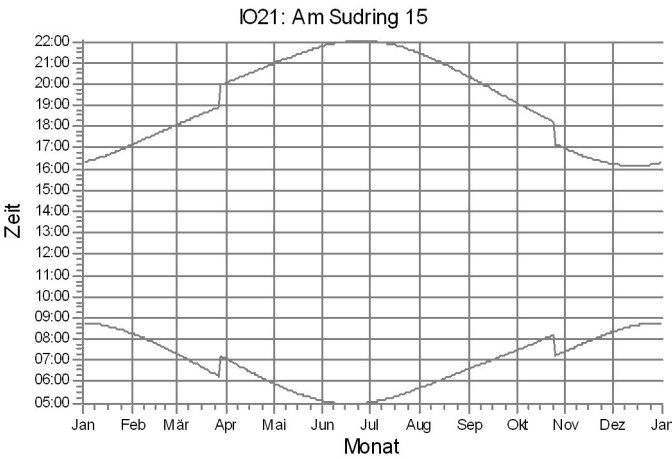
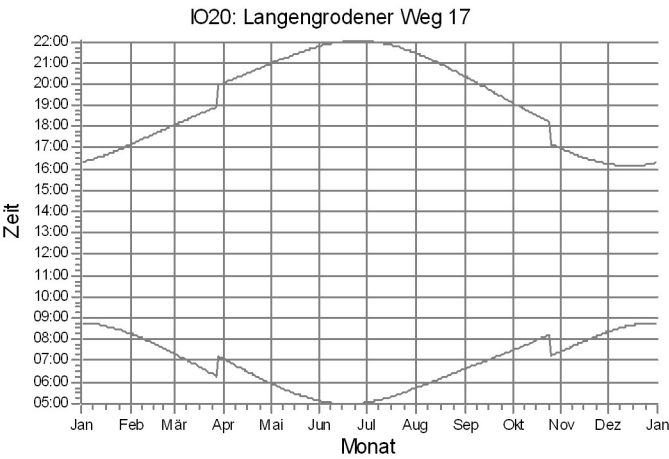
Berechnung: M180777_02 Zusatzbelastung



WEA

- WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)
- WEA ZB2: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)
- WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

SHADOW - Grafischer Kalender
Berechnung: M180777_02 Zusatzbelastung

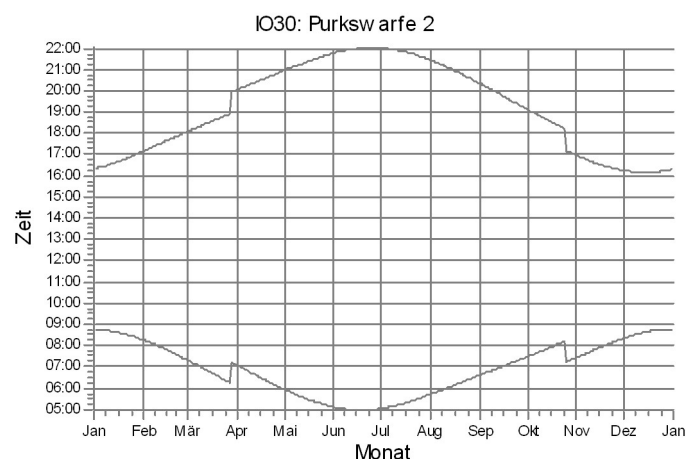
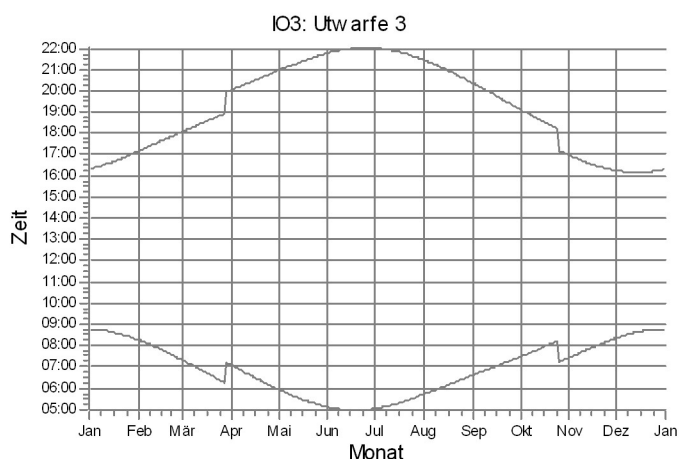
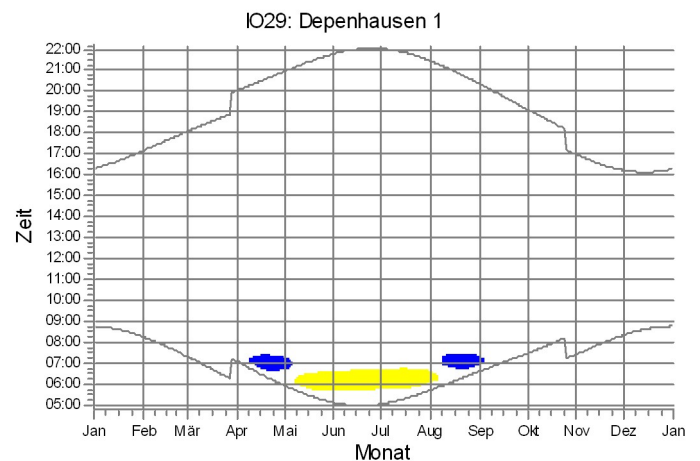
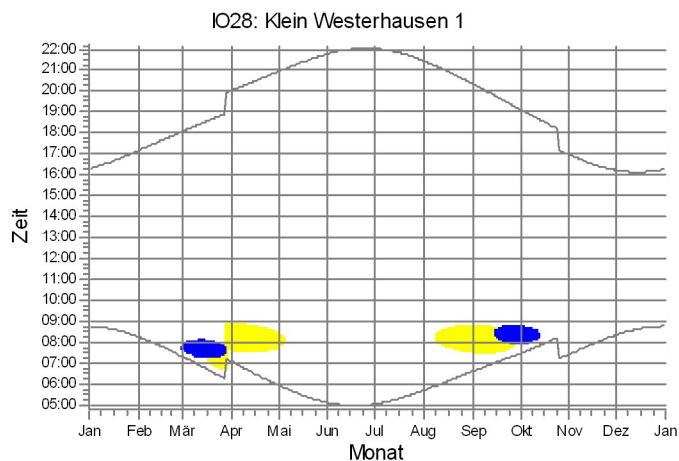
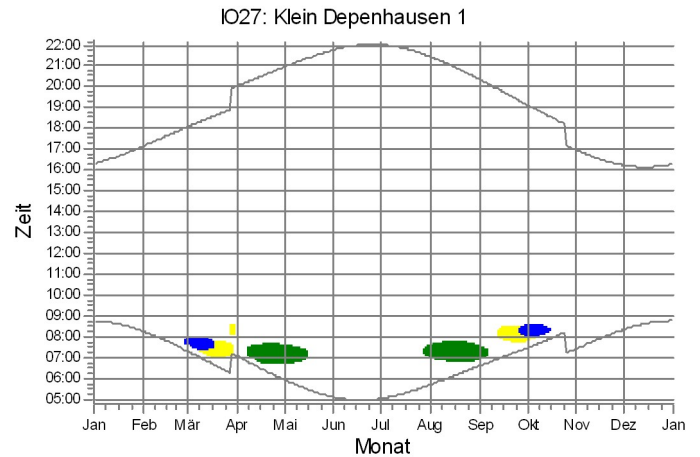
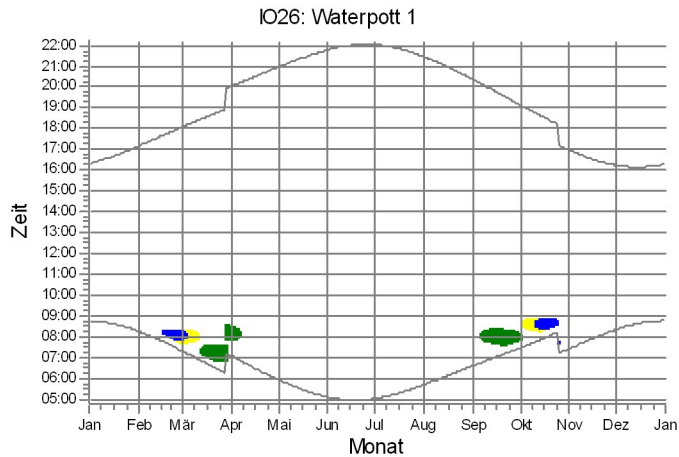


WEA

- WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)
- WEA ZB2: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)
- WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Zusatzbelastung

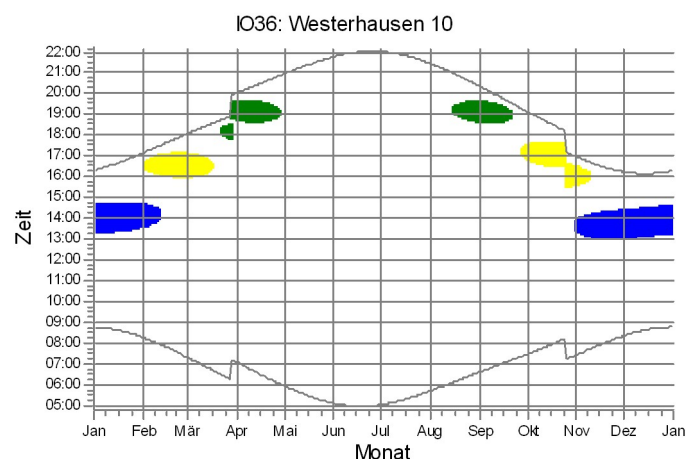
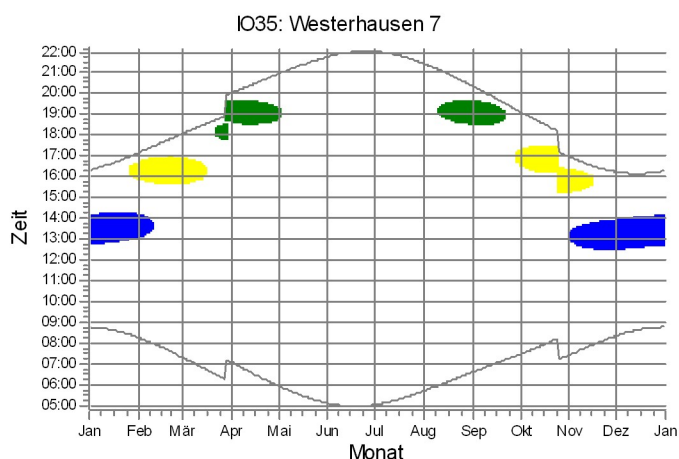
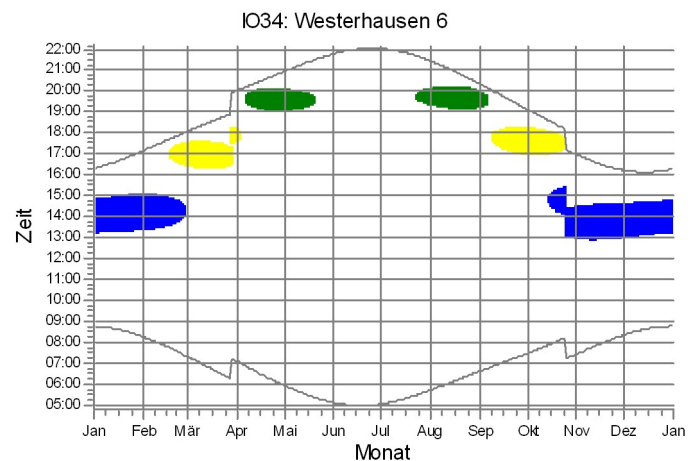
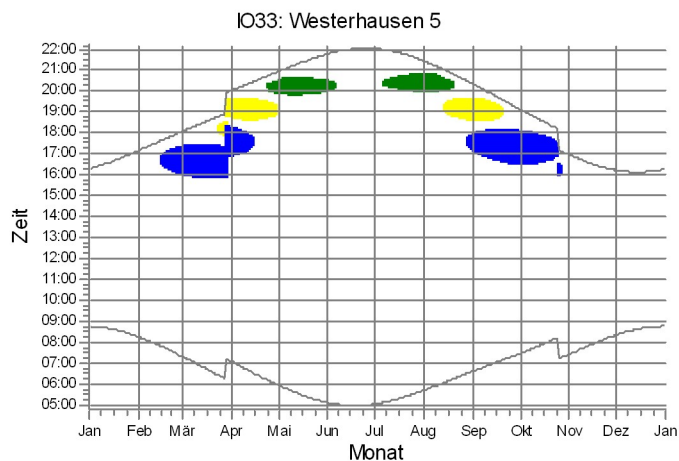
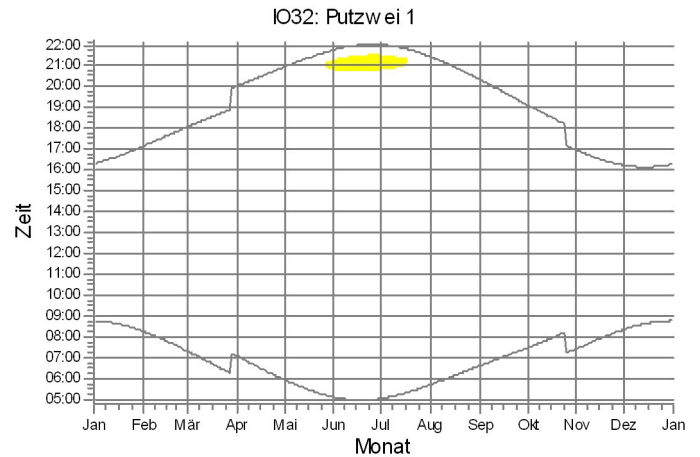
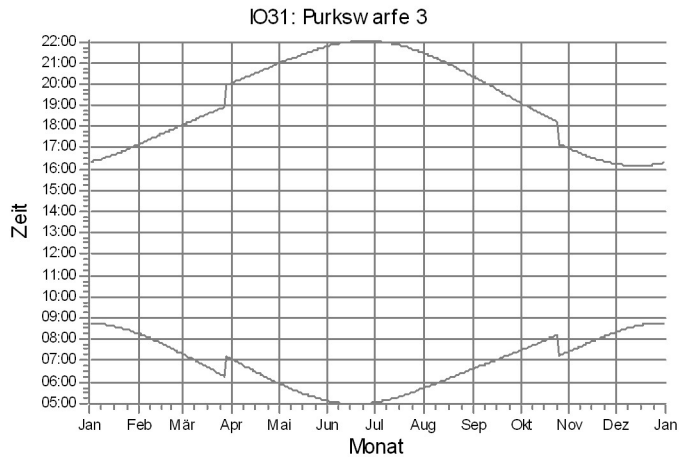


WEA

- WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)
- WEA ZB2: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)
- WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Zusatzbelastung

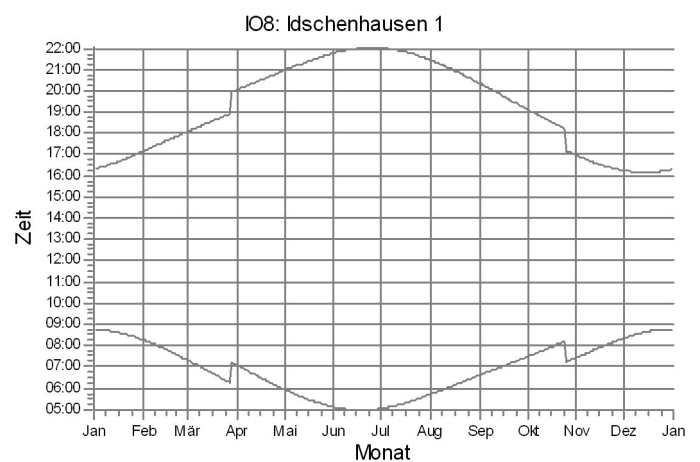
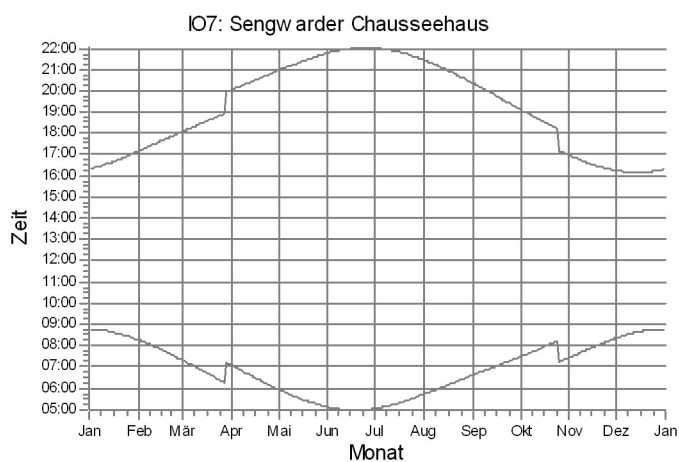
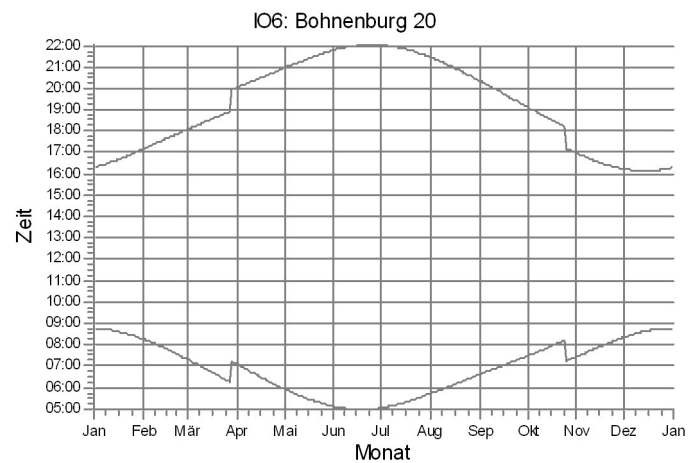
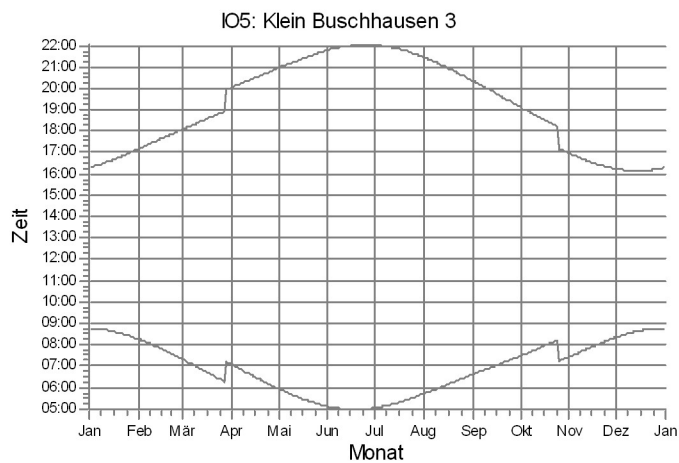
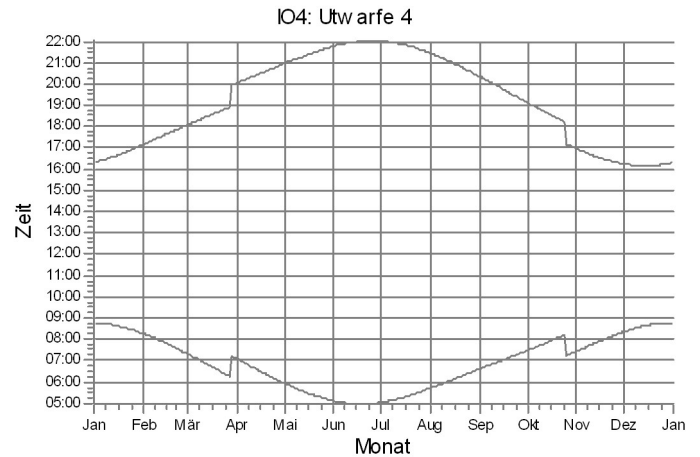
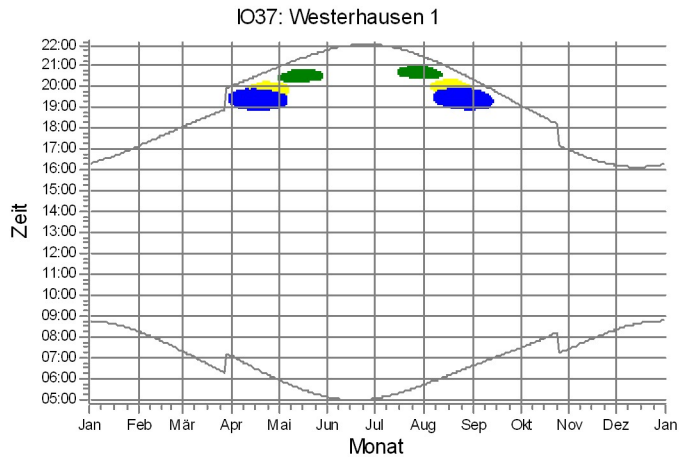


WEA

- WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)
- WEA ZB2: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)
- WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Zusatzbelastung



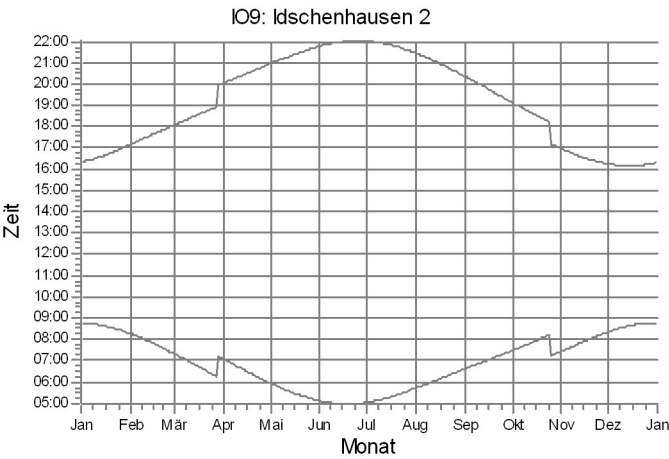
WEA

-  WEA ZB1: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)
-  WEA ZB2: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)
-  WEA ZB3: NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)

Projekt:
M180777

Lizenziierter Anwender:
Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Grafischer Kalender
Berechnung: M180777_02 Zusatzbelastung



WEA

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO1 - Utwarfe 1
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:08	07:37 18:55	07:36 16:48	08:28 16:10
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21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
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23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
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28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:41	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
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31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO10 - Remmelhausen 4
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:21	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:00	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:02	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
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9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
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17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:56 16:29	08:40 16:08
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21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:23	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:39	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:44 16:12
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27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
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30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	235
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO11 - Westerhausen 3
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai	Juni	
1	08:45	08:15	07:19		07:04		19:05 (WEA ZB2)	05:55	05:06
	16:18	17:09	18:04		20:02	25	19:30 (WEA ZB2)	20:57	21:47
2	08:45	08:14	07:16		07:02		19:05 (WEA ZB2)	05:53	05:05
	16:19	17:11	18:06		20:04	24	19:29 (WEA ZB2)	20:59	21:48
3	08:45	08:12	07:14		06:59		19:07 (WEA ZB2)	05:51	05:05
	16:21	17:13	18:08		20:06	22	19:29 (WEA ZB2)	21:01	21:49
4	08:45	08:10	07:12		06:57		19:07 (WEA ZB2)	05:49	05:04
	16:22	17:15	18:10		20:08	19	19:26 (WEA ZB2)	21:03	21:50
5	08:44	08:09	07:09		06:54		19:09 (WEA ZB2)	05:47	05:03
	16:23	17:17	18:12		20:10	16	19:25 (WEA ZB2)	21:04	21:51
6	08:44	08:07	07:07	17:46 (WEA ZB3)	06:52		19:11 (WEA ZB2)	05:45	05:02
	16:24	17:19	18:14	1	17:47 (WEA ZB3)	10	19:21 (WEA ZB2)	21:06	21:52
7	08:44	08:05	07:05		17:42 (WEA ZB3)			05:43	05:02
	16:26	17:21	18:16	8	17:50 (WEA ZB3)			21:08	21:53
8	08:43	08:03	07:02		17:39 (WEA ZB3)			05:41	05:01
	16:27	17:23	18:18	12	17:51 (WEA ZB3)			21:10	21:54
9	08:43	08:01	07:00		17:37 (WEA ZB3)		19:46 (WEA ZB1)	05:40	05:00
	16:28	17:25	18:20	16	17:53 (WEA ZB3)	3	19:49 (WEA ZB1)	21:11	21:55
10	08:42	07:59	06:57		17:35 (WEA ZB3)		19:45 (WEA ZB1)	05:38	05:00
	16:30	17:27	18:22	20	17:55 (WEA ZB3)	6	19:51 (WEA ZB1)	21:13	21:56
11	08:41	07:57	06:55		17:34 (WEA ZB3)		19:44 (WEA ZB1)	05:36	04:59
	16:31	17:29	18:23	23	17:57 (WEA ZB3)	10	19:54 (WEA ZB1)	21:15	21:57
12	08:40	07:55	06:53		17:32 (WEA ZB3)		19:42 (WEA ZB1)	05:34	04:59
	16:33	17:31	18:25	26	17:58 (WEA ZB3)	13	19:55 (WEA ZB1)	21:17	21:57
13	08:40	07:53	06:50		17:32 (WEA ZB3)		19:42 (WEA ZB1)	05:32	04:59
	16:35	17:33	18:27	29	18:01 (WEA ZB3)	15	19:57 (WEA ZB1)	21:18	21:58
14	08:39	07:51	06:48		17:31 (WEA ZB3)		19:41 (WEA ZB1)	05:31	04:58
	16:36	17:35	18:29	31	18:02 (WEA ZB3)	18	19:59 (WEA ZB1)	21:20	21:59
15	08:38	07:49	06:45		17:30 (WEA ZB3)		19:41 (WEA ZB1)	05:29	04:58
	16:38	17:37	18:31	35	18:05 (WEA ZB3)	20	20:01 (WEA ZB1)	21:22	21:59
16	08:37	07:47	06:43		17:30 (WEA ZB3)		19:40 (WEA ZB1)	05:27	04:58
	16:40	17:39	18:33	35	18:05 (WEA ZB3)	22	20:02 (WEA ZB1)	21:23	22:00
17	08:36	07:45	06:41		17:30 (WEA ZB3)		19:41 (WEA ZB1)	05:26	04:58
	16:41	17:41	18:35	35	18:05 (WEA ZB3)	23	20:04 (WEA ZB1)	21:25	22:00
18	08:35	07:43	06:38		17:30 (WEA ZB3)		19:41 (WEA ZB1)	05:24	04:58
	16:43	17:43	18:37	35	18:05 (WEA ZB3)	22	20:03 (WEA ZB1)	21:27	22:01
19	08:34	07:41	06:36		17:29 (WEA ZB3)		19:42 (WEA ZB1)	05:23	04:58
	16:45	17:45	18:38	35	18:04 (WEA ZB3)	21	20:03 (WEA ZB1)	21:28	22:01
20	08:33	07:39	06:33		17:30 (WEA ZB3)		19:43 (WEA ZB1)	05:21	04:58
	16:46	17:47	18:40	33	18:03 (WEA ZB3)	19	20:02 (WEA ZB1)	21:30	22:02
21	08:31	07:36	06:31		17:30 (WEA ZB3)		19:43 (WEA ZB1)	05:20	04:58
	16:48	17:49	18:42	32	18:02 (WEA ZB3)	16	19:59 (WEA ZB1)	21:31	22:02
22	08:30	07:34	06:28		17:30 (WEA ZB3)		19:45 (WEA ZB1)	05:18	04:58
	16:50	17:51	18:44	36	18:18 (WEA ZB2)	13	19:58 (WEA ZB1)	21:33	22:02
23	08:29	07:32	06:26		17:31 (WEA ZB3)		19:47 (WEA ZB1)	05:17	04:59
	16:52	17:53	18:46	38	18:19 (WEA ZB2)	8	19:55 (WEA ZB1)	21:34	22:02
24	08:28	07:30	06:23		17:32 (WEA ZB3)			05:15	04:59
	16:54	17:55	18:48	39	18:21 (WEA ZB2)			21:36	22:02
25	08:26	07:28	06:21		17:33 (WEA ZB3)			05:14	04:59
	16:56	17:57	18:49	39	18:23 (WEA ZB2)			21:37	22:02
26	08:25	07:25	06:19		17:35 (WEA ZB3)			05:13	05:00
	16:58	17:59	18:51	37	18:25 (WEA ZB2)			21:39	22:02
27	08:23	07:23	06:16		17:38 (WEA ZB3)			05:12	05:00
	16:59	18:01	18:53	35	18:27 (WEA ZB2)			21:40	22:02
28	08:22	07:21	06:14		18:05 (WEA ZB2)			05:11	05:01
	17:01	18:02	18:55	23	18:28 (WEA ZB2)			21:41	22:02
29	08:20		07:11		19:05 (WEA ZB2)			05:09	05:01
	17:03		19:57	26	19:31 (WEA ZB2)			21:43	22:02
30	08:19		07:09		19:05 (WEA ZB2)			05:08	05:02
	17:05		19:59	27	19:32 (WEA ZB2)			21:44	22:02
31	08:17		07:06		19:05 (WEA ZB2)			05:07	
	17:07		20:00	26	19:31 (WEA ZB2)			21:45	
Sonnenscheinstunden	251	274	367		419		493	509	
astr.max.mögl.Beschattung			732		345				

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO11 - Westerhausen 3
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	05:02 22:01	05:42 21:27	06:36 20:20	19:43 (WEA ZB1) 19:52 (WEA ZB1)	07:28 18:12 (WEA ZB3)	07:26 16:57
2	05:03 22:01	05:44 21:25	06:37 20:18	19:44 (WEA ZB1) 19:50 (WEA ZB1)	07:30 19:05	07:28 16:55
3	05:04 22:01	05:45 21:23	06:39 20:16	19:44 (WEA ZB1) 19:47 (WEA ZB1)	07:32 19:02	07:30 16:53
4	05:05 22:00	05:47 21:21	06:41 20:13		07:34 19:00	07:32 16:51
5	05:06 22:00	05:49 21:19	06:43 20:11		07:36 18:58	07:34 16:50
6	05:07 21:59	05:50 21:17	06:44 20:09	19:07 (WEA ZB2) 19:17 (WEA ZB2)	07:37 18:55	07:36 16:48
7	05:08 21:58	05:52 21:15	06:46 20:06	19:04 (WEA ZB2) 19:20 (WEA ZB2)	07:39 18:53	07:38 16:46
8	05:09 21:58	05:54 21:13	06:48 20:04	19:02 (WEA ZB2) 19:21 (WEA ZB2)	07:41 18:50	07:40 16:44
9	05:10 21:57	05:55 21:11	06:50 20:01	19:00 (WEA ZB2) 19:22 (WEA ZB2)	07:43 18:48	07:41 16:42
10	05:11 21:56	05:57 21:09	06:51 19:59	18:59 (WEA ZB2) 19:23 (WEA ZB2)	07:45 18:46	07:43 16:41
11	05:12 21:55	05:59 21:07	06:53 19:56	18:58 (WEA ZB2) 19:23 (WEA ZB2)	07:47 18:43	07:45 16:39
12	05:13 21:54	06:01 21:05	06:55 19:54	18:56 (WEA ZB2) 19:23 (WEA ZB2)	07:48 18:41	07:47 16:37
13	05:14 21:53	06:02 21:03	06:57 19:51	18:56 (WEA ZB2) 19:23 (WEA ZB2)	07:50 18:39	07:49 16:35
14	05:15 21:52	06:04 21:01	06:58 19:49	18:56 (WEA ZB2) 19:21 (WEA ZB2)	07:52 18:36	07:51 16:34
15	05:17 21:51	06:06 20:59	07:00 19:47	18:56 (WEA ZB2) 19:19 (WEA ZB2)	07:54 18:34	07:53 16:32
16	05:18 21:50	06:08 20:57	07:02 19:44	18:27 (WEA ZB3) 19:16 (WEA ZB2)	07:56 18:32	07:55 16:31
17	05:19 21:49	06:09 20:55	07:04 19:42	18:24 (WEA ZB3) 19:14 (WEA ZB2)	07:58 18:29	07:57 16:29
18	05:21 21:48	06:11 20:53	07:05 19:39	18:22 (WEA ZB3) 19:12 (WEA ZB2)	07:59 18:27	07:58 16:28
19	05:22 21:46	06:13 20:50	07:07 19:37	18:19 (WEA ZB3) 19:08 (WEA ZB2)	08:01 18:25	08:00 16:26
20	05:23 21:45	06:15 20:48	07:09 19:34	18:17 (WEA ZB3) 19:06 (WEA ZB2)	08:03 18:23	08:02 16:25
21	05:25 21:44	06:16 20:46	07:11 19:32	18:16 (WEA ZB3) 19:04 (WEA ZB2)	08:05 18:20	08:04 16:24
22	05:26 21:42	06:18 20:44	07:12 19:29	18:15 (WEA ZB3) 19:02 (WEA ZB2)	08:07 18:18	08:06 16:23
23	05:28 21:41	06:20 20:41	07:14 19:27	18:14 (WEA ZB3) 18:47 (WEA ZB3)	08:09 18:16	08:07 16:21
24	05:29 21:40	06:22 20:39	07:16 19:24	18:13 (WEA ZB3) 18:47 (WEA ZB3)	08:11 18:14	08:09 16:20
25	05:31 21:38	06:23 20:37	07:18 19:22	18:13 (WEA ZB3) 18:47 (WEA ZB3)	07:13 17:12	08:11 16:19
26	05:32 21:37	06:25 20:35	07:19 19:19	18:12 (WEA ZB3) 18:47 (WEA ZB3)	07:15 17:10	08:13 16:18
27	05:34 21:35	06:27 20:32	07:21 19:17	18:11 (WEA ZB3) 18:46 (WEA ZB3)	07:16 17:07	08:14 16:17
28	05:35 21:33	06:29 20:30	07:23 19:15	18:11 (WEA ZB3) 18:46 (WEA ZB3)	07:18 17:05	08:16 16:16
29	05:37 21:32	06:30 20:28	07:25 19:12	18:11 (WEA ZB3) 18:44 (WEA ZB3)	07:20 17:03	08:17 16:15
30	05:39 21:30	06:32 20:25	07:27 19:10	18:11 (WEA ZB3) 18:42 (WEA ZB3)	07:22 17:01	08:19 16:14
31	05:40 21:28	06:34 20:23	19:42 (WEA ZB1) 19:54 (WEA ZB1)		07:24 16:59	
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		209	763	120		

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO12 - Westerhausen 4
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45 16:18	08:16 17:09	07:19 18:04	16:41 (WEA ZB3) 20:02	19:11 (WEA ZB1) 20:57	05:55 21:47
2	08:45 16:19	08:14 17:11	07:16 18:06	16:43 (WEA ZB3) 20:04	19:11 (WEA ZB1) 20:59	05:53 21:48
3	08:45 16:21	08:12 17:13	07:14 18:08	16:44 (WEA ZB3) 20:06	19:12 (WEA ZB1) 21:01	05:51 21:49
4	08:45 16:22	08:10 17:15	07:12 18:10	16:47 (WEA ZB3) 20:08	19:11 (WEA ZB1) 21:03	05:49 21:50
5	08:44 16:23	08:09 17:17	07:09 18:12	16:50 (WEA ZB3) 20:10	19:12 (WEA ZB1) 21:04	05:47 21:51
6	08:44 16:24	08:07 17:19	07:07 18:14	17:43 (WEA ZB2) 20:11	19:36 (WEA ZB1) 21:06	05:45 21:52
7	08:44 16:26	08:05 17:21	07:05 18:16	17:31 (WEA ZB2) 20:13	19:33 (WEA ZB1) 21:08	05:43 21:53
8	08:43 16:27	08:03 17:23	07:02 18:18	17:50 (WEA ZB2) 20:15	19:32 (WEA ZB1) 21:10	05:41 21:54
9	08:43 16:28	08:01 17:25	07:00 18:20	17:30 (WEA ZB2) 20:17	19:18 (WEA ZB1) 21:11	05:40 21:55
10	08:42 16:30	07:59 17:27	06:57 18:22	17:53 (WEA ZB2) 20:19	19:26 (WEA ZB1) 21:13	05:38 21:56
11	08:41 16:31	07:57 17:29	06:55 18:23	17:28 (WEA ZB2) 20:21	05:36 21:15	04:59 21:57
12	08:40 16:33	07:55 17:31	06:53 18:25	17:57 (WEA ZB2) 20:22	05:34 21:17	04:59 21:57
13	08:40 16:35	07:53 17:33	06:50 18:27	17:42 (WEA ZB2) 20:24	05:32 21:18	04:59 21:58
14	08:39 16:36	07:51 17:35	06:48 18:29	17:57 (WEA ZB2) 20:26	05:31 21:20	04:58 21:59
15	08:38 16:38	07:49 17:37	06:45 18:31	17:30 (WEA ZB2) 20:28	05:29 21:22	04:58 21:59
16	08:37 16:39	07:47 17:39	06:43 18:33	17:55 (WEA ZB2) 20:30	05:27 21:23	04:58 22:00
17	08:36 16:41	07:45 17:41	06:41 18:35	17:30 (WEA ZB2) 20:32	05:26 21:25	04:58 22:00
18	08:35 16:43	07:43 17:43	06:38 18:37	17:53 (WEA ZB2) 20:33	05:24 21:27	04:58 22:01
19	08:34 16:45	07:41 17:45	06:36 18:38	17:31 (WEA ZB2) 20:35	05:23 21:28	04:58 22:01
20	08:33 16:46	07:39 17:47	06:33 18:40	17:52 (WEA ZB2) 20:37	05:21 21:30	04:58 22:02
21	08:32 16:48	07:36 17:49	06:31 18:42	17:36 (WEA ZB2) 20:39	05:20 21:31	04:58 22:02
22	08:30 16:50	07:34 17:51	06:28 18:44	16:37 (WEA ZB3) 20:41	05:18 21:33	04:58 22:02
23	08:29 16:52	07:32 17:53	06:26 18:46	17:15 (WEA ZB3) 20:43	05:17 21:34	04:59 22:02
24	08:28 16:54	07:30 17:55	06:23 18:48	16:38 (WEA ZB3) 20:44	05:15 21:36	04:59 22:02
25	08:26 16:56	07:28 17:57	06:21 18:49	17:15 (WEA ZB3) 20:46	05:14 21:37	04:59 22:02
26	08:25 16:58	07:25 17:59	06:19 18:51	16:38 (WEA ZB3) 20:48	05:13 21:39	05:00 22:02
27	08:23 16:59	07:23 18:01	06:16 18:53	17:13 (WEA ZB3) 20:50	05:12 21:40	05:00 22:02
28	08:22 17:01	07:21 18:02	06:14 18:55	16:40 (WEA ZB3) 20:52	05:11 21:41	05:01 22:02
29	08:20 17:03		07:11 19:57	17:12 (WEA ZB3) 20:54	05:09 21:43	05:01 22:02
30	08:19 17:05		07:09 19:59	18:19 (WEA ZB1) 20:55	05:08 21:44	05:02 22:02
31	08:17 17:07		07:06 20:00	18:25 (WEA ZB1) 20:57	05:07 21:45	
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung		581	564	184		

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO12 - Westerhausen 4
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September		Oktober		November		Dezember
1	05:02	05:42	06:36		07:28	18:08 (WEA ZB2)	07:26	16:15 (WEA ZB3)	08:21
	22:01	21:27	20:21		19:07	29 18:37 (WEA ZB2)	16:57	11 16:26 (WEA ZB3)	16:13
2	05:03	05:44	06:37		07:30	18:06 (WEA ZB2)	07:28	16:18 (WEA ZB3)	08:22
	22:01	21:25	20:18		19:05	30 18:36 (WEA ZB2)	16:55	6 16:24 (WEA ZB3)	16:13
3	05:04	05:45	06:39	19:16 (WEA ZB1)	07:32	18:06 (WEA ZB2)	07:30		08:24
	22:01	21:23	20:16	8 19:24 (WEA ZB1)	19:02	28 18:34 (WEA ZB2)	16:53		16:12
4	05:05	05:47	06:41	19:13 (WEA ZB1)	07:34	18:06 (WEA ZB2)	07:32		08:25
	22:00	21:21	20:13	14 19:27 (WEA ZB1)	19:00	25 18:31 (WEA ZB2)	16:51		16:11
5	05:06	05:49	06:43	19:11 (WEA ZB1)	07:36	18:07 (WEA ZB2)	07:34		08:26
	22:00	21:19	20:11	18 19:29 (WEA ZB1)	18:58	22 18:29 (WEA ZB2)	16:50		16:11
6	05:07	05:50	06:44	19:08 (WEA ZB1)	07:37	18:07 (WEA ZB2)	07:36		08:28
	21:59	21:17	20:09	21 19:29 (WEA ZB1)	18:55	20 18:27 (WEA ZB2)	16:48		16:10
7	05:08	05:52	06:46	19:07 (WEA ZB1)	07:39	18:08 (WEA ZB2)	07:38		08:29
	21:58	21:15	20:06	23 19:30 (WEA ZB1)	18:53	16 18:24 (WEA ZB2)	16:46		16:10
8	05:08	05:54	06:48	19:07 (WEA ZB1)	07:41	18:09 (WEA ZB2)	07:40		08:30
	21:58	21:13	20:04	24 19:31 (WEA ZB1)	18:50	13 18:22 (WEA ZB2)	16:44		16:09
9	05:10	05:55	06:50	19:05 (WEA ZB1)	07:43	17:23 (WEA ZB3)	07:42		08:32
	21:57	21:11	20:01	26 19:31 (WEA ZB1)	18:48	23 18:19 (WEA ZB2)	16:42		16:09
10	05:11	05:57	06:51	19:05 (WEA ZB1)	07:45	17:19 (WEA ZB3)	07:43		08:33
	21:56	21:09	19:59	26 19:31 (WEA ZB1)	18:46	26 18:16 (WEA ZB2)	16:41		16:09
11	05:12	05:59	06:53	19:04 (WEA ZB1)	07:47	17:17 (WEA ZB3)	07:45		08:34
	21:55	21:07	19:56	25 19:29 (WEA ZB1)	18:43	25 18:14 (WEA ZB2)	16:39		16:08
12	05:13	06:01	06:55	19:03 (WEA ZB1)	07:48	17:15 (WEA ZB3)	07:47		08:35
	21:54	21:05	19:54	23 19:26 (WEA ZB1)	18:41	27 17:42 (WEA ZB3)	16:37		16:08
13	05:14	06:02	06:57	19:03 (WEA ZB1)	07:50	17:14 (WEA ZB3)	07:49		08:36
	21:53	21:03	19:51	20 19:23 (WEA ZB1)	18:39	29 17:43 (WEA ZB3)	16:35		16:08
14	05:15	06:04	06:58	19:04 (WEA ZB1)	07:52	17:12 (WEA ZB3)	07:51		08:37
	21:52	21:01	19:49	17 19:21 (WEA ZB1)	18:36	32 17:44 (WEA ZB3)	16:34		16:08
15	05:17	06:06	07:00	19:04 (WEA ZB1)	07:54	17:11 (WEA ZB3)	07:53		08:38
	21:51	20:59	19:47	15 19:19 (WEA ZB1)	18:34	34 17:45 (WEA ZB3)	16:32		16:08
16	05:18	06:08	07:02	19:04 (WEA ZB1)	07:56	17:10 (WEA ZB3)	07:55		08:39
	21:50	20:57	19:44	12 19:16 (WEA ZB1)	18:32	35 17:45 (WEA ZB3)	16:31		16:08
17	05:19	06:09	07:04	19:05 (WEA ZB1)	07:58	17:10 (WEA ZB3)	07:57		08:40
	21:49	20:55	19:42	9 19:14 (WEA ZB1)	18:29	36 17:46 (WEA ZB3)	16:29		16:08
18	05:21	06:11	07:05	19:07 (WEA ZB1)	07:59	17:09 (WEA ZB3)	07:58		08:41
	21:48	20:53	19:39	5 19:12 (WEA ZB1)	18:27	37 17:46 (WEA ZB3)	16:28		16:09
19	05:22	06:13	07:07		08:01	17:09 (WEA ZB3)	08:00		08:41
	21:46	20:50	19:37		18:25	37 17:46 (WEA ZB3)	16:26		16:09
20	05:23	06:15	07:09		08:03	17:08 (WEA ZB3)	08:02		08:42
	21:45	20:48	19:34		18:23	38 17:46 (WEA ZB3)	16:25		16:09
21	05:25	06:16	07:11		08:05	17:08 (WEA ZB3)	08:04		08:43
	21:44	20:46	19:32		18:20	38 17:46 (WEA ZB3)	16:24		16:10
22	05:26	06:18	07:12		08:07	17:08 (WEA ZB3)	08:06		08:43
	21:42	20:44	19:29		18:18	38 17:46 (WEA ZB3)	16:23		16:10
23	05:28	06:20	07:14	18:21 (WEA ZB2)	08:09	17:08 (WEA ZB3)	08:07		08:44
	21:41	20:41	19:27	8 18:29 (WEA ZB2)	18:16	37 17:45 (WEA ZB3)	16:21		16:11
24	05:29	06:22	07:16	18:17 (WEA ZB2)	08:11	17:08 (WEA ZB3)	08:09		08:44
	21:40	20:39	19:24	15 18:32 (WEA ZB2)	18:14	36 17:44 (WEA ZB3)	16:20		16:11
25	05:31	06:23	07:18	18:15 (WEA ZB2)	07:13	16:09 (WEA ZB3)	08:11		08:44
	21:38	20:37	19:22	19 18:34 (WEA ZB2)	17:12	33 16:42 (WEA ZB3)	16:19		16:12
26	05:32	06:25	07:19	18:13 (WEA ZB2)	07:15	16:09 (WEA ZB3)	08:13		08:45
	21:37	20:35	19:20	23 18:36 (WEA ZB2)	17:10	30 16:39 (WEA ZB3)	16:18		16:13
27	05:34	06:27	07:21	18:11 (WEA ZB2)	07:17	16:10 (WEA ZB3)	08:14		08:45
	21:35	20:32	19:17	25 18:36 (WEA ZB2)	17:07	27 16:37 (WEA ZB3)	16:17		16:13
28	05:35	06:29	07:23	18:10 (WEA ZB2)	07:18	16:10 (WEA ZB3)	08:16		08:45
	21:33	20:30	19:15	26 18:36 (WEA ZB2)	17:05	25 16:35 (WEA ZB3)	16:16		16:14
29	05:37	06:30	07:25	18:09 (WEA ZB2)	07:20	16:11 (WEA ZB3)	08:17		08:45
	21:32	20:28	19:12	28 18:37 (WEA ZB2)	17:03	21 16:32 (WEA ZB3)	16:15		16:15
30	05:39	06:32	07:27	18:08 (WEA ZB2)	07:22	16:12 (WEA ZB3)	08:19		08:45
	21:30	20:25	19:10	29 18:37 (WEA ZB2)	17:01	18 16:30 (WEA ZB3)	16:14		16:16
31	05:40	06:34			07:24	16:14 (WEA ZB3)			08:45
	21:28	20:23			16:59	14 16:28 (WEA ZB3)			16:17
Sonnenscheinstunden	511	459	382		329		260		234
astr.max.mögl.Beschattung			459		879		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	Zeitpunkt (SS:MM) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO13 - Westerhausen 11
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai		Juni	
1	08:45	14:18 (WEA ZB3)	08:16	14:37 (WEA ZB3)	07:19	16:22 (WEA ZB2)	07:04	18:35 (WEA ZB1)	05:55	05:06						
	16:18	55	15:13 (WEA ZB3)	17:09	38	15:15 (WEA ZB3)	18:04	35	16:57 (WEA ZB2)	20:02	35	19:10 (WEA ZB1)	20:57		21:47	
2	08:45	14:18 (WEA ZB3)	08:14	14:39 (WEA ZB3)	07:16	16:24 (WEA ZB2)	07:02	18:36 (WEA ZB1)	05:53	05:05						
	16:19	56	15:14 (WEA ZB3)	17:11	37	16:39 (WEA ZB2)	18:06	32	16:56 (WEA ZB2)	20:04	33	19:09 (WEA ZB1)	20:59		21:48	
3	08:45	14:18 (WEA ZB3)	08:12	14:41 (WEA ZB3)	07:14	16:25 (WEA ZB2)	06:59	18:37 (WEA ZB1)	05:51	05:05						
	16:21	56	15:14 (WEA ZB3)	17:13	40	16:41 (WEA ZB2)	18:08	29	16:54 (WEA ZB2)	20:06	31	19:08 (WEA ZB1)	21:01		21:49	
4	08:45	14:19 (WEA ZB3)	08:10	14:44 (WEA ZB3)	07:12	16:27 (WEA ZB2)	06:57	18:38 (WEA ZB1)	05:49	05:04						
	16:22	56	15:15 (WEA ZB3)	17:15	41	16:44 (WEA ZB2)	18:10	25	16:52 (WEA ZB2)	20:08	28	19:06 (WEA ZB1)	21:03		21:50	
5	08:44	14:20 (WEA ZB3)	08:09	14:47 (WEA ZB3)	07:09	16:29 (WEA ZB2)	06:54	18:40 (WEA ZB1)	05:47	05:03						
	16:23	56	15:16 (WEA ZB3)	17:17	41	16:47 (WEA ZB2)	18:12	19	16:48 (WEA ZB2)	20:10	24	19:04 (WEA ZB1)	21:04		21:51	
6	08:44	14:20 (WEA ZB3)	08:07	14:51 (WEA ZB3)	07:07	16:34 (WEA ZB2)	06:52	18:42 (WEA ZB1)	05:45	05:02						
	16:24	56	15:16 (WEA ZB3)	17:19	37	16:49 (WEA ZB2)	18:14	10	16:44 (WEA ZB2)	20:12	20	19:02 (WEA ZB1)	21:06		21:52	
7	08:44	14:20 (WEA ZB3)	08:05	16:25 (WEA ZB2)	07:05	16:34 (WEA ZB2)	06:50	18:45 (WEA ZB1)	05:43	05:02						
	16:26	56	15:16 (WEA ZB3)	17:21	26	16:51 (WEA ZB2)	18:16	13	18:58 (WEA ZB1)	21:08						
8	08:43	14:21 (WEA ZB3)	08:03	16:23 (WEA ZB2)	07:02	16:34 (WEA ZB2)	06:47	19:08 (WEA ZB1)	05:42	05:01						
	16:27	56	15:17 (WEA ZB3)	17:23	30	16:53 (WEA ZB2)	18:18		21:10	21:54						
9	08:43	14:21 (WEA ZB3)	08:01	16:22 (WEA ZB2)	07:00	16:34 (WEA ZB2)	06:45		05:40	05:00						
	16:29	57	15:18 (WEA ZB3)	17:25	33	16:55 (WEA ZB2)	18:20		21:11	21:55						
10	08:42	14:21 (WEA ZB3)	07:59	16:22 (WEA ZB2)	06:57	16:34 (WEA ZB2)	06:42		05:38	05:00						
	16:30	57	15:18 (WEA ZB3)	17:27	36	16:58 (WEA ZB2)	18:22		21:13	21:56						
11	08:41	14:21 (WEA ZB3)	07:57	16:20 (WEA ZB2)	06:55	16:34 (WEA ZB2)	06:40		05:36	04:59						
	16:31	57	15:18 (WEA ZB3)	17:29	39	16:59 (WEA ZB2)	18:23		21:15	21:57						
12	08:41	14:22 (WEA ZB3)	07:55	16:19 (WEA ZB2)	06:53	16:34 (WEA ZB2)	06:38		05:34	04:59						
	16:33	56	15:18 (WEA ZB3)	17:31	42	17:01 (WEA ZB2)	18:25		21:17	21:58						
13	08:40	14:22 (WEA ZB3)	07:53	16:19 (WEA ZB2)	06:50	17:51 (WEA ZB1)	06:35		05:32	04:59						
	16:35	57	15:19 (WEA ZB3)	17:33	43	17:02 (WEA ZB2)	18:27	10	18:01 (WEA ZB1)	20:24						
14	08:39	14:23 (WEA ZB3)	07:51	16:18 (WEA ZB2)	06:48	17:48 (WEA ZB1)	06:33		05:31	04:58						
	16:36	56	15:19 (WEA ZB3)	17:35	44	17:02 (WEA ZB2)	18:29	15	18:03 (WEA ZB1)	20:26						
15	08:38	14:23 (WEA ZB3)	07:49	16:18 (WEA ZB2)	06:45	17:45 (WEA ZB1)	06:31		05:29	04:58						
	16:38	56	15:19 (WEA ZB3)	17:37	45	17:03 (WEA ZB2)	18:31	20	18:05 (WEA ZB1)	20:28						
16	08:37	14:24 (WEA ZB3)	07:47	16:18 (WEA ZB2)	06:43	17:43 (WEA ZB1)	06:28		05:27	04:59						
	16:40	56	15:20 (WEA ZB3)	17:39	45	17:03 (WEA ZB2)	18:33	24	18:07 (WEA ZB1)	20:30						
17	08:36	14:25 (WEA ZB3)	07:45	16:18 (WEA ZB2)	06:41	17:41 (WEA ZB1)	06:26		05:26	04:58						
	16:41	55	15:20 (WEA ZB3)	17:41	46	17:04 (WEA ZB2)	18:35	27	18:08 (WEA ZB1)	20:32						
18	08:35	14:24 (WEA ZB3)	07:43	16:17 (WEA ZB2)	06:38	17:40 (WEA ZB1)	06:24		05:24	04:58						
	16:43	56	15:20 (WEA ZB3)	17:43	46	17:03 (WEA ZB2)	18:37	31	18:11 (WEA ZB1)	20:34						
19	08:34	14:25 (WEA ZB3)	07:41	16:17 (WEA ZB2)	06:36	17:38 (WEA ZB1)	06:21		05:23	04:58						
	16:45	55	15:20 (WEA ZB3)	17:45	46	17:03 (WEA ZB2)	18:38	34	18:12 (WEA ZB1)	20:35						
20	08:33	14:26 (WEA ZB3)	07:39	16:17 (WEA ZB2)	06:33	17:38 (WEA ZB1)	06:19		05:21	04:58						
	16:46	55	15:21 (WEA ZB3)	17:47	47	17:04 (WEA ZB2)	18:40	36	18:14 (WEA ZB1)	20:37						
21	08:32	14:26 (WEA ZB3)	07:37	16:18 (WEA ZB2)	06:31	17:36 (WEA ZB1)	06:17		05:20	04:58						
	16:48	54	15:20 (WEA ZB3)	17:49	46	17:04 (WEA ZB2)	18:42	39	18:15 (WEA ZB1)	20:39						
22	08:30	14:27 (WEA ZB3)	07:34	16:17 (WEA ZB2)	06:28	17:36 (WEA ZB1)	06:15		05:18	04:58						
	16:50	53	15:20 (WEA ZB3)	17:51	46	17:03 (WEA ZB2)	18:44	40	18:16 (WEA ZB1)	20:41						
23	08:29	14:28 (WEA ZB3)	07:32	16:18 (WEA ZB2)	06:26	17:35 (WEA ZB1)	06:12		05:17	04:59						
	16:52	52	15:20 (WEA ZB3)	17:53	45	17:03 (WEA ZB2)	18:46	41	18:16 (WEA ZB1)	20:43						
24	08:28	14:29 (WEA ZB3)	07:30	16:18 (WEA ZB2)	06:24	17:35 (WEA ZB1)	06:10		05:15	04:59						
	16:54	51	15:20 (WEA ZB3)	17:55	44	17:02 (WEA ZB2)	18:48	41	18:16 (WEA ZB1)	20:44						
25	08:26	14:29 (WEA ZB3)	07:28	16:18 (WEA ZB2)	06:21	17:35 (WEA ZB1)	06:08		05:14	04:59						
	16:56	51	15:20 (WEA ZB3)	17:57	43	17:01 (WEA ZB2)	18:49	41	18:16 (WEA ZB1)	20:46						
26	08:25	14:31 (WEA ZB3)	07:25	16:19 (WEA ZB2)	06:19	17:34 (WEA ZB1)	06:06		05:13	05:00						
	16:58	49	15:20 (WEA ZB3)	17:59	41	17:00 (WEA ZB2)	18:51	42	18:16 (WEA ZB1)	20:48						
27	08:23	14:31 (WEA ZB3)	07:23	16:20 (WEA ZB2)	06:16	17:34 (WEA ZB1)	06:04		05:12	05:00						
	16:59	48	15:19 (WEA ZB3)	18:01	40	17:00 (WEA ZB2)	18:53	41	18:15 (WEA ZB1)	20:50						
28	08:22	14:32 (WEA ZB3)	07:21	16:20 (WEA ZB2)	06:14	17:34 (WEA ZB1)	06:02		05:11	05:01						
	17:01	46	15:18 (WEA ZB3)	18:02	38	16:58 (WEA ZB2)	18:55	40	18:14 (WEA ZB1)	20:52						
29	08:20	14:34 (WEA ZB3)				07:11	18:34 (WEA ZB1)	06:00	05:09	05:01						
	17:03	44	15:18 (WEA ZB3)			19:57	19:14 (WEA ZB1)	20:54	21:43	22:02						
30	08:19	14:35 (WEA ZB3)				07:09	18:34 (WEA ZB1)	05:57	05:08	05:02						
	17:05	42	15:17 (WEA ZB3)			19:59	19:13 (WEA ZB1)	20:55	21:44	22:02						
31	08:17	14:36 (WEA ZB3)				07:06	18:35 (WEA ZB1)		05:07							
	17:07	40	15:16 (WEA ZB3)			20:01	19:12 (WEA ZB1)		21:45							
Sonnenscheinstunden	251		274			367		419	493	509						
astr.max.mögl.Beschattung	1650		1145			788		184								

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO13 - Westerhausen 11
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September		Oktober		November		Dezember				
1	05:02 22:01	05:42 21:27	06:36 20:21		07:28 19:07	6	18:33 (WEA ZB1) 18:39 (WEA ZB1)	07:26 16:57	36	15:50 (WEA ZB2) 16:26 (WEA ZB2)	08:21 16:13	56	14:04 (WEA ZB3) 15:00 (WEA ZB3)
2	05:03 22:01	05:44 21:25	06:37 20:18		07:30 19:05			07:28 16:55	33	15:52 (WEA ZB2) 16:25 (WEA ZB2)	08:22 16:13	57	14:04 (WEA ZB3) 15:01 (WEA ZB3)
3	05:04 22:01	05:45 21:23	06:39 20:16		07:32 19:02			07:30 16:53	29	15:53 (WEA ZB2) 16:22 (WEA ZB2)	08:24 16:12	57	14:04 (WEA ZB3) 15:01 (WEA ZB3)
4	05:05 22:00	05:47 21:21	06:41 20:13		07:34 19:00			07:32 16:51	26	15:54 (WEA ZB2) 16:20 (WEA ZB2)	08:25 16:11	56	14:05 (WEA ZB3) 15:01 (WEA ZB3)
5	05:06 22:00	05:49 21:19	06:43 20:11	12	18:42 (WEA ZB1) 18:54 (WEA ZB1)			07:34 16:50	38	14:20 (WEA ZB3) 16:18 (WEA ZB2)	08:27 16:11	56	14:05 (WEA ZB3) 15:01 (WEA ZB3)
6	05:07 21:59	05:50 21:17	06:44 20:09	19	18:38 (WEA ZB1) 18:57 (WEA ZB1)			07:36 16:48	41	14:16 (WEA ZB3) 16:16 (WEA ZB2)	08:28 16:10	56	14:06 (WEA ZB3) 15:02 (WEA ZB3)
7	05:08 21:58	05:52 21:15	06:46 20:06	24	18:35 (WEA ZB1) 18:59 (WEA ZB1)			07:38 16:46	42	14:13 (WEA ZB3) 16:14 (WEA ZB2)	08:29 16:10	56	14:06 (WEA ZB3) 15:02 (WEA ZB3)
8	05:09 21:58	05:54 21:13	06:48 20:04	28	18:33 (WEA ZB1) 19:01 (WEA ZB1)	15	17:07 (WEA ZB2) 17:22 (WEA ZB2)	07:40 16:44	41	14:11 (WEA ZB3) 16:12 (WEA ZB2)	08:31 16:09	56	14:07 (WEA ZB3) 15:03 (WEA ZB3)
9	05:10 21:57	05:55 21:11	06:50 20:01	30	18:31 (WEA ZB1) 19:01 (WEA ZB1)	22	17:03 (WEA ZB2) 17:25 (WEA ZB2)	07:42 16:42	36	14:09 (WEA ZB3) 14:45 (WEA ZB3)	08:32 16:09	56	14:07 (WEA ZB3) 15:03 (WEA ZB3)
10	05:11 21:56	05:57 21:09	06:51 19:59	34	18:29 (WEA ZB1) 19:03 (WEA ZB1)	27	17:00 (WEA ZB2) 17:27 (WEA ZB2)	07:43 16:41	38	14:08 (WEA ZB3) 14:46 (WEA ZB3)	08:33 16:09	56	14:07 (WEA ZB3) 15:03 (WEA ZB3)
11	05:12 21:55	05:59 21:07	06:53 19:56	36	18:28 (WEA ZB1) 19:04 (WEA ZB1)	30	16:58 (WEA ZB2) 17:28 (WEA ZB2)	07:45 16:39	40	14:07 (WEA ZB3) 14:47 (WEA ZB3)	08:34 16:08	55	14:08 (WEA ZB3) 15:03 (WEA ZB3)
12	05:13 21:54	06:01 21:05	06:55 19:54	37	18:26 (WEA ZB1) 19:03 (WEA ZB1)	34	16:56 (WEA ZB2) 17:30 (WEA ZB2)	07:47 16:37	42	14:06 (WEA ZB3) 14:48 (WEA ZB3)	08:35 16:08	56	14:09 (WEA ZB3) 15:05 (WEA ZB3)
13	05:14 21:53	06:02 21:03	06:57 19:52	39	18:25 (WEA ZB1) 19:04 (WEA ZB1)	37	16:54 (WEA ZB2) 17:31 (WEA ZB2)	07:49 16:36	44	14:06 (WEA ZB3) 14:50 (WEA ZB3)	08:36 16:08	56	14:09 (WEA ZB3) 15:05 (WEA ZB3)
14	05:15 21:52	06:04 21:01	06:58 19:49	39	18:25 (WEA ZB1) 19:04 (WEA ZB1)	39	16:53 (WEA ZB2) 17:32 (WEA ZB2)	07:51 16:34	46	14:05 (WEA ZB3) 14:51 (WEA ZB3)	08:37 16:08	55	14:10 (WEA ZB3) 15:05 (WEA ZB3)
15	05:17 21:51	06:06 20:59	07:00 19:47	41	18:24 (WEA ZB1) 19:05 (WEA ZB1)	40	16:52 (WEA ZB2) 17:32 (WEA ZB2)	07:53 16:32	48	14:04 (WEA ZB3) 14:52 (WEA ZB3)	08:38 16:08	56	14:10 (WEA ZB3) 15:06 (WEA ZB3)
16	05:18 21:50	06:08 20:57	07:02 19:44	41	18:23 (WEA ZB1) 19:04 (WEA ZB1)	42	16:51 (WEA ZB2) 17:33 (WEA ZB2)	07:55 16:31	49	14:04 (WEA ZB3) 14:53 (WEA ZB3)	08:39 16:08	55	14:10 (WEA ZB3) 15:05 (WEA ZB3)
17	05:19 21:49	06:09 20:55	07:04 19:42	42	18:22 (WEA ZB1) 19:04 (WEA ZB1)	43	16:50 (WEA ZB2) 17:33 (WEA ZB2)	07:57 16:29	51	14:03 (WEA ZB3) 14:54 (WEA ZB3)	08:40 16:08	55	14:11 (WEA ZB3) 15:06 (WEA ZB3)
18	05:21 21:48	06:11 20:53	07:05 19:39	42	18:22 (WEA ZB1) 19:04 (WEA ZB1)	45	16:49 (WEA ZB2) 17:34 (WEA ZB2)	07:58 16:28	51	14:03 (WEA ZB3) 14:54 (WEA ZB3)	08:41 16:09	56	14:11 (WEA ZB3) 15:07 (WEA ZB3)
19	05:22 21:47	06:13 20:50	07:07 19:37	42	18:21 (WEA ZB1) 19:03 (WEA ZB1)	45	16:49 (WEA ZB2) 17:34 (WEA ZB2)	08:00 16:27	52	14:03 (WEA ZB3) 14:55 (WEA ZB3)	08:41 16:09	55	14:12 (WEA ZB3) 15:07 (WEA ZB3)
20	05:23 21:45	06:15 20:48	07:09 19:34	41	18:21 (WEA ZB1) 19:02 (WEA ZB1)	46	16:48 (WEA ZB2) 17:34 (WEA ZB2)	08:02 16:25	53	14:02 (WEA ZB3) 14:55 (WEA ZB3)	08:42 16:09	55	14:12 (WEA ZB3) 15:07 (WEA ZB3)
21	05:25 21:44	06:16 20:46	07:11 19:32	41	18:21 (WEA ZB1) 19:02 (WEA ZB1)	46	16:48 (WEA ZB2) 17:34 (WEA ZB2)	08:04 16:24	54	14:02 (WEA ZB3) 14:56 (WEA ZB3)	08:43 16:10	55	14:13 (WEA ZB3) 15:08 (WEA ZB3)
22	05:26 21:42	06:18 20:44	07:12 19:29	39	18:22 (WEA ZB1) 19:01 (WEA ZB1)	46	16:48 (WEA ZB2) 17:34 (WEA ZB2)	08:06 16:23	55	14:02 (WEA ZB3) 14:57 (WEA ZB3)	08:43 16:10	55	14:13 (WEA ZB3) 15:08 (WEA ZB3)
23	05:28 21:41	06:20 20:41	07:14 19:27	39	18:21 (WEA ZB1) 18:58 (WEA ZB1)	47	16:47 (WEA ZB2) 17:34 (WEA ZB2)	08:07 16:21	55	14:02 (WEA ZB3) 14:57 (WEA ZB3)	08:44 16:11	55	14:14 (WEA ZB3) 15:09 (WEA ZB3)
24	05:29 21:40	06:22 20:39	07:16 19:24	34	18:22 (WEA ZB1) 18:56 (WEA ZB1)	47	16:47 (WEA ZB2) 17:34 (WEA ZB2)	08:09 16:20	55	14:03 (WEA ZB3) 14:58 (WEA ZB3)	08:44 16:11	55	14:14 (WEA ZB3) 15:09 (WEA ZB3)
25	05:31 21:38	06:23 20:37	07:18 19:22	32	18:22 (WEA ZB1) 18:54 (WEA ZB1)	46	16:47 (WEA ZB2) 16:33 (WEA ZB2)	08:11 16:19	55	14:02 (WEA ZB3) 14:57 (WEA ZB3)	08:45 16:12	56	14:14 (WEA ZB3) 15:10 (WEA ZB3)
26	05:32 21:37	06:25 20:35	07:20 19:20	29	18:23 (WEA ZB1) 18:52 (WEA ZB1)	45	16:48 (WEA ZB2) 16:33 (WEA ZB2)	08:13 16:18	56	14:02 (WEA ZB3) 14:58 (WEA ZB3)	08:45 16:13	55	14:16 (WEA ZB3) 15:11 (WEA ZB3)
27	05:34 21:35	06:27 20:32	07:21 19:17	25	18:23 (WEA ZB1) 18:48 (WEA ZB1)	44	16:47 (WEA ZB2) 16:32 (WEA ZB2)	08:14 16:17	57	14:02 (WEA ZB3) 14:59 (WEA ZB3)	08:45 16:13	55	14:16 (WEA ZB3) 15:11 (WEA ZB3)
28	05:35 21:33	06:29 20:30	07:23 19:15	21	18:25 (WEA ZB1) 18:46 (WEA ZB1)	44	16:48 (WEA ZB2) 16:32 (WEA ZB2)	08:16 16:16	56	14:03 (WEA ZB3) 14:59 (WEA ZB3)	08:45 16:14	56	14:16 (WEA ZB3) 15:12 (WEA ZB3)
29	05:37 21:32	06:30 20:28	07:25 19:12	17	18:27 (WEA ZB1) 18:44 (WEA ZB1)	43	16:48 (WEA ZB2) 16:31 (WEA ZB2)	08:18 16:15	57	14:03 (WEA ZB3) 15:00 (WEA ZB3)	08:45 16:15	55	14:17 (WEA ZB3) 15:12 (WEA ZB3)
30	05:39 21:30	06:32 20:25	07:27 19:10	13	18:29 (WEA ZB1) 18:42 (WEA ZB1)	41	18:29 (WEA ZB1) 16:30 (WEA ZB2)	08:19 16:14	56	14:03 (WEA ZB3) 14:59 (WEA ZB3)	08:45 16:16	56	14:17 (WEA ZB3) 15:13 (WEA ZB3)
31	05:40 21:28	06:34 20:23			07:24 16:59	38	15:50 (WEA ZB2) 16:28 (WEA ZB2)			08:45 16:17		55	14:17 (WEA ZB3) 15:12 (WEA ZB3)
Sonnenscheinstunden	511	459	382		329			260		234			
astr.max.mögl.Beschattung				835		958		1392			1724		

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO14 - Westerhausen 12
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai		Juni	
1	08:45	13:48 (WEA ZB3)	08:16	16:00 (WEA ZB2)	07:19	16:16 (WEA ZB2)	07:04	18:26 (WEA ZB1)	05:55	05:06						
	16:18	57	14:45 (WEA ZB3)	17:09	37	16:37 (WEA ZB2)	18:04	10	16:26 (WEA ZB2)	20:02	33	18:59 (WEA ZB1)	20:57	21:47		
2	08:45		13:49 (WEA ZB3)	08:14		16:00 (WEA ZB2)	07:16			07:02		18:28 (WEA ZB1)	05:53	05:05		
	16:19	57	14:46 (WEA ZB3)	17:11	39	16:39 (WEA ZB2)	18:06			20:04	29	18:57 (WEA ZB1)	20:59	21:48		
3	08:45		13:48 (WEA ZB3)	08:12		15:59 (WEA ZB2)	07:14			06:59		18:30 (WEA ZB1)	05:51	05:05		
	16:21	58	14:46 (WEA ZB3)	17:13	42	16:41 (WEA ZB2)	18:08			20:06	25	18:55 (WEA ZB1)	21:01	21:49		
4	08:45		13:49 (WEA ZB3)	08:10		15:59 (WEA ZB2)	07:12			06:57		18:32 (WEA ZB1)	05:49	05:04		
	16:22	58	14:47 (WEA ZB3)	17:15	45	16:44 (WEA ZB2)	18:10			20:08	20	18:52 (WEA ZB1)	21:03	21:50		
5	08:44		13:51 (WEA ZB3)	08:09		15:59 (WEA ZB2)	07:09			06:54		18:35 (WEA ZB1)	05:47	05:03		
	16:23	56	14:47 (WEA ZB3)	17:17	45	16:44 (WEA ZB2)	18:12			20:10	13	18:48 (WEA ZB1)	21:04	21:51		
6	08:44		13:51 (WEA ZB3)	08:07		15:58 (WEA ZB2)	07:07			06:52			05:45	05:02		
	16:24	56	14:47 (WEA ZB3)	17:19	47	16:45 (WEA ZB2)	18:14			20:12			21:06	21:52		
7	08:44		13:51 (WEA ZB3)	08:05		15:58 (WEA ZB2)	07:05			06:50			05:43	05:02		
	16:26	56	14:47 (WEA ZB3)	17:21	47	16:45 (WEA ZB2)	18:16			20:13			21:08	21:53		
8	08:43		13:52 (WEA ZB3)	08:03		15:58 (WEA ZB2)	07:02		17:44 (WEA ZB1)	06:47			05:42	05:01		
	16:27	56	14:48 (WEA ZB3)	17:23	48	16:46 (WEA ZB2)	18:18	7	17:51 (WEA ZB1)	20:15			21:10	21:54		
9	08:43		13:53 (WEA ZB3)	08:01		15:57 (WEA ZB2)	07:00		17:40 (WEA ZB1)	06:45			05:40	05:00		
	16:29	55	14:48 (WEA ZB3)	17:25	49	16:46 (WEA ZB2)	18:20	13	17:53 (WEA ZB1)	20:17			21:11	21:55		
10	08:42		13:53 (WEA ZB3)	07:59		15:57 (WEA ZB2)	06:57		17:36 (WEA ZB1)	06:42			05:38	05:00		
	16:30	55	14:48 (WEA ZB3)	17:27	50	16:47 (WEA ZB2)	18:22	19	17:55 (WEA ZB1)	20:19			21:13	21:56		
11	08:41		13:54 (WEA ZB3)	07:57		15:57 (WEA ZB2)	06:55		17:34 (WEA ZB1)	06:40			05:36	04:59		
	16:31	54	14:48 (WEA ZB3)	17:29	50	16:47 (WEA ZB2)	18:23	23	17:57 (WEA ZB1)	20:21			21:15	21:57		
12	08:41		13:54 (WEA ZB3)	07:55		15:56 (WEA ZB2)	06:53		17:32 (WEA ZB1)	06:38			05:34	04:59		
	16:33	54	14:48 (WEA ZB3)	17:31	50	16:46 (WEA ZB2)	18:25	26	17:58 (WEA ZB1)	20:23			21:17	21:58		
13	08:40		13:55 (WEA ZB3)	07:53		15:57 (WEA ZB2)	06:50		17:30 (WEA ZB1)	06:35			05:32	04:59		
	16:35	53	14:48 (WEA ZB3)	17:33	49	16:46 (WEA ZB2)	18:27	31	18:01 (WEA ZB1)	20:24			21:18	21:58		
14	08:39		13:56 (WEA ZB3)	07:51		15:57 (WEA ZB2)	06:48		17:29 (WEA ZB1)	06:33			05:31	04:59		
	16:36	53	14:49 (WEA ZB3)	17:35	49	16:46 (WEA ZB2)	18:29	34	18:03 (WEA ZB1)	20:26			21:20	21:59		
15	08:38		13:56 (WEA ZB3)	07:49		15:57 (WEA ZB2)	06:45		17:28 (WEA ZB1)	06:31			05:29	04:58		
	16:38	53	14:49 (WEA ZB3)	17:37	49	16:46 (WEA ZB2)	18:31	37	18:05 (WEA ZB1)	20:28			21:22	21:59		
16	08:37		13:57 (WEA ZB3)	07:47		15:58 (WEA ZB2)	06:43		17:27 (WEA ZB1)	06:28			05:27	04:58		
	16:40	52	14:49 (WEA ZB3)	17:39	48	16:46 (WEA ZB2)	18:33	40	18:07 (WEA ZB1)	20:30			21:23	22:00		
17	08:36		13:58 (WEA ZB3)	07:45		15:58 (WEA ZB2)	06:41		17:25 (WEA ZB1)	06:26			05:26	04:58		
	16:41	51	14:49 (WEA ZB3)	17:41	48	16:46 (WEA ZB2)	18:35	43	18:08 (WEA ZB1)	20:32			21:25	22:01		
18	08:35		13:59 (WEA ZB3)	07:43		15:58 (WEA ZB2)	06:38		17:25 (WEA ZB1)	06:24			05:24	04:58		
	16:43	49	14:48 (WEA ZB3)	17:43	47	16:45 (WEA ZB2)	18:37	44	18:09 (WEA ZB1)	20:34			21:27	22:01		
19	08:34		14:00 (WEA ZB3)	07:41		15:58 (WEA ZB2)	06:36		17:24 (WEA ZB1)	06:21			05:23	04:58		
	16:45	48	14:48 (WEA ZB3)	17:45	47	16:45 (WEA ZB2)	18:38	44	18:08 (WEA ZB1)	20:35			21:28	22:01		
20	08:33		14:01 (WEA ZB3)	07:39		15:59 (WEA ZB2)	06:33		17:24 (WEA ZB1)	06:19			05:21	04:58		
	16:46	47	14:48 (WEA ZB3)	17:47	45	16:44 (WEA ZB2)	18:40	45	18:09 (WEA ZB1)	20:37			21:30	22:02		
21	08:32		14:02 (WEA ZB3)	07:37		16:00 (WEA ZB2)	06:31		17:23 (WEA ZB1)	06:17			05:20	04:58		
	16:48	45	14:47 (WEA ZB3)	17:49	44	16:44 (WEA ZB2)	18:42	45	18:08 (WEA ZB1)	20:39			21:31	22:02		
22	08:30		14:03 (WEA ZB3)	07:34		16:00 (WEA ZB2)	06:28		17:23 (WEA ZB1)	06:15			05:18	04:58		
	16:50	44	14:47 (WEA ZB3)	17:51	42	16:42 (WEA ZB2)	18:44	45	18:08 (WEA ZB1)	20:41			21:33	22:02		
23	08:29		14:04 (WEA ZB3)	07:32		16:02 (WEA ZB2)	06:26		17:22 (WEA ZB1)	06:12			05:17	04:59		
	16:52	43	16:18 (WEA ZB2)	17:53	39	16:41 (WEA ZB2)	18:46	45	18:07 (WEA ZB1)	20:43			21:34	22:02		
24	08:28		14:06 (WEA ZB3)	07:30		16:03 (WEA ZB2)	06:24		17:22 (WEA ZB1)	06:10			05:15	04:59		
	16:54	49	16:21 (WEA ZB2)	17:55	37	16:40 (WEA ZB2)	18:48	45	18:07 (WEA ZB1)	20:44			21:36	22:02		
25	08:26		14:07 (WEA ZB3)	07:28		16:04 (WEA ZB2)	06:21		17:23 (WEA ZB1)	06:08			05:14	04:59		
	16:56	50	16:22 (WEA ZB2)	17:57	34	16:38 (WEA ZB2)	18:49	44	18:07 (WEA ZB1)	20:46			21:37	22:02		
26	08:25		14:09 (WEA ZB3)	07:25		16:06 (WEA ZB2)	06:19		17:22 (WEA ZB1)	06:06			05:13	05:00		
	16:58	52	16:25 (WEA ZB2)	17:59	30	16:36 (WEA ZB2)	18:51	44	18:06 (WEA ZB1)	20:48			21:39	22:02		
27	08:23		14:11 (WEA ZB3)	07:23		16:09 (WEA ZB2)	06:16		17:23 (WEA ZB1)	06:04			05:12	05:00		
	16:59	52	16:27 (WEA ZB2)	18:01	25	16:34 (WEA ZB2)	18:53	43	18:06 (WEA ZB1)	20:50			21:40	22:02		
28	08:22		14:13 (WEA ZB3)	07:21		16:11 (WEA ZB2)	06:14		17:23 (WEA ZB1)	06:02			05:11	05:01		
	17:01	52	16:29 (WEA ZB2)	18:02	20	16:31 (WEA ZB2)	18:55	41	18:04 (WEA ZB1)	20:52			21:42	22:02		
29	08:20		14:17 (WEA ZB3)				07:11		18:24 (WEA ZB1)	06:00			05:09	05:01		
	17:03	49	16:31 (WEA ZB2)				19:57	40	19:04 (WEA ZB1)	20:54			21:43	22:02		
30	08:19		14:20 (WEA ZB3)				07:09		18:24 (WEA ZB1)	05:57			05:08	05:02		
	17:05	46	16:33 (WEA ZB2)				19:59	38	19:02 (WEA ZB1)	20:55			21:44	22:02		
31	08:17		16:01 (WEA ZB2)				07:06		18:25 (WEA ZB1)				05:07			
	17:07	34	16:35 (WEA ZB2)				20:01	36	19:01 (WEA ZB1)				21:45			
Sonnenscheinstunden	251			274			367			419			493		509	
astr.max.mögl.Beschattung	1594			1202			882			120						

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO14 - Westerhausen 12
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	October	November	Dezember
1	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	18:11 (WEA ZB1) 16:57	07:26 15:26 (WEA ZB2) 08:21 13:36 (WEA ZB3)
2	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	18:11 (WEA ZB1) 16:55	07:28 15:27 (WEA ZB2) 08:22 13:36 (WEA ZB3)
3	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	18:13 (WEA ZB1) 16:53	07:30 15:27 (WEA ZB2) 08:24 13:36 (WEA ZB3)
4	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	18:15 (WEA ZB1) 16:51	07:32 15:28 (WEA ZB2) 08:25 13:36 (WEA ZB3)
5	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	18:19 (WEA ZB1) 16:50	07:34 15:28 (WEA ZB2) 08:27 13:36 (WEA ZB3)
6	05:07 21:59	05:50 21:17	06:44 20:09	07:37 18:55	18:29 (WEA ZB1) 16:50	07:36 15:29 (WEA ZB2) 08:28 13:37 (WEA ZB3)
7	05:08 21:58	05:52 21:15	06:46 20:06	07:39 18:53	16:48 15:29 (WEA ZB2) 08:29 13:37 (WEA ZB3)	45 16:14 (WEA ZB2) 16:10 14:33 (WEA ZB3)
8	05:09 21:58	05:54 21:13	06:48 20:04	07:41 18:50	16:46 15:30 (WEA ZB2) 08:31 13:38 (WEA ZB3)	44 16:13 (WEA ZB2) 16:10 14:34 (WEA ZB3)
9	05:10 21:57	05:55 21:11	06:50 20:01	07:43 18:48	16:44 15:30 (WEA ZB2) 08:32 13:38 (WEA ZB3)	42 16:12 (WEA ZB2) 16:09 14:35 (WEA ZB3)
10	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	16:42 15:31 (WEA ZB2) 08:33 13:38 (WEA ZB3)	40 16:10 (WEA ZB2) 16:09 14:35 (WEA ZB3)
11	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	16:41 15:32 (WEA ZB2) 08:34 13:38 (WEA ZB3)	37 16:08 (WEA ZB2) 16:09 14:35 (WEA ZB3)
12	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	16:39 15:32 (WEA ZB2) 08:34 13:38 (WEA ZB3)	34 16:06 (WEA ZB2) 16:08 14:35 (WEA ZB3)
13	05:14 21:53	06:02 21:03	06:57 19:52	07:50 18:39	16:37 15:33 (WEA ZB2) 08:35 13:39 (WEA ZB3)	46 16:04 (WEA ZB2) 16:08 14:37 (WEA ZB3)
14	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	16:43 (WEA ZB2) 16:34	50 15:58 (WEA ZB2) 16:08 14:38 (WEA ZB3)
15	05:17 21:51	06:06 20:59	07:00 19:47	07:54 18:34	16:40 (WEA ZB2) 16:32	51 15:56 (WEA ZB2) 16:08 14:38 (WEA ZB3)
16	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	16:38 (WEA ZB2) 16:31	52 15:58 (WEA ZB2) 16:08 14:38 (WEA ZB3)
17	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	16:36 (WEA ZB2) 16:29	50 15:56 (WEA ZB2) 16:08 14:38 (WEA ZB3)
18	05:21 21:48	06:11 20:53	07:05 19:39	08:00 18:27	16:34 (WEA ZB2) 16:28	49 15:55 (WEA ZB2) 16:09 14:39 (WEA ZB3)
19	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	16:33 (WEA ZB2) 16:27	49 15:55 (WEA ZB2) 16:09 14:39 (WEA ZB3)
20	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	16:31 (WEA ZB2) 16:25	43 15:53 (WEA ZB2) 16:09 14:40 (WEA ZB3)
21	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	16:30 (WEA ZB2) 16:24	44 15:52 (WEA ZB2) 16:09 14:40 (WEA ZB3)
22	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	16:29 (WEA ZB2) 16:23	45 15:51 (WEA ZB2) 16:09 14:41 (WEA ZB3)
23	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	16:29 (WEA ZB2) 16:21	47 15:50 (WEA ZB2) 16:09 14:41 (WEA ZB3)
24	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	16:28 (WEA ZB2) 16:20	48 15:49 (WEA ZB2) 16:09 14:42 (WEA ZB3)
25	05:31 21:38	06:23 20:37	07:18 19:22	08:13 18:12	16:27 (WEA ZB2) 16:19	49 15:48 (WEA ZB2) 16:09 14:42 (WEA ZB3)
26	05:32 21:37	06:25 20:35	07:20 19:20	08:15 18:10	16:26 (WEA ZB2) 16:18	50 15:47 (WEA ZB2) 16:09 14:43 (WEA ZB3)
27	05:34 21:35	06:27 20:32	07:21 19:17	08:17 18:08	16:25 (WEA ZB2) 16:17	51 15:46 (WEA ZB2) 16:09 14:43 (WEA ZB3)
28	05:35 21:33	06:29 20:30	07:23 19:15	08:18 18:06	16:24 (WEA ZB2) 16:16	52 15:45 (WEA ZB2) 16:09 14:44 (WEA ZB3)
29	05:37 21:32	06:30 20:28	07:25 19:12	08:20 18:04	16:23 (WEA ZB2) 16:15	53 15:44 (WEA ZB2) 16:09 14:44 (WEA ZB3)
30	05:39 21:30	06:32 20:25	07:27 19:10	08:22 18:02	16:22 (WEA ZB2) 16:14	54 15:43 (WEA ZB2) 16:09 14:45 (WEA ZB3)
31	05:40 21:28	06:34 20:23		07:24 16:59	16:21 (WEA ZB2) 16:15 (WEA ZB2)	54 15:42 (WEA ZB2) 16:09 14:45 (WEA ZB3)
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung			908	879	1421	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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	(WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO15 - Westerhausen 9A
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:
Die Sonne scheint täglich von Sonnenauf- bis -untergang
Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45 16:18 138	10:57 (WEA ZB3) 08:16 15:11 (WEA ZB1) 17:09 10:59 (WEA ZB3) 08:14 15:12 (WEA ZB1) 17:11 11:00 (WEA ZB3) 08:12 15:13 (WEA ZB1) 17:13 11:01 (WEA ZB3) 08:10 15:13 (WEA ZB1) 17:15 11:04 (WEA ZB3) 08:09 15:14 (WEA ZB1) 17:17 11:06 (WEA ZB3) 08:07 15:15 (WEA ZB1) 17:19 12:27 (WEA ZB2) 08:05 15:15 (WEA ZB1) 17:21 12:29 (WEA ZB2) 08:03 15:17 (WEA ZB1) 17:23 12:30 (WEA ZB2) 08:01 15:17 (WEA ZB1) 17:25 12:31 (WEA ZB2) 07:59 15:18 (WEA ZB1) 17:27 12:32 (WEA ZB2) 07:57 15:18 (WEA ZB1) 17:29 12:33 (WEA ZB2) 07:55 15:19 (WEA ZB1) 17:31 12:35 (WEA ZB2) 07:53 15:20 (WEA ZB1) 17:33 12:37 (WEA ZB2) 07:51 15:20 (WEA ZB1) 17:35 12:39 (WEA ZB2) 07:49 15:21 (WEA ZB1) 17:37 12:42 (WEA ZB2) 07:47 15:22 (WEA ZB1) 17:39 12:46 (WEA ZB2) 07:45 15:23 (WEA ZB1) 17:41 14:01 (WEA ZB1) 07:43 15:23 (WEA ZB1) 17:43 14:02 (WEA ZB1) 07:41 15:24 (WEA ZB1) 17:45 14:02 (WEA ZB1) 07:39 15:25 (WEA ZB1) 17:47 14:02 (WEA ZB1) 07:37 15:25 (WEA ZB1) 17:49 14:02 (WEA ZB1) 07:34 15:26 (WEA ZB1) 17:51 14:02 (WEA ZB1) 07:32 15:26 (WEA ZB1) 17:53 14:02 (WEA ZB1) 07:30 15:27 (WEA ZB1) 17:55 14:02 (WEA ZB1) 07:28 15:27 (WEA ZB1) 17:57 14:03 (WEA ZB1) 07:25 15:28 (WEA ZB1) 17:59 14:02 (WEA ZB1) 07:23 15:28 (WEA ZB1) 18:01 14:02 (WEA ZB1) 07:21 15:28 (WEA ZB1) 18:03 14:03 (WEA ZB1) 15:29 (WEA ZB1) 14:03 (WEA ZB1) 15:29 (WEA ZB1) 14:03 (WEA ZB1) 15:29 (WEA ZB1)	08:16 17:09 08:14 17:11 08:12 17:13 08:10 17:15 08:09 17:17 08:07 17:19 08:05 17:21 08:03 17:23 08:01 17:25 07:59 17:27 07:57 17:29 07:55 17:31 07:53 17:33 07:51 17:35 07:49 17:37 07:47 17:39 07:45 17:41 07:43 17:43 07:41 17:45 07:39 17:47 07:37 17:49 07:34 17:51 07:32 17:53 07:30 17:55 07:28 17:57 07:25 17:59 07:23 18:01 07:21 18:03 07:11 19:57 07:09 19:59 07:06 20:01	23	14:38 (WEA ZB1) 07:04 15:01 (WEA ZB1) 20:02 07:02 20:57 20:04 20:59 06:59 05:51 20:06 21:01 06:57 05:49 20:08 21:03 06:54 05:47 20:10 21:04 06:52 05:45 20:12 21:06 06:50 05:43 20:13 21:08 06:47 05:42 20:15 21:10 06:45 05:40 20:17 21:11 06:42 05:38 20:19 21:13 06:40 05:36 20:21 21:15 06:38 05:34 20:23 21:17 06:35 05:32 20:24 21:18 06:33 05:31 20:26 21:20 06:31 05:29 20:28 21:22 06:28 05:27 20:30 21:23 06:26 05:26 20:32 21:25 06:24 05:24 20:34 21:27 06:21 05:23 20:35 21:28 06:19 05:21 20:37 21:30 06:17 05:20 20:39 21:31 06:15 05:18 20:41 21:33 06:13 05:17 20:43 21:34 06:10 05:16 20:45 21:36 06:08 05:14 20:46 21:37 06:06 05:13 20:48 21:39 06:04 05:12 20:50 21:40 06:02 05:11 20:52 21:42 06:00 05:09 20:54 21:43 05:57 05:08 20:55 21:44 05:07 21:45 493	05:06 21:47 05:05 21:48 05:05 21:49 05:04 21:50 05:03 21:51 05:02 21:52 05:02 21:53 05:01 21:54 05:00 21:55 21:56 05:00 21:57 04:59 21:58 04:59 21:59 04:58 22:00 04:58 22:01 04:58 22:01 04:58 22:02 04:58 22:02 04:59 22:02 04:59 22:02 05:00 22:02 05:01 22:02 05:01 22:02 05:02 22:02
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung	3155	2020	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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO15 - Westerhausen 9A
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober		November		Dezember			
1	05:03 22:01	05:42 21:27	06:36 20:21	07:28 19:07		07:26 16:57	83	13:35 (WEA ZB1) 14:58 (WEA ZB1)	08:21 16:13	110	12:14 (WEA ZB2) 15:00 (WEA ZB1)
2	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05		07:28 16:55	84	13:35 (WEA ZB1) 14:59 (WEA ZB1)	08:22 16:13	112	12:14 (WEA ZB2) 15:01 (WEA ZB1)
3	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:03		07:30 16:53	84	13:35 (WEA ZB1) 14:59 (WEA ZB1)	08:24 16:12	113	12:13 (WEA ZB2) 15:00 (WEA ZB1)
4	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00		07:32 16:51	84	13:35 (WEA ZB1) 14:59 (WEA ZB1)	08:25 16:11	114	12:13 (WEA ZB2) 15:01 (WEA ZB1)
5	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58		07:34 16:50	86	13:34 (WEA ZB1) 15:00 (WEA ZB1)	08:27 16:11	115	12:12 (WEA ZB2) 15:00 (WEA ZB1)
6	05:07 21:59	05:50 21:17	06:44 20:09	07:37 18:55		07:36 16:48	86	13:34 (WEA ZB1) 15:00 (WEA ZB1)	08:28 16:10	123	10:53 (WEA ZB3) 15:01 (WEA ZB1)
7	05:08 21:58	05:52 21:15	06:46 20:06	07:39 18:53		07:38 16:46	86	13:34 (WEA ZB1) 15:00 (WEA ZB1)	08:29 16:10	127	10:50 (WEA ZB3) 15:00 (WEA ZB1)
8	05:09 21:58	05:54 21:14	06:48 20:04	07:41 18:50		07:40 16:44	86	13:34 (WEA ZB1) 15:00 (WEA ZB1)	08:31 16:09	131	10:50 (WEA ZB3) 15:01 (WEA ZB1)
9	05:10 21:57	05:55 21:12	06:50 20:01	07:43 18:48		07:42 16:42	86	13:34 (WEA ZB1) 15:00 (WEA ZB1)	08:32 16:09	134	10:49 (WEA ZB3) 15:01 (WEA ZB1)
10	05:11 21:56	05:57 21:10	06:51 19:59	07:45 18:46		07:44 16:41	86	13:34 (WEA ZB1) 15:00 (WEA ZB1)	08:33 16:09	135	10:48 (WEA ZB3) 15:01 (WEA ZB1)
11	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43		07:45 16:39	86	13:34 (WEA ZB1) 15:00 (WEA ZB1)	08:34 16:08	138	10:47 (WEA ZB3) 15:01 (WEA ZB1)
12	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	15	07:47 16:37	86	13:35 (WEA ZB1) 15:01 (WEA ZB1)	08:35 16:08	139	10:48 (WEA ZB3) 15:02 (WEA ZB1)
13	05:14 21:53	06:02 21:03	06:57 19:52	07:50 18:39	28	07:49 16:36	86	13:35 (WEA ZB1) 15:01 (WEA ZB1)	08:36 16:08	139	10:48 (WEA ZB3) 15:02 (WEA ZB1)
14	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	36	07:51 16:34	86	13:35 (WEA ZB1) 15:01 (WEA ZB1)	08:37 16:08	141	10:48 (WEA ZB3) 15:02 (WEA ZB1)
15	05:17 21:51	06:06 20:59	07:00 19:47	07:54 18:34	42	07:53 16:32	86	13:35 (WEA ZB1) 15:01 (WEA ZB1)	08:38 16:08	142	10:48 (WEA ZB3) 15:03 (WEA ZB1)
16	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	48	07:55 16:31	86	13:35 (WEA ZB1) 15:01 (WEA ZB1)	08:39 16:08	142	10:48 (WEA ZB3) 15:03 (WEA ZB1)
17	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	52	07:57 16:29	85	13:36 (WEA ZB1) 15:01 (WEA ZB1)	08:40 16:08	145	10:47 (WEA ZB3) 15:03 (WEA ZB1)
18	05:21 21:48	06:11 20:53	07:05 19:39	08:00 18:27	56	07:59 16:28	85	13:36 (WEA ZB1) 15:01 (WEA ZB1)	08:41 16:09	144	10:48 (WEA ZB3) 15:03 (WEA ZB1)
19	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	59	08:00 16:27	84	13:37 (WEA ZB1) 15:01 (WEA ZB1)	08:41 16:09	144	10:49 (WEA ZB3) 15:04 (WEA ZB1)
20	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	63	08:02 16:25	84	13:37 (WEA ZB1) 15:01 (WEA ZB1)	08:42 16:09	146	10:48 (WEA ZB3) 15:04 (WEA ZB1)
21	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	66	08:04 16:24	83	13:38 (WEA ZB1) 15:01 (WEA ZB1)	08:43 16:10	144	10:49 (WEA ZB3) 15:05 (WEA ZB1)
22	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	68	08:06 16:23	83	13:38 (WEA ZB1) 15:01 (WEA ZB1)	08:43 16:10	143	10:49 (WEA ZB3) 15:04 (WEA ZB1)
23	05:28 21:41	06:20 20:42	07:14 19:27	08:09 18:16	71	08:07 16:21	82	13:39 (WEA ZB1) 15:01 (WEA ZB1)	08:44 16:11	146	10:50 (WEA ZB3) 15:06 (WEA ZB1)
24	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	72	08:09 16:20	81	13:40 (WEA ZB1) 15:01 (WEA ZB1)	08:44 16:11	145	10:50 (WEA ZB3) 15:06 (WEA ZB1)
25	05:31 21:38	06:23 20:37	07:18 19:22	08:13 17:12	74	08:11 16:19	93	12:23 (WEA ZB2) 15:00 (WEA ZB1)	08:45 16:12	144	10:51 (WEA ZB3) 15:06 (WEA ZB1)
26	05:32 21:37	06:25 20:35	07:20 19:20	08:15 17:10	76	08:13 16:18	99	12:20 (WEA ZB2) 15:00 (WEA ZB1)	08:45 16:13	144	10:52 (WEA ZB3) 15:07 (WEA ZB1)
27	05:34 21:35	06:27 20:32	07:21 19:17	08:17 17:08	77	08:14 16:17	102	12:18 (WEA ZB2) 15:00 (WEA ZB1)	08:45 16:13	142	10:53 (WEA ZB3) 15:08 (WEA ZB1)
28	05:35 21:33	06:29 20:30	07:23 19:15	08:19 17:05	78	08:16 16:16	106	12:17 (WEA ZB2) 15:01 (WEA ZB1)	08:45 16:14	141	10:54 (WEA ZB3) 15:08 (WEA ZB1)
29	05:37 21:32	06:30 20:28	07:25 19:12	08:20 17:03	80	08:18 16:15	108	12:16 (WEA ZB2) 15:01 (WEA ZB1)	08:45 16:15	142	10:54 (WEA ZB3) 15:09 (WEA ZB1)
30	05:39 21:30	06:32 20:25	07:27 19:10	08:22 17:01	81	08:19 16:14	109	12:15 (WEA ZB2) 15:00 (WEA ZB1)	08:46 16:16	141	10:55 (WEA ZB3) 15:10 (WEA ZB1)
31	05:40 21:28	06:34 20:23		08:24 16:59	83				08:45 16:17	140	10:56 (WEA ZB3) 15:11 (WEA ZB1)
Sonnenscheinstunden	511	459	382	329		260			234		
astr.max.mögl.Beschattung				1225		2651			4206		

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO16 - Westerhausen 9
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45 16:18 110	12:17 (WEA ZB2) 14:48 (WEA ZB1) 17:09 76	13:42 (WEA ZB1) 14:58 (WEA ZB1) 18:04	07:19 18:04 20:02	05:55 20:57 21:47	05:06 21:47 21:47
2	08:45 16:19 109	12:18 (WEA ZB2) 14:49 (WEA ZB1) 17:11 76	13:42 (WEA ZB1) 14:58 (WEA ZB1) 18:06	07:16 18:06 20:04	05:53 20:59 21:48	05:05 21:48 21:48
3	08:45 16:21 108	12:19 (WEA ZB2) 14:50 (WEA ZB1) 17:13 74	13:44 (WEA ZB1) 14:58 (WEA ZB1) 18:08	07:14 18:08 20:06	05:51 21:01 21:49	05:05 21:49 21:49
4	08:45 16:22 106	12:20 (WEA ZB2) 14:50 (WEA ZB1) 17:15 74	13:44 (WEA ZB1) 14:58 (WEA ZB1) 18:10	07:12 18:10 20:08	05:49 21:03 21:50	05:04 21:50 21:50
5	08:45 16:23 105	12:22 (WEA ZB2) 14:51 (WEA ZB1) 17:17 72	13:45 (WEA ZB1) 14:57 (WEA ZB1) 18:12	07:09 18:12 20:10	05:47 21:04 21:51	05:03 21:51 21:51
6	08:44 16:24 103	12:23 (WEA ZB2) 14:51 (WEA ZB1) 17:19 71	13:46 (WEA ZB1) 14:57 (WEA ZB1) 18:14	07:07 18:14 20:12	05:45 21:06 21:52	05:02 21:52 21:52
7	08:44 16:26 101	12:24 (WEA ZB2) 14:51 (WEA ZB1) 17:21 69	13:47 (WEA ZB1) 14:56 (WEA ZB1) 18:16	07:05 18:16 20:13	05:43 21:08 21:53	05:02 21:53 21:53
8	08:43 16:27 98	12:27 (WEA ZB2) 14:53 (WEA ZB1) 17:23 67	13:48 (WEA ZB1) 14:55 (WEA ZB1) 18:18	07:02 18:18 20:15	05:42 21:10 21:54	05:01 21:54 21:54
9	08:43 16:29 95	12:29 (WEA ZB2) 14:53 (WEA ZB1) 17:25 65	13:49 (WEA ZB1) 14:54 (WEA ZB1) 18:20	07:00 18:20 20:17	05:40 21:11 21:55	05:00 21:55 21:55
10	08:42 16:30 87	12:33 (WEA ZB2) 14:53 (WEA ZB1) 17:27 62	13:51 (WEA ZB1) 14:53 (WEA ZB1) 18:22	06:57 18:22 20:19	05:38 21:13 21:56	05:00 21:56 21:56
11	08:41 16:32 80	13:34 (WEA ZB1) 14:54 (WEA ZB1) 17:29 60	13:52 (WEA ZB1) 14:52 (WEA ZB1) 18:24	06:55 18:24 20:21	05:36 21:15 21:57	05:00 21:57 21:57
12	08:41 16:33 80	13:34 (WEA ZB1) 14:54 (WEA ZB1) 17:31 57	13:53 (WEA ZB1) 14:50 (WEA ZB1) 18:25	06:53 18:25 20:23	05:34 21:17 21:58	04:59 21:58 21:58
13	08:40 16:35 81	13:34 (WEA ZB1) 14:55 (WEA ZB1) 17:33 54	13:55 (WEA ZB1) 14:49 (WEA ZB1) 18:27	06:50 18:27 20:24	05:32 21:18 21:58	04:59 21:58 21:58
14	08:39 16:36 81	13:34 (WEA ZB1) 14:55 (WEA ZB1) 17:35 51	13:57 (WEA ZB1) 14:48 (WEA ZB1) 18:29	06:48 18:29 20:26	05:31 21:20 21:59	04:59 21:59 21:59
15	08:38 16:38 81	13:35 (WEA ZB1) 14:56 (WEA ZB1) 17:37 47	13:59 (WEA ZB1) 14:46 (WEA ZB1) 18:31	06:45 18:31 20:28	05:29 21:22 22:00	04:58 22:00 22:00
16	08:37 16:40 81	13:35 (WEA ZB1) 14:56 (WEA ZB1) 17:39 42	14:02 (WEA ZB1) 14:44 (WEA ZB1) 18:33	06:43 18:33 20:30	05:27 21:23 22:00	04:58 22:00 22:00
17	08:36 16:41 81	13:36 (WEA ZB1) 14:57 (WEA ZB1) 17:41 36	14:05 (WEA ZB1) 14:41 (WEA ZB1) 18:35	06:41 18:35 20:32	05:26 21:25 22:01	04:58 22:01 22:01
18	08:35 16:43 82	13:35 (WEA ZB1) 14:57 (WEA ZB1) 17:43 29	14:08 (WEA ZB1) 14:37 (WEA ZB1) 18:37	06:38 18:37 20:34	05:24 21:27 22:01	04:58 22:01 22:01
19	08:34 16:45 81	13:36 (WEA ZB1) 14:57 (WEA ZB1) 17:45 18	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:36 18:38 20:35	05:23 21:28 22:01	04:58 22:01 22:01
20	08:33 16:47 81	13:37 (WEA ZB1) 14:58 (WEA ZB1) 17:47 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:33 18:40 20:37	05:21 21:30 22:02	04:58 22:02 22:02
21	08:32 16:48 82	13:36 (WEA ZB1) 14:58 (WEA ZB1) 17:49 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:31 18:42 20:39	05:20 21:31 22:02	04:58 22:02 22:02
22	08:30 16:50 81	13:37 (WEA ZB1) 14:58 (WEA ZB1) 17:51 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:28 18:44 20:41	05:18 21:33 22:02	04:58 22:02 22:02
23	08:29 16:52 81	13:37 (WEA ZB1) 14:58 (WEA ZB1) 17:53 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:26 18:46 20:43	05:17 21:34 22:02	04:59 22:02 22:02
24	08:28 16:54 81	13:38 (WEA ZB1) 14:59 (WEA ZB1) 17:55 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:24 18:48 20:45	05:16 21:36 22:02	04:59 22:02 22:02
25	08:26 16:56 80	13:38 (WEA ZB1) 14:58 (WEA ZB1) 17:57 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:21 18:50 20:46	05:14 21:37 22:02	04:59 22:02 22:02
26	08:25 16:58 80	13:39 (WEA ZB1) 14:59 (WEA ZB1) 17:59 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:19 18:51 20:48	05:13 21:39 22:02	05:00 22:02 22:02
27	08:23 16:59 80	13:39 (WEA ZB1) 14:59 (WEA ZB1) 18:01 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:16 18:53 20:50	05:12 21:40 22:02	05:00 22:02 22:02
28	08:22 17:01 79	13:39 (WEA ZB1) 14:58 (WEA ZB1) 18:03 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	06:14 18:55 20:52	05:11 21:42 22:02	05:01 22:02 22:02
29	08:20 17:03 79	13:40 (WEA ZB1) 14:59 (WEA ZB1) 18:05 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	07:11 19:57 20:54	06:00 21:43 22:02	05:01 22:02 22:02
30	08:19 17:05 78	13:41 (WEA ZB1) 14:59 (WEA ZB1) 18:07 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	07:09 19:59 20:55	05:57 21:44 22:02	05:02 22:02 22:02
31	08:17 17:07 77	13:41 (WEA ZB1) 14:58 (WEA ZB1) 18:09 36	14:14 (WEA ZB1) 14:32 (WEA ZB1) 18:38	07:06 20:01 21:45	05:07 21:45 22:02	05:02 22:02 22:02
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung	2709	1100				

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)

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO16 - Westerhausen 9

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September	Oktober		November		Dezember	
1	05:03 22:01	05:42 21:27	06:36 20:21	07:28 19:07		07:26 16:57	13:19 (WEA ZB1)	08:21 16:13	13:16 (WEA ZB1)
2	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05		07:28 16:55	13:19 (WEA ZB1)	08:22 16:13	12:17 (WEA ZB2)
3	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:03		07:30 16:53	13:18 (WEA ZB1)	08:24 16:12	12:13 (WEA ZB2)
4	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00		07:32 16:51	13:17 (WEA ZB1)	08:25 16:11	12:11 (WEA ZB2)
5	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58		07:34 16:50	13:16 (WEA ZB1)	08:27 16:11	12:10 (WEA ZB2)
6	05:07 21:59	05:50 21:17	06:44 20:09	07:37 18:55		07:36 16:48	13:15 (WEA ZB1)	08:28 16:10	12:09 (WEA ZB2)
7	05:08 21:58	05:52 21:15	06:46 20:06	07:39 18:53		07:38 16:46	13:14 (WEA ZB1)	08:29 16:10	12:08 (WEA ZB2)
8	05:09 21:58	05:54 21:14	06:48 20:04	07:41 18:50		07:40 16:44	13:13 (WEA ZB1)	08:31 16:09	12:08 (WEA ZB2)
9	05:10 21:57	05:55 21:12	06:50 20:01	07:43 18:48		07:42 16:42	13:13 (WEA ZB1)	08:32 16:09	12:08 (WEA ZB2)
10	05:11 21:56	05:57 21:10	06:51 19:59	07:45 18:46		07:44 16:41	13:12 (WEA ZB1)	08:33 16:09	12:07 (WEA ZB2)
11	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43		07:45 16:39	13:12 (WEA ZB1)	08:34 16:08	12:07 (WEA ZB2)
12	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41		07:47 16:37	13:13 (WEA ZB1)	08:35 16:08	12:08 (WEA ZB2)
13	05:14 21:53	06:02 21:03	06:57 19:52	07:50 18:39		07:49 16:36	13:12 (WEA ZB1)	08:36 16:08	10:53 (WEA ZB3)
14	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36		07:51 16:34	13:12 (WEA ZB1)	08:37 16:08	10:52 (WEA ZB3)
15	05:17 21:51	06:06 20:59	07:00 19:47	07:54 18:34		07:53 16:32	13:12 (WEA ZB1)	08:38 16:08	10:51 (WEA ZB3)
16	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32		07:55 16:31	13:12 (WEA ZB1)	08:39 16:08	10:51 (WEA ZB3)
17	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29		07:57 16:29	13:12 (WEA ZB1)	08:40 16:08	10:50 (WEA ZB3)
18	05:21 21:48	06:11 20:53	07:05 19:39	08:00 18:27		07:59 16:28	13:12 (WEA ZB1)	08:41 16:09	10:50 (WEA ZB3)
19	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25		08:00 16:27	13:12 (WEA ZB1)	08:41 16:09	10:51 (WEA ZB3)
20	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23		08:02 16:25	13:12 (WEA ZB1)	08:42 16:09	10:51 (WEA ZB3)
21	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20		08:04 16:24	13:12 (WEA ZB1)	08:43 16:10	10:51 (WEA ZB3)
22	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18		08:06 16:23	13:13 (WEA ZB1)	08:43 16:10	10:51 (WEA ZB3)
23	05:28 21:41	06:20 20:42	07:14 19:27	08:09 18:16	14:42 (WEA ZB1)	08:07 16:21	13:13 (WEA ZB1)	08:44 16:11	10:52 (WEA ZB3)
24	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	14:37 (WEA ZB1)	08:09 16:20	13:13 (WEA ZB1)	08:44 16:11	10:53 (WEA ZB3)
25	05:31 21:38	06:23 20:37	07:18 19:22	08:13 17:12	15:09 (WEA ZB1)	08:11 16:19	13:13 (WEA ZB1)	08:45 16:12	10:53 (WEA ZB3)
26	05:32 21:37	06:25 20:35	07:20 19:20	08:15 17:10	13:30 (WEA ZB1)	08:13 16:18	13:13 (WEA ZB1)	08:45 16:13	10:55 (WEA ZB3)
27	05:34 21:35	06:27 20:32	07:21 19:17	08:17 17:08	14:14 (WEA ZB1)	08:14 16:17	13:14 (WEA ZB1)	08:45 16:13	10:56 (WEA ZB3)
28	05:35 21:33	06:29 20:30	07:23 19:15	08:19 17:05	14:16 (WEA ZB1)	08:16 16:16	13:14 (WEA ZB1)	08:45 16:14	10:57 (WEA ZB3)
29	05:37 21:32	06:30 20:28	07:25 19:12	08:20 17:03	14:17 (WEA ZB1)	08:18 16:15	13:15 (WEA ZB1)	08:45 16:15	10:58 (WEA ZB3)
30	05:39 21:30	06:32 20:25	07:27 19:10	08:22 17:01	14:19 (WEA ZB1)	08:19 16:14	13:15 (WEA ZB1)	08:46 16:16	11:00 (WEA ZB3)
31	05:40 21:28	06:34 20:23		08:24 16:59	14:20 (WEA ZB1)		14:35 (WEA ZB1)	08:46 16:17	12:16 (WEA ZB2)
Sonnenscheinstunden	511	459	382	329	14:21 (WEA ZB1)	260		234	14:48 (WEA ZB1)
astr.max.mögl.Beschattung				409		2313		3577	

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO17 - Rüschenstede 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:45		14:27 (WEA ZB1)	08:16	07:19	07:04	05:55	05:06	05:02	05:42	06:36	07:28	07:26					07:28	07:26			08:21		14:20 (WEA ZB1)
	16:18	30	14:57 (WEA ZB1)	17:09	18:04	20:02	20:57	21:47	22:01	21:27	20:21	19:07	16:57					19:07	16:57			16:13	17	14:37 (WEA ZB1)
2	08:45		14:28 (WEA ZB1)	08:14	07:16	07:02	05:53	05:05	05:03	05:44	06:37	07:30	07:28					07:30	07:28			08:22		14:20 (WEA ZB1)
	16:19	30	14:58 (WEA ZB1)	17:11	18:06	20:04	20:59	21:48	22:01	21:25	20:18	19:05	16:55					19:05	16:55			16:13	19	14:39 (WEA ZB1)
3	08:45		14:30 (WEA ZB1)	08:12	07:14	06:59	05:51	05:05	05:04	05:45	06:39	07:32	07:30					07:32	07:30			08:24		14:19 (WEA ZB1)
	16:21	28	14:58 (WEA ZB1)	17:13	18:08	20:06	21:01	21:49	22:01	21:23	20:16	19:02	16:53					19:02	16:53			16:12	21	14:40 (WEA ZB1)
4	08:45		14:30 (WEA ZB1)	08:10	07:12	06:57	05:49	05:04	05:05	05:47	06:41	07:34	07:32					07:34	07:32			08:25		14:18 (WEA ZB1)
	16:22	28	14:58 (WEA ZB1)	17:15	18:10	20:08	21:03	21:50	22:00	21:21	20:13	19:00	16:51					19:00	16:51			16:11	24	14:42 (WEA ZB1)
5	08:45		14:31 (WEA ZB1)	08:09	07:09	06:54	05:47	05:03	05:06	05:49	06:43	07:36	07:34					07:36	07:34			08:27		14:18 (WEA ZB1)
	16:23	27	14:58 (WEA ZB1)	17:17	18:12	20:10	21:04	21:51	22:00	21:19	20:11	18:58	16:50					18:58	16:50			16:11	24	14:42 (WEA ZB1)
6	08:44		14:32 (WEA ZB1)	08:07	07:07	06:52	05:45	05:02	05:07	05:50	06:44	07:37	07:36					07:37	07:36			08:28		14:18 (WEA ZB1)
	16:24	26	14:58 (WEA ZB1)	17:19	18:14	20:12	21:06	21:52	21:59	21:17	20:09	18:55	16:48					18:55	16:48			08:28	26	14:44 (WEA ZB1)
7	08:44		14:33 (WEA ZB1)	08:05	07:05	06:50	05:43	05:02	05:08	05:52	06:46	07:39	07:38					07:39	07:38			08:29		14:17 (WEA ZB1)
	16:26	24	14:57 (WEA ZB1)	17:21	18:16	20:13	21:08	21:53	21:58	21:15	20:06	18:53	16:46					18:53	16:46			16:10	27	14:44 (WEA ZB1)
8	08:43		14:34 (WEA ZB1)	08:03	07:02	06:47	05:41	05:01	05:08	05:54	06:48	07:41	07:40					07:41	07:40			08:31		14:18 (WEA ZB1)
	16:27	24	14:58 (WEA ZB1)	17:23	18:18	20:15	21:10	21:54	21:58	21:14	20:04	18:50	16:44					18:50	16:44			16:09	28	14:46 (WEA ZB1)
9	08:43		14:35 (WEA ZB1)	08:01	07:00	06:45	05:40	05:00	05:10	05:55	06:50	07:43	07:42					07:43	07:42			08:32		14:18 (WEA ZB1)
	16:28	22	14:57 (WEA ZB1)	17:25	18:20	20:17	21:11	21:55	21:57	21:12	20:01	18:48	16:42					18:48	16:42			16:09	28	14:46 (WEA ZB1)
10	08:42		14:37 (WEA ZB1)	07:59	06:57	06:42	05:38	05:00	05:11	05:57	06:51	07:45	07:44					07:45	07:44			08:33		14:18 (WEA ZB1)
	16:30	19	14:56 (WEA ZB1)	17:27	18:22	20:19	21:13	21:56	21:56	21:10	19:59	18:46	16:41					18:46	16:41			16:09	29	14:47 (WEA ZB1)
11	08:41		14:38 (WEA ZB1)	07:57	06:55	06:40	05:36	04:59	05:12	05:59	06:53	07:47	07:45					07:47	07:45			08:34		14:17 (WEA ZB1)
	16:31	17	14:55 (WEA ZB1)	17:29	18:23	20:21	21:15	21:57	21:55	21:07	19:56	18:43	16:39					18:43	16:39			16:08	30	14:47 (WEA ZB1)
12	08:41		14:40 (WEA ZB1)	07:55	06:53	06:38	05:34	04:59	05:13	06:01	06:55	07:48	07:47					06:55	07:48			08:35		14:19 (WEA ZB1)
	16:33	14	14:54 (WEA ZB1)	17:31	18:25	20:23	21:17	21:58	21:54	21:05	19:54	18:41	16:37					18:41	16:37			16:08	30	14:49 (WEA ZB1)
13	08:40		14:42 (WEA ZB1)	07:53	06:50	06:35	05:32	04:57	05:14	06:02	06:57	07:50	07:49					06:57	07:50			08:36		14:19 (WEA ZB1)
	16:35	10	14:52 (WEA ZB1)	17:33	18:27	20:24	21:18	21:58	21:53	21:03	19:52	18:39	16:36					18:39	16:36			16:08		14:49 (WEA ZB1)
14	08:39		14:43 (WEA ZB1)	07:51	06:49	06:33	05:30	04:58	05:15	06:04	06:58	07:52	07:51					06:58	07:52			16:08		14:50 (WEA ZB1)
	16:36		14:45 (WEA ZB1)	17:35	18:29	20:26	21:20	21:59	21:52	21:01	19:49	18:36	16:34					18:36	16:34			16:08	31	14:50 (WEA ZB1)
15	08:38		14:46 (WEA ZB1)	07:49	06:45	06:31	05:29	04:58	05:17	06:06	07:00	07:54	07:53					07:00	07:54			08:38		14:19 (WEA ZB1)
	16:38		14:47 (WEA ZB1)	17:37	18:31	20:28	21:22	22:00	21:51	20:59	19:47	18:34	16:32					19:47	18:34			16:08	32	14:51 (WEA ZB1)
16	08:37		14:48 (WEA ZB1)	07:47	06:43	06:28	05:27	04:58	05:18	06:08	07:02	07:56	07:55					07:02	07:56			08:39		14:20 (WEA ZB1)
	16:40		14:49 (WEA ZB1)	17:39	18:33	20:30	21:23	22:00	21:50	20:57	19:44	18:32	16:31					19:44	18:32			16:08	31	14:51 (WEA ZB1)
17	08:36		14:50 (WEA ZB1)	07:45	06:41	06:26	05:26	04:58	05:19	06:09	07:04	07:58	07:57					07:04	07:58			08:40		14:19 (WEA ZB1)
	16:41		14:51 (WEA ZB1)	17:41	18:35	20:32	21:25	22:01	21:49	20:55	19:42	18:29	16:29					19:42	18:29			16:08	32	14:51 (WEA ZB1)
18	08:35		14:52 (WEA ZB1)	07:43	06:38	06:24	05:24	04:58	05:21	06:11	07:05	08:00	07:59					08:00	07:59			08:41		14:20 (WEA ZB1)
	16:43		14:53 (WEA ZB1)	17:43	18:37	20:34	21:27	22:01	21:48	20:53	19:39	18:27	16:28					19:39	18:27			16:09	32	14:52 (WEA ZB1)
19	08:34		14:54 (WEA ZB1)	07:41	06:36	06:21	05:23	04:58	05:22	06:13	07:07	08:01	08:00					08:01	08:00			08:41		14:20 (WEA ZB1)
	16:45		14:55 (WEA ZB1)	17:45	18:38	20:35	21:28	22:01	21:47	20:50	19:37	18:25	16:27					19:37	18:25			16:09	33	14:53 (WEA ZB1)
20	08:33		14:56 (WEA ZB1)	07:39	06:33	06:19	05:21	04:58	05:23	06:15	07:09	08:03	08:02					08:03	08:02			16:09		14:20 (WEA ZB1)
	16:46		14:57 (WEA ZB1)	17:47	18:40	20:37	21:30	22:02	21:45	20:48	19:34	18:23	16:25					19:34	18:23			16:09	33	14:53 (WEA ZB1)
21	08:32		14:58 (WEA ZB1)	07:37	06:31	06:17	05:20	04:58	05:25	06:16	07:11	08:05	08:04					08:05	08:04			08:43		14:21 (WEA ZB1)
	16:48		14:59 (WEA ZB1)	17:49	18:42	20:39	21:31	22:02	21:44	20:46	19:32	18:20	16:24					19:32	18:20			16:10	32	14:54 (WEA ZB1)
22	08:30		14:59 (WEA ZB1)	07:34	06:28	06:15	05:18	04:58	05:26	06:18	07:12	08:07	08:06					08:07	08:06			08:43		14:21 (WEA ZB1)
	16:50		15:01 (WEA ZB1)	17:51	18:44	20:41	21:33	22:02	21:43	20:44	19:29	18:18	16:23					19:29	18:18			16:10	32	14:53 (WEA ZB1)
23	08:29		15:02 (WEA ZB1)	07:32	06:26	06:12	05:17	04:59	05:28	06:20	07:14	08:09	08:07					08:09	08:07			08:44		14:22 (WEA ZB1)
	16:52		15:03 (WEA ZB1)	17:53	18:46	20:43	21:34	22:02	21:41	20:42	19:27	18:16	16:21					19:27	18:16			16:11	32	14:54 (WEA ZB1)
24	08:28		15:04 (WEA ZB1)	07:30	06:24	06:10	05:15	04:59	05:29	06:22	07:16	08:11	08:09					08:11	08:09			08:44		14:22 (WEA ZB1)
	16:54		15:05 (WEA ZB1)	17:55	18:48	20:45	21:36	22:02	21:40	20:39	19:24	18:14	16:20					19:24	18:14			16:11	33	14:55 (WEA ZB1)
25	08:26		15:06 (WEA ZB1)	07:28	06:21	06:08	05:14	04:59	05:31	06:23	07:18	07:13	08:11					07:13	08:11			08:45		14:23 (WEA ZB1)
	16:56		15:07 (WEA ZB1)	17:57	18:50	20:46	21:37	22:02	21:38	20:37	19:22	17:12	16:19					17:12	16:19			16:12	32	14:55 (WEA ZB1)
26	08:25		15:08 (WEA ZB1)	07:25	06:19	06:06	05:13	05:00	05:32	06:25	07:20	07:15	08:13					07:15	08:13			08:45		14:24 (WEA ZB1)
	16:58		15:09 (WEA ZB1)	17:59	18:51	20:48	21:39	22:02	21:37	20:35	19:20	17:10	16:18					17:10	16:18					

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO18 - Langengroden 1
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 22:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:50 20:13	05:43 21:08	05:02 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	08:00 18:27	07:58 16:28	08:41 16:09
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:23	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:20 19:20	07:15 17:10	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:42	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:01		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO19 - WA Sengwarden BP207
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:21	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:05 21:49	05:04 22:00	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:11 18:10	06:57 20:08	05:49 21:02	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:08 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 21:59	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:07 21:59	05:50 21:17	06:44 20:08	07:37 18:55	07:36 16:48	08:28 16:10
7	08:43 16:26	08:05 17:21	07:04 18:16	06:49 20:13	05:43 21:08	05:02 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:57	05:54 21:13	06:48 20:04	07:41 18:50	07:39 16:44	08:30 16:09
9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:10 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:16	04:59 21:57	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:17 21:51	06:06 20:59	07:00 19:46	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:56 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:26	04:58 22:01	05:20 21:48	06:11 20:52	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:09
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:01	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:23	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:39	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:44 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:36	06:25 20:34	07:19 19:19	07:15 17:10	08:12 16:18	08:45 16:13
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:41	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:53	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:17 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	235
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO2 - Utwarfe 2

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
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31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO20 - Langengrodener Weg 17
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 22:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
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31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO21 - Am Sudring 15
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:
Die Sonne scheint täglich von Sonnenauf- bis -untergang
Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
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25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	04:59 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:10	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO22 - Georg-Adden-Straße 55
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 22:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:12
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:05 22:00	05:48 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:25	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:14	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:39 21:11	05:00 21:55	05:09 21:57	05:55 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:10 21:56	05:57 21:10	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:08
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:00 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:59 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:19 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:08 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	04:59 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:38 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO23 - Hooksiel
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:12
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:05 22:00	05:48 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:10
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:25	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:09
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:39 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	05:10 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:08
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:58	05:13 21:54	06:00 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:08
19	08:34 16:44	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:19 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:27 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:21 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:55	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:58	06:19 18:51	06:06 20:48	05:13 21:39	04:59 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:11 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:38 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO24 - Depenhausen/Pakens 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni		Juli		August		September		Oktober		November		Dezember	
1	08:45	09:52 (WEA ZB3)	08:16	07:19	07:04	05:55	05:06	05:03	05:42	06:36	07:29	07:26	08:21	09:47 (WEA ZB3)										
16:18	93	11:48 (WEA ZB1)	17:09	18:04	20:02	20:57	21:47	22:01	21:27	20:21	19:07	16:57	16:13	67	11:33 (WEA ZB1)									
2	08:45	09:53 (WEA ZB3)	08:14	07:16	07:02	05:53	05:05	05:03	05:44	06:37	07:30	07:28	08:22	09:46 (WEA ZB3)										
16:19	91	11:49 (WEA ZB1)	17:11	18:06	20:04	20:59	21:48	22:01	21:25	20:18	19:05	16:55	16:13	72	11:34 (WEA ZB1)									
3	08:45	09:55 (WEA ZB3)	08:12	07:14	06:59	05:51	05:05	05:04	05:45	06:39	07:32	07:30	08:24	09:44 (WEA ZB3)										
16:21	90	11:50 (WEA ZB1)	17:13	18:08	20:06	21:01	21:49	22:01	21:23	20:16	19:03	16:53	16:12	75	11:34 (WEA ZB1)									
4	08:45	09:55 (WEA ZB3)	08:10	07:12	06:57	05:49	05:04	05:05	05:47	06:41	07:34	07:32	08:25	09:44 (WEA ZB3)										
16:22	87	11:49 (WEA ZB1)	17:15	18:10	20:08	21:03	21:50	22:00	21:21	20:13	19:00	16:51	16:11	78	11:35 (WEA ZB1)									
5	08:45	09:56 (WEA ZB3)	08:09	07:09	06:54	05:47	05:03	05:06	05:49	06:43	07:36	07:34	08:27	09:43 (WEA ZB3)										
16:23	85	11:50 (WEA ZB1)	17:17	18:12	20:10	21:04	21:51	22:00	21:19	20:11	18:58	16:50	16:11	80	11:35 (WEA ZB1)									
6	08:44	09:57 (WEA ZB3)	08:07	07:07	06:52	05:45	05:02	05:07	05:50	06:44	07:38	07:36	08:28	09:43 (WEA ZB3)										
16:24	82	11:50 (WEA ZB1)	17:19	18:14	20:12	21:06	21:52	21:59	21:17	20:09	18:55	16:48	16:10	82	11:36 (WEA ZB1)									
7	08:44	09:58 (WEA ZB3)	08:05	07:05	06:50	05:43	05:02	05:08	05:52	06:46	07:39	07:38	08:29	09:43 (WEA ZB3)										
16:26	80	11:50 (WEA ZB1)	17:21	18:16	20:13	21:08	21:53	21:58	21:15	20:08	18:53	16:46	16:10	83	11:36 (WEA ZB1)									
8	08:43	10:00 (WEA ZB3)	08:03	07:02	06:47	05:40	05:01	05:09	05:54	06:47	07:41	07:40	08:31	09:44 (WEA ZB3)										
16:27	78	11:51 (WEA ZB1)	17:23	18:18	20:15	21:10	21:54	21:58	21:14	20:04	18:51	16:44	16:09	88	11:36 (WEA ZB1)									
9	08:43	10:01 (WEA ZB3)	08:01	07:00	06:45	05:40	05:00	05:10	05:56	06:50	07:43	07:42	08:32	09:43 (WEA ZB3)										
16:29	75	11:51 (WEA ZB1)	17:25	18:20	20:17	21:12	21:55	21:57	21:12	20:01	18:48	16:42	16:09	89	11:38 (WEA ZB1)									
10	08:42	10:03 (WEA ZB3)	07:59	06:58	06:42	05:38	05:00	05:11	05:57	06:51	07:45	07:44	08:33	09:43 (WEA ZB3)										
16:30	72	11:51 (WEA ZB1)	17:27	18:22	20:19	21:13	21:56	21:56	21:10	19:59	18:46	16:41	16:09	90	11:38 (WEA ZB1)									
11	08:41	10:05 (WEA ZB3)	07:57	06:55	06:40	05:36	05:00	05:12	05:59	06:53	07:47	07:45	10:49 (WEA ZB1)	08:34	09:42 (WEA ZB3)									
16:32	67	11:51 (WEA ZB1)	17:29	18:24	20:21	21:15	21:57	21:55	21:08	19:56	18:43	16:39	15	11:04 (WEA ZB1)	08:34	09:42 (WEA ZB3)								
12	08:41	10:51 (WEA ZB1)	07:55	06:53	06:38	05:34	04:59	05:13	06:01	06:55	07:48	07:47	10:46 (WEA ZB1)	08:35	09:43 (WEA ZB3)									
16:33	60	11:51 (WEA ZB1)	17:31	18:25	20:23	21:17	21:58	21:54	21:05	19:54	18:41	16:37	23	11:09 (WEA ZB1)	08:36	09:44 (WEA ZB3)								
13	08:40	10:52 (WEA ZB1)	07:53	06:50	06:35	05:32	04:59	05:14	06:02	06:57	07:50	07:49	10:44 (WEA ZB1)	08:36	09:44 (WEA ZB3)									
16:35	59	11:51 (WEA ZB1)	17:33	18:27	20:24	21:18	21:58	21:53	21:03	19:52	18:39	16:36	28	11:12 (WEA ZB1)	08:37	09:44 (WEA ZB3)								
14	08:39	10:53 (WEA ZB1)	07:51	06:48	06:33	05:31	04:59	05:15	06:04	06:58	07:52	07:51	10:42 (WEA ZB1)	08:37	09:44 (WEA ZB3)									
16:36	58	11:51 (WEA ZB1)	17:35	18:29	20:26	21:20	21:59	21:52	21:01	19:49	18:36	16:34	33	11:15 (WEA ZB1)	08:38	09:44 (WEA ZB3)								
15	08:38	10:53 (WEA ZB1)	07:49	06:45	06:31	05:29	04:58	05:17	06:06	07:00	07:54	07:53	10:40 (WEA ZB1)	08:38	09:44 (WEA ZB3)									
16:38	58	11:51 (WEA ZB1)	17:37	18:31	20:28	21:22	22:00	21:51	21:09	19:47	18:34	16:32	37	11:17 (WEA ZB1)	08:39	09:45 (WEA ZB3)								
16	08:37	10:54 (WEA ZB1)	07:47	06:43	06:28	05:27	04:58	05:18	06:08	07:02	07:56	07:55	10:39 (WEA ZB1)	08:39	09:45 (WEA ZB3)									
17	08:36	10:55 (WEA ZB1)	07:45	06:41	06:26	05:24	04:58	05:19	06:09	07:04	07:58	07:57	10:38 (WEA ZB1)	08:40	09:44 (WEA ZB3)									
16:41	56	11:51 (WEA ZB1)	17:41	18:35	20:32	21:25	22:01	21:49	20:55	19:42	18:29	16:29	42	11:20 (WEA ZB1)	08:40	09:44 (WEA ZB3)								
18	08:35	10:56 (WEA ZB1)	07:43	06:38	06:24	05:24	04:58	05:21	06:11	07:05	08:00	07:59	10:37 (WEA ZB1)	08:41	09:45 (WEA ZB3)									
16:43	54	11:50 (WEA ZB1)	17:43	18:37	20:34	21:27	22:01	21:48	20:53	19:39	18:27	16:28	44	11:21 (WEA ZB1)	08:41	09:45 (WEA ZB3)								
19	08:34	10:57 (WEA ZB1)	07:41	06:36	06:22	05:23	04:58	05:22	06:13	07:07	08:01	08:00	10:36 (WEA ZB1)	08:41	09:45 (WEA ZB3)									
16:45	53	11:50 (WEA ZB1)	17:45	18:38	20:35	21:28	22:01	21:47	20:50	19:37	18:25	16:27	47	11:23 (WEA ZB1)	08:42	09:45 (WEA ZB3)								
20	08:33	10:58 (WEA ZB1)	07:39	06:33	06:19	05:21	04:58	05:23	06:15	07:09	08:03	08:02	10:35 (WEA ZB1)	08:42	09:45 (WEA ZB3)									
16:47	52	11:50 (WEA ZB1)	17:47	18:40	20:37	21:30	22:02	21:45	20:48	19:34	18:23	16:25	49	11:24 (WEA ZB1)	08:43	09:46 (WEA ZB3)								
21	08:32	10:59 (WEA ZB1)	07:37	06:31	06:17	05:20	04:58	05:25	06:16	07:11	08:05	08:04	10:35 (WEA ZB1)	08:43	09:46 (WEA ZB3)									
16:48	50	11:49 (WEA ZB1)	17:49	18:42	20:39	21:31	22:02	21:44	20:46	19:32	18:20	16:24	50	11:25 (WEA ZB1)	08:44	09:46 (WEA ZB3)								
22	08:30	11:00 (WEA ZB1)	07:34	06:28	06:15	05:18	04:58	05:26	06:18	07:13	08:07	08:06	10:34 (WEA ZB1)	08:43	09:46 (WEA ZB3)									
16:50	49	11:49 (WEA ZB1)	17:51	18:44	20:41	21:33	22:02	21:43	20:44	19:29	18:18	16:23	52	11:26 (WEA ZB1)	08:44	09:46 (WEA ZB3)								
23	08:29	11:01 (WEA ZB1)	07:32	06:26	06:13	05:17	04:59	05:28	06:20	07:14	08:09	08:08	10:34 (WEA ZB1)	08:44	09:47 (WEA ZB3)									
16:52	47	11:48 (WEA ZB1)	17:53	18:46	20:43	21:34	22:02	21:44	20:45	19:32	18:16	16:21	53	11:27 (WEA ZB1)	08:44	09:47 (WEA ZB3)								
24	08:28	11:03 (WEA ZB1)	07:30	06:24	06:10	05:16	04:59	05:29	06:22	07:16	08:11	08:09	10:34 (WEA ZB1)	08:44	09:47 (WEA ZB3)									
16:54	44	11:47 (WEA ZB1)	17:55	18:48	20:45	21:36	22:02	21:40	20:39	19:25	18:14	16:20	54	11:28 (WEA ZB1)	08:45	09:48 (WEA ZB3)								
25	08:26	11:04 (WEA ZB1)	07:28	06:21	06:08	05:14	04:59	05:31	06:23	07:18	08:13	08:11	10:34 (WEA ZB1)	08:45	09:48 (WEA ZB3)									
16:56	42	11:46 (WEA ZB1)	17:57	18:50	20:46	21:37	22:02	21:38	20:37	19:22	18:12	16:19	55	11:29 (WEA ZB1)	08:45	09:48 (WEA ZB3)								
26	08:25	11:06 (WEA ZB1)	07:25	06:19	06:06	05:13	05:00	05:32	06:25	07:20	08:15	08:13	10:33 (WEA ZB1)	08:45	09:49 (WEA ZB3)									
16:58	39	11:45 (WEA ZB1)	17:59	18:51	20:48	21:39	22:02	21:37	20:35	19:20	18:10	16:18	56	11:29 (WEA ZB1)	08:45	09:49 (WEA ZB3)								
27	08:24	11:07 (WEA ZB1)	07:23	06:16	06:04	05:12	05:00	05:34	06:27	07:21	08:17	08:14	10:33 (WEA ZB1)	08:45	09:49 (WEA ZB3)									
17:00	37	11:44 (WEA ZB1)	18:01	18:53	20:50	21:40	22:02	21:35	20:32	19:17	18:08	16:17	57	11:30 (WEA ZB1)	08:46	09:50 (WEA ZB3)								
28	08:22	11:09 (WEA ZB1)	07:21	06:14	06:02	05:11	05:01	05:35	06:29	07:23	08:19	08:16	10:33 (WEA ZB1)	08:45	09:50 (WEA ZB3)									
17:01	33	11:42 (WEA ZB1)	18:03	18:55	20:52	21:42	22:02	21:33	20:30	19:15	18:05	16:16	58	11:31 (WEA ZB1)	08:46	09:51 (WEA ZB3)								
29	08:20	11:12 (WEA ZB1)	07:19	06:11	06:00	05:09	05:01	05:37	06:30	07:25	08:20	08:18	10:33 (WEA ZB1)	08:45	09:51 (WEA ZB3)									
17:03	28	11:40 (WEA ZB1)	18:04	18:57	20:54	21:43	22:02	21:32	20:28	19:12	18:03	16:15	59	11:32 (WEA ZB1)	08:46	09:51 (WEA ZB3)								
30	08:19	11:15 (WEA ZB1)	07:17	06:09	05:57	05:08	05:02	05:39	06:32	07:27	08:22	08:19	10:32 (WEA ZB1)	08:46	09:51 (WEA ZB3)									
17:05	22	11:37 (WEA ZB1)	18:06	18:59	20:55	21:44	22:02	21:30	20:25	19:10	18:01	16:14	60	11:32 (WEA ZB1)	08:46	09:51 (WEA ZB3)								
31	08:17	11:19 (WEA ZB1)	07:15	06:07	05:55	05:06	05:03	05:40	06:34	07:29	08:24	08:21	10:32 (WEA ZB1)	08:46	09:52 (WEA ZB3)									
17:07	14	11:33 (WEA ZB1)	18:07	18:59	20:56	21:45	22:03	21:28	20:23	19:08	18:00	16:17	61	11:33 (WEA ZB1)	08:47	09:52 (WEA ZB3)								
Sonnenscheinstunden	251		274	367	420	493	509	511	459	382	329	260	911	2825										
ast mit mgl. Beschattung	1812		201	201	201	201	201	201	201	201	201	201	201	201										

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO25 - Tain 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:46 16:18	08:16 17:09	08:43 (WEA ZB3) 09:08 (WEA ZB2)	07:19 18:05	08:14 (WEA ZB1) 20:02	05:55 20:57
2	08:45 16:20	08:14 17:11	08:41 (WEA ZB3) 09:09 (WEA ZB2)	07:16 18:06	08:16 (WEA ZB1) 20:04	05:53 20:59
3	08:45 16:21	08:12 17:13	08:40 (WEA ZB3) 09:10 (WEA ZB2)	07:14 18:08	08:17 (WEA ZB1) 20:06	05:51 21:01
4	08:45 16:22	08:11 17:15	08:38 (WEA ZB3) 09:10 (WEA ZB2)	07:12 18:10	08:21 (WEA ZB1) 20:08	05:49 21:03
5	08:45 16:23	08:09 17:17	08:36 (WEA ZB3) 09:10 (WEA ZB2)	07:09 18:12	08:34 (WEA ZB1) 20:10	05:47 21:04
6	08:44 16:24	08:07 17:19	08:36 (WEA ZB3) 09:09 (WEA ZB2)	07:07 18:14	06:52 20:12	05:45 21:06
7	08:44 16:26	08:05 17:21	08:32 (WEA ZB1) 09:09 (WEA ZB2)	07:05 18:16	06:50 20:13	05:44 21:08
8	08:43 16:27	08:03 17:23	08:30 (WEA ZB1) 09:09 (WEA ZB2)	07:02 18:18	06:47 20:15	05:42 21:10
9	08:43 16:29	08:01 17:25	08:28 (WEA ZB1) 09:08 (WEA ZB2)	07:00 18:20	06:45 20:17	05:40 21:12
10	08:42 16:30	07:59 17:27	08:26 (WEA ZB1) 09:07 (WEA ZB2)	06:58 18:22	06:42 20:19	05:38 21:13
11	08:41 16:32	07:57 17:29	08:24 (WEA ZB1) 09:06 (WEA ZB2)	06:55 18:24	06:40 20:21	05:36 21:15
12	08:41 16:33	07:55 17:31	08:22 (WEA ZB1) 09:05 (WEA ZB2)	06:53 18:25	06:38 20:23	05:34 21:17
13	08:40 16:35	07:53 17:33	08:19 (WEA ZB1) 09:02 (WEA ZB2)	06:50 18:27	06:35 20:24	05:33 21:18
14	08:39 16:36	07:51 17:35	08:17 (WEA ZB1) 08:58 (WEA ZB2)	06:48 18:29	06:33 20:26	05:31 21:20
15	08:38 16:38	07:49 17:37	08:15 (WEA ZB1) 08:47 (WEA ZB1)	06:46 18:31	06:31 20:28	05:29 21:22
16	08:37 16:40	07:47 17:39	08:13 (WEA ZB1) 08:48 (WEA ZB1)	06:43 18:33	06:28 20:30	05:27 21:23
17	08:36 16:41	07:45 17:41	08:11 (WEA ZB1) 08:48 (WEA ZB1)	06:41 18:35	06:26 20:32	05:26 21:25
18	08:35 16:43	07:43 17:43	08:10 (WEA ZB1) 08:48 (WEA ZB1)	06:38 18:37	06:24 20:34	05:24 21:27
19	08:34 16:45	07:41 17:45	08:10 (WEA ZB1) 08:48 (WEA ZB1)	06:36 18:39	06:22 20:35	05:23 21:28
20	08:33 16:47	07:39 17:47	08:10 (WEA ZB1) 08:48 (WEA ZB1)	06:33 18:40	06:19 20:37	05:21 21:30
21	08:32 16:48	07:37 17:49	08:11 (WEA ZB1) 08:48 (WEA ZB1)	06:31 18:42	06:17 20:39	05:20 21:31
22	08:30 16:50	07:34 17:51	08:10 (WEA ZB1) 08:48 (WEA ZB1)	06:28 18:44	06:15 20:41	05:18 21:33
23	08:29 16:52	07:32 17:53	08:10 (WEA ZB1) 08:47 (WEA ZB1)	06:26 18:46	06:13 20:43	05:17 21:34
24	08:28 16:54	07:30 17:55	08:11 (WEA ZB1) 08:47 (WEA ZB1)	06:24 18:48	06:10 20:45	05:16 21:36
25	08:26 16:56	07:28 17:57	08:12 (WEA ZB1) 08:47 (WEA ZB1)	06:21 18:50	06:08 20:46	05:14 21:37
26	08:25 16:58	07:26 17:59	08:11 (WEA ZB1) 08:45 (WEA ZB1)	06:19 18:51	06:06 20:48	05:13 21:39
27	08:24 17:00	07:23 18:01	08:13 (WEA ZB1) 08:45 (WEA ZB1)	06:16 18:53	06:04 20:50	05:12 21:40
28	08:22 17:01	07:21 18:03	08:13 (WEA ZB1) 08:43 (WEA ZB1)	06:14 18:55	06:02 20:52	05:11 21:42
29	08:21 17:03	07:19 18:05	08:11 (WEA ZB1) 08:41 (WEA ZB1)	06:11 18:57	06:00 20:54	05:10 21:43
30	08:19 17:05	07:17 18:03	08:10 (WEA ZB1) 08:40 (WEA ZB1)	06:09 19:00	05:58 20:56	05:08 21:44
31	08:17 17:07	07:15 18:01	08:09 (WEA ZB1) 08:39 (WEA ZB1)	06:07 19:02	05:56 20:58	05:06 21:46
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung	117	992	84			

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)

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO25 - Tain 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:
Die Sonne scheint täglich von Sonnenauf- bis -untergang
Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober		November	Dezember
1	05:03	05:42	06:36	07:29		07:26	07:56 (WEA ZB1) 08:21
	22:02	21:27	20:21	19:07		16:57	41 08:37 (WEA ZB2) 16:13
2	05:03	05:44	06:38	07:30		07:28	07:58 (WEA ZB1) 08:22
	22:01	21:25	20:18	19:05		16:55	40 08:38 (WEA ZB2) 16:13
3	05:04	05:45	06:39	07:32		07:30	08:00 (WEA ZB1) 08:24
	22:01	21:23	20:16	19:03		16:53	38 08:38 (WEA ZB2) 16:12
4	05:05	05:47	06:41	07:34		07:32	08:02 (WEA ZB1) 08:25
	22:00	21:21	20:13	19:00		16:52	34 08:39 (WEA ZB2) 16:11
5	05:06	05:49	06:43	07:36		07:34	08:05 (WEA ZB3) 08:27
	22:00	21:19	20:11	18:58		16:50	34 08:39 (WEA ZB2) 16:11
6	05:07	05:50	06:45	07:38		07:36	08:06 (WEA ZB3) 08:28
	21:59	21:17	20:09	18:55		16:48	33 08:39 (WEA ZB2) 16:10
7	05:08	05:52	06:46	07:39		07:38	08:08 (WEA ZB3) 08:29
	21:58	21:16	20:06	18:53		16:46	31 08:39 (WEA ZB2) 16:10
8	05:09	05:54	06:48	07:41		07:40	08:10 (WEA ZB3) 08:31
	21:58	21:14	20:04	18:51		16:44	29 08:39 (WEA ZB2) 16:09
9	05:10	05:56	06:50	07:43	08:59 (WEA ZB1)	07:42	08:12 (WEA ZB3) 08:32
	21:57	21:12	20:01	18:48	7 09:06 (WEA ZB1)	16:42	27 08:39 (WEA ZB2) 16:09
10	05:11	05:57	06:52	07:45	08:53 (WEA ZB1)	07:44	08:14 (WEA ZB3) 08:33
	21:56	21:10	19:59	18:46	16 09:09 (WEA ZB1)	16:41	25 08:39 (WEA ZB2) 16:09
11	05:12	05:59	06:53	07:47	08:50 (WEA ZB1)	07:45	08:17 (WEA ZB3) 08:34
	21:55	21:08	19:57	18:43	22 09:12 (WEA ZB1)	16:39	23 08:40 (WEA ZB2) 16:09
12	05:13	06:01	06:55	07:48	08:48 (WEA ZB1)	07:47	08:19 (WEA ZB3) 08:35
	21:54	21:06	19:54	18:41	26 09:14 (WEA ZB1)	16:37	21 08:40 (WEA ZB2) 16:08
13	05:14	06:02	06:57	07:50	08:47 (WEA ZB1)	07:49	08:21 (WEA ZB3) 08:36
	21:53	21:03	19:52	18:39	28 09:15 (WEA ZB1)	16:36	18 08:39 (WEA ZB2) 16:08
14	05:15	06:04	06:59	07:52	08:45 (WEA ZB1)	07:51	08:23 (WEA ZB3) 08:37
	21:52	21:01	19:49	18:36	31 09:16 (WEA ZB1)	16:34	16 08:39 (WEA ZB2) 16:08
15	05:17	06:06	07:00	07:54	08:44 (WEA ZB1)	07:53	08:25 (WEA ZB2) 08:38
	21:51	20:59	19:47	18:34	33 09:17 (WEA ZB1)	16:32	13 08:38 (WEA ZB2) 16:08
16	05:18	06:08	07:02	07:56	08:43 (WEA ZB1)	07:55	08:27 (WEA ZB2) 08:39
	21:50	20:57	19:44	18:32	35 09:18 (WEA ZB1)	16:31	11 08:38 (WEA ZB2) 16:08
17	05:19	06:09	07:04	07:58	08:43 (WEA ZB1)	07:57	08:29 (WEA ZB2) 08:40
	21:49	20:55	19:42	18:30	35 09:18 (WEA ZB1)	16:29	8 08:37 (WEA ZB2) 16:08
18	05:21	06:11	07:06	08:00	08:42 (WEA ZB1)	07:59	08:31 (WEA ZB2) 08:41
	21:48	20:53	19:39	18:27	37 09:19 (WEA ZB1)	16:28	5 08:36 (WEA ZB2) 16:09
19	05:22	06:13	07:07	08:01	08:41 (WEA ZB1)	08:00	08:33 (WEA ZB2) 08:42
	21:47	20:51	19:37	18:25	38 09:19 (WEA ZB1)	16:27	2 08:35 (WEA ZB2) 16:09
20	05:23	06:15	07:09	08:03	08:41 (WEA ZB1)	08:02	08:42
	21:45	20:48	19:34	18:23	38 09:19 (WEA ZB1)	16:25	16:09
21	05:25	06:16	07:11	08:05	08:41 (WEA ZB1)	08:04	08:43
	21:44	20:46	19:32	18:21	38 09:19 (WEA ZB1)	16:24	16:10
22	05:26	06:18	07:13	08:07	08:41 (WEA ZB1)	08:06	08:43
	21:43	20:44	19:29	18:18	38 09:19 (WEA ZB1)	16:23	16:10
23	05:28	06:20	07:14	08:09	08:41 (WEA ZB1)	08:08	08:44
	21:41	20:42	19:27	18:16	37 09:18 (WEA ZB1)	16:21	16:11
24	05:29	06:22	07:16	08:11	08:41 (WEA ZB1)	08:09	08:44
	21:40	20:39	19:25	18:14	37 09:18 (WEA ZB1)	16:20	16:11
25	05:31	06:23	07:18	07:13	07:41 (WEA ZB1)	08:11	08:45
	21:38	20:37	19:22	17:12	37 08:18 (WEA ZB1)	16:19	16:12
26	05:32	06:25	07:20	07:15	07:43 (WEA ZB1)	08:13	08:45
	21:37	20:35	19:20	17:10	34 08:17 (WEA ZB1)	16:18	16:13
27	05:34	06:27	07:21	07:17	07:45 (WEA ZB1)	08:14	08:45
	21:35	20:32	19:17	17:08	31 08:16 (WEA ZB1)	16:17	16:13
28	05:36	06:29	07:23	07:19	07:47 (WEA ZB1)	08:16	08:45
	21:33	20:30	19:15	17:05	37 08:29 (WEA ZB2) 16:16		16:14
29	05:37	06:31	07:25	07:21	07:49 (WEA ZB1) 08:18		08:46
	21:32	20:28	19:12	17:03	40 08:32 (WEA ZB2) 16:15		16:15
30	05:39	06:32	07:27	07:22	07:51 (WEA ZB1) 08:19		08:46
	21:30	20:25	19:10	17:01	42 08:34 (WEA ZB2) 16:14		16:16
31	05:40	06:34		07:24	07:53 (WEA ZB1)		08:46
	21:28	20:23		16:59	42 08:35 (WEA ZB2)		16:17
Sonnenscheinstunden	511	459	382	329		260	234
astr.max.mögl.Beschattung				759		449	

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO26 - Waterpott 1
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:46 16:18	08:16 17:09	07:19 18:05	07:45 (WEA ZB2) 20:02	07:54 (WEA ZB1) 20:57	05:55 21:47
2	08:45 16:20	08:14 17:11	07:16 18:06	07:46 (WEA ZB2) 20:04	07:55 (WEA ZB1) 20:59	05:53 21:48
3	08:45 16:21	08:12 17:13	07:14 18:08	07:45 (WEA ZB2) 20:06	07:56 (WEA ZB1) 21:01	05:51 21:49
4	08:45 16:22	08:11 17:15	07:12 18:10	07:46 (WEA ZB2) 20:08	07:57 (WEA ZB1) 21:03	05:49 21:50
5	08:45 16:23	08:09 17:17	07:09 18:12	07:47 (WEA ZB2) 20:10	08:00 (WEA ZB1) 21:04	05:47 21:51
6	08:44 16:24	08:07 17:19	07:07 18:14	07:47 (WEA ZB2) 20:12	08:16 (WEA ZB1) 21:06	05:45 21:52
7	08:44 16:26	08:05 17:21	07:05 18:16	07:48 (WEA ZB2) 20:13	08:05 (WEA ZB1) 21:08	05:44 21:53
8	08:43 16:27	08:03 17:23	07:02 18:18	07:49 (WEA ZB2) 20:15	08:12 (WEA ZB1) 21:10	05:42 21:54
9	08:43 16:29	08:01 17:25	07:00 18:20	07:51 (WEA ZB2) 20:17	08:08 (WEA ZB1) 21:12	05:40 21:55
10	08:42 16:30	07:59 17:27	06:58 18:22	07:53 (WEA ZB2) 20:19	08:04 (WEA ZB1) 21:13	05:38 21:56
11	08:41 16:32	07:57 17:29	06:55 18:24	08:04 (WEA ZB2) 20:21	08:00 (WEA ZB1) 21:15	05:36 21:57
12	08:41 16:33	07:55 17:31	06:53 18:25	08:04 (WEA ZB2) 20:23	08:00 (WEA ZB1) 21:17	05:34 21:58
13	08:40 16:35	07:53 17:33	06:50 18:27	07:14 (WEA ZB1) 20:24	08:00 (WEA ZB1) 21:18	05:33 21:58
14	08:39 16:36	07:51 17:35	06:48 18:29	07:23 (WEA ZB1) 20:26	08:00 (WEA ZB1) 21:20	05:31 21:59
15	08:38 16:38	07:49 17:37	06:46 18:31	07:12 (WEA ZB1) 20:28	08:00 (WEA ZB1) 21:22	05:29 22:00
16	08:37 16:40	07:47 17:39	06:43 18:33	07:09 (WEA ZB1) 20:30	08:00 (WEA ZB1) 21:23	05:27 22:00
17	08:36 16:41	07:45 17:41	06:41 18:35	07:28 (WEA ZB1) 20:32	08:00 (WEA ZB1) 21:25	05:26 22:01
18	08:35 16:43	07:43 17:43	06:38 18:37	07:30 (WEA ZB1) 20:34	08:00 (WEA ZB1) 21:27	05:24 22:01
19	08:34 16:45	07:41 17:45	06:36 18:39	07:02 (WEA ZB1) 20:36	08:00 (WEA ZB1) 21:29	05:23 22:01
20	08:33 16:47	07:39 17:47	06:33 18:40	07:31 (WEA ZB1) 20:38	08:00 (WEA ZB1) 21:31	05:22 22:02
21	08:32 16:48	07:37 17:49	06:31 18:42	07:32 (WEA ZB1) 20:40	08:00 (WEA ZB1) 21:33	05:21 22:02
22	08:30 16:50	07:34 17:51	06:29 18:44	07:32 (WEA ZB1) 20:42	08:00 (WEA ZB1) 21:35	05:19 22:02
23	08:29 16:52	07:32 17:53	06:26 18:46	07:32 (WEA ZB1) 20:44	08:00 (WEA ZB1) 21:37	05:17 22:02
24	08:28 16:54	07:30 17:55	06:24 18:48	07:33 (WEA ZB1) 20:46	08:00 (WEA ZB1) 21:39	05:16 22:02
25	08:26 16:56	07:28 17:57	06:21 18:50	07:32 (WEA ZB1) 20:48	08:00 (WEA ZB1) 21:41	05:14 22:03
26	08:25 16:58	07:26 17:59	06:19 18:51	07:32 (WEA ZB1) 20:50	08:00 (WEA ZB1) 21:43	05:13 22:03
27	08:24 17:00	07:23 18:01	06:16 18:53	07:31 (WEA ZB1) 20:52	08:00 (WEA ZB1) 21:45	05:12 22:02
28	08:22 17:01	07:21 18:03	06:14 18:55	07:31 (WEA ZB1) 20:54	08:00 (WEA ZB1) 21:47	05:11 22:02
29	08:20 17:03		07:11 19:57	07:32 (WEA ZB1) 20:56	08:00 (WEA ZB1) 21:49	05:10 22:02
30	08:19 17:05		07:09 19:59	07:32 (WEA ZB1) 20:58	08:00 (WEA ZB1) 21:51	05:08 22:02
31	08:17 17:07		07:07 20:01	07:53 (WEA ZB1) 21:00	08:00 (WEA ZB1) 21:53	05:07 22:02
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung		215	851	132		

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO26 - Waterpott 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September		Oktober		November	Dezember
1	05:03	05:42	06:36		07:29	07:55 (WEA ZB1)	07:26	08:21
	22:02	21:27	20:21		19:07	08:00 (WEA ZB1)	16:57	16:14
2	05:03	05:44	06:38		07:30		07:28	08:22
	22:01	21:25	20:18		19:05		16:55	16:13
3	05:04	05:45	06:39		07:32	08:33 (WEA ZB2)	07:30	08:24
	22:01	21:23	20:16		19:03	08:40 (WEA ZB2)	16:53	16:12
4	05:05	05:47	06:41		07:34	08:29 (WEA ZB2)	07:32	08:25
	22:00	21:21	20:13		19:00	08:44 (WEA ZB2)	16:52	16:11
5	05:06	05:49	06:43		07:36	08:26 (WEA ZB2)	07:34	08:27
	22:00	21:19	20:11		18:58	08:46 (WEA ZB2)	16:50	16:11
6	05:07	05:50	06:45	08:01 (WEA ZB1)	07:38	08:25 (WEA ZB2)	07:36	08:28
	21:59	21:17	20:09	5	08:06 (WEA ZB1)	08:48 (WEA ZB2)	16:48	16:10
7	05:08	05:52	06:46		07:39	08:23 (WEA ZB2)	07:38	08:29
	21:58	21:16	20:06	16	08:11 (WEA ZB1)	08:49 (WEA ZB2)	16:46	16:10
8	05:09	05:54	06:48		07:41	08:22 (WEA ZB2)	07:40	08:31
	21:58	21:14	20:04	21	08:14 (WEA ZB1)	08:49 (WEA ZB2)	16:44	16:09
9	05:10	05:56	06:50		07:43	08:21 (WEA ZB2)	07:42	08:32
	21:57	21:12	20:01	25	08:15 (WEA ZB1)	08:50 (WEA ZB2)	16:42	16:09
10	05:11	05:57	06:52		07:45	08:20 (WEA ZB2)	07:44	08:33
	21:56	21:10	19:59	29	08:17 (WEA ZB1)	08:49 (WEA ZB2)	16:41	16:09
11	05:12	05:59	06:53		07:47	08:19 (WEA ZB2)	07:45	08:34
	21:55	21:08	19:57	31	08:18 (WEA ZB1)	08:50 (WEA ZB2)	16:39	16:09
12	05:13	06:01	06:55		07:48	08:19 (WEA ZB2)	07:47	08:35
	21:54	21:05	19:54	33	08:19 (WEA ZB1)	08:50 (WEA ZB2)	16:37	16:08
13	05:14	06:02	06:57		07:50	08:18 (WEA ZB2)	07:49	08:36
	21:53	21:03	19:52	35	08:19 (WEA ZB1)	08:50 (WEA ZB2)	16:36	16:08
14	05:15	06:04	06:59		07:52	08:19 (WEA ZB2)	07:51	08:37
	21:52	21:01	19:49	36	08:19 (WEA ZB1)	08:49 (WEA ZB2)	16:34	16:08
15	05:17	06:06	07:00		07:54	08:21 (WEA ZB2)	07:53	08:38
	21:51	20:59	19:47	38	08:20 (WEA ZB1)	08:49 (WEA ZB2)	16:32	16:08
16	05:18	06:08	07:02		07:56	08:23 (WEA ZB2)	07:55	08:39
	21:50	20:57	19:44	38	08:19 (WEA ZB1)	08:48 (WEA ZB3)	16:31	16:08
17	05:19	06:09	07:04		07:58	08:25 (WEA ZB3)	07:57	08:40
	21:49	20:55	19:42	39	08:20 (WEA ZB1)	08:48 (WEA ZB3)	16:29	16:09
18	05:21	06:11	07:06		08:00	08:27 (WEA ZB3)	07:59	08:41
	21:48	20:53	19:39	40	08:20 (WEA ZB1)	08:48 (WEA ZB3)	16:28	16:09
19	05:22	06:13	07:07		08:01	08:29 (WEA ZB3)	08:00	08:42
	21:47	20:51	19:37	40	08:20 (WEA ZB1)	08:48 (WEA ZB3)	16:27	16:09
20	05:23	06:15	07:09		08:03	08:31 (WEA ZB3)	08:02	08:42
	21:45	20:48	19:34	39	08:18 (WEA ZB1)	08:48 (WEA ZB3)	16:25	16:09
21	05:25	06:16	07:11		08:05	08:33 (WEA ZB3)	08:04	08:43
	21:44	20:46	19:32	39	08:18 (WEA ZB1)	08:47 (WEA ZB3)	16:24	16:10
22	05:26	06:18	07:13		08:07	08:35 (WEA ZB3)	08:06	08:43
	21:43	20:44	19:29	38	08:18 (WEA ZB1)	08:46 (WEA ZB3)	16:23	16:10
23	05:28	06:20	07:14		08:09	08:37 (WEA ZB3)	08:08	08:44
	21:41	20:42	19:27	36	08:17 (WEA ZB1)	08:46 (WEA ZB3)	16:21	16:11
24	05:29	06:22	07:16		08:11	08:39 (WEA ZB3)	08:09	08:44
	21:40	20:39	19:25	33	08:15 (WEA ZB1)	08:44 (WEA ZB3)	16:20	16:11
25	05:31	06:23	07:18		07:13	07:41 (WEA ZB3)	08:11	08:45
	21:38	20:37	19:22	30	08:14 (WEA ZB1)	07:43 (WEA ZB3)	16:19	16:12
26	05:32	06:25	07:20		07:15		08:13	08:45
	21:37	20:35	19:20	27	08:13 (WEA ZB1)		16:18	16:13
27	05:34	06:27	07:21		07:17		08:14	08:45
	21:35	20:32	19:17	24	08:12 (WEA ZB1)		16:17	16:13
28	05:36	06:29	07:23		07:19		08:16	08:45
	21:33	20:30	19:15	20	08:09 (WEA ZB1)		16:16	16:14
29	05:37	06:31	07:25		07:20		08:18	08:45
	21:32	20:28	19:12	16	08:07 (WEA ZB1)		16:15	16:15
30	05:39	06:32	07:27		07:22		08:19	08:46
	21:30	20:25	19:10	11	08:04 (WEA ZB1)		16:14	16:16
31	05:40	06:34			07:24			08:46
	21:28	20:23			16:59			16:17
Sonnenscheinstunden	511	459	382		329		260	234
astr.max.mögl.Beschattung			739		479			

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO27 - Klein Depenhäusen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45	08:16	07:19	07:43 (WEA ZB3)	07:04	05:55
	16:18	17:09	18:05	8 07:51 (WEA ZB3)	20:02	20:57
2	08:45	08:14	07:16	07:41 (WEA ZB3)	07:02	05:53
	16:20	17:11	18:06	11 07:52 (WEA ZB3)	20:04	20:59
3	08:45	08:12	07:14	07:38 (WEA ZB3)	06:59	05:51
	16:21	17:13	18:08	15 07:53 (WEA ZB3)	20:06	21:01
4	08:45	08:10	07:12	07:36 (WEA ZB3)	06:57	05:49
	16:22	17:15	18:10	18 07:54 (WEA ZB3)	20:08	21:03
5	08:45	08:09	07:09	07:34 (WEA ZB3)	06:54	05:47
	16:23	17:17	18:12	20 07:54 (WEA ZB3)	20:10	21:04
6	08:44	08:07	07:07	07:31 (WEA ZB3)	06:52	05:45
	16:24	17:19	18:14	23 07:54 (WEA ZB3)	20:12	21:06
7	08:44	08:05	07:05	07:29 (WEA ZB3)	06:50	05:44
	16:26	17:21	18:16	25 07:54 (WEA ZB3)	20:13	21:08
8	08:43	08:03	07:02	07:26 (WEA ZB3)	06:47	05:42
	16:27	17:23	18:18	28 07:54 (WEA ZB3)	20:15	07:11 (WEA ZB1)
9	08:43	08:01	07:00	07:24 (WEA ZB2)	06:45	07:21 (WEA ZB1)
	16:29	17:25	18:20	30 07:54 (WEA ZB3)	20:17	07:09 (WEA ZB1)
10	08:42	07:59	06:58	07:21 (WEA ZB2)	06:43	07:25 (WEA ZB1)
	16:30	17:27	18:22	31 07:52 (WEA ZB3)	20:19	07:06 (WEA ZB1)
11	08:41	07:57	06:55	07:19 (WEA ZB2)	06:40	07:27 (WEA ZB1)
	16:32	17:29	18:24	33 07:52 (WEA ZB3)	20:21	07:04 (WEA ZB1)
12	08:41	07:55	06:53	07:17 (WEA ZB2)	06:38	07:29 (WEA ZB1)
	16:33	17:31	18:25	34 07:51 (WEA ZB3)	20:23	07:02 (WEA ZB1)
13	08:40	07:53	06:50	07:14 (WEA ZB2)	06:35	07:31 (WEA ZB1)
	16:35	17:33	18:27	36 07:50 (WEA ZB3)	20:24	07:02 (WEA ZB1)
14	08:39	07:51	06:48	07:12 (WEA ZB2)	06:33	07:33 (WEA ZB1)
	16:36	17:35	18:29	36 07:48 (WEA ZB3)	20:26	06:57 (WEA ZB1)
15	08:38	07:49	06:46	07:09 (WEA ZB2)	06:31	07:33 (WEA ZB1)
	16:38	17:37	18:31	37 07:46 (WEA ZB3)	20:28	06:55 (WEA ZB1)
16	08:37	07:47	06:43	07:07 (WEA ZB2)	06:28	07:34 (WEA ZB1)
	16:40	17:39	18:33	37 07:44 (WEA ZB2)	20:30	06:52 (WEA ZB1)
17	08:36	07:45	06:41	07:06 (WEA ZB2)	06:26	07:33 (WEA ZB1)
	16:41	17:41	18:35	38 07:44 (WEA ZB2)	20:32	06:50 (WEA ZB1)
18	08:35	07:43	06:38	07:06 (WEA ZB2)	06:24	07:34 (WEA ZB1)
	16:43	17:43	18:37	38 07:44 (WEA ZB2)	20:34	06:50 (WEA ZB1)
19	08:34	07:41	06:36	07:05 (WEA ZB2)	06:22	07:35 (WEA ZB1)
	16:45	17:45	18:39	38 07:43 (WEA ZB2)	20:35	06:49 (WEA ZB1)
20	08:33	07:39	06:33	07:05 (WEA ZB2)	06:19	07:35 (WEA ZB1)
	16:47	17:47	18:40	38 07:43 (WEA ZB2)	20:37	06:49 (WEA ZB1)
21	08:32	07:37	06:31	07:05 (WEA ZB2)	06:17	07:36 (WEA ZB1)
	16:48	17:49	18:42	37 07:42 (WEA ZB2)	20:39	06:47 (WEA ZB1)
22	08:30	07:34	06:28	07:05 (WEA ZB2)	06:15	07:35 (WEA ZB1)
	16:50	17:51	18:44	37 07:42 (WEA ZB2)	20:41	06:47 (WEA ZB1)
23	08:29	07:32	06:26	07:06 (WEA ZB2)	06:13	07:35 (WEA ZB1)
	16:52	17:53	18:46	36 07:42 (WEA ZB2)	20:43	06:47 (WEA ZB1)
24	08:28	07:30	06:24	07:06 (WEA ZB2)	06:10	07:35 (WEA ZB1)
	16:54	17:55	18:48	34 07:40 (WEA ZB2)	20:45	06:47 (WEA ZB1)
25	08:26	07:28	06:21	07:07 (WEA ZB2)	06:08	07:35 (WEA ZB1)
	16:56	17:57	18:50	32 07:39 (WEA ZB2)	20:46	06:46 (WEA ZB1)
26	08:25	07:26	06:19	07:07 (WEA ZB2)	06:06	07:35 (WEA ZB1)
	16:58	17:59	18:51	30 07:37 (WEA ZB2)	20:48	06:46 (WEA ZB1)
27	08:24	07:23	06:16	07:08 (WEA ZB2)	06:04	07:35 (WEA ZB1)
	17:00	18:01	18:53	28 07:36 (WEA ZB2)	20:50	06:46 (WEA ZB1)
28	08:22	07:21	06:14	07:09 (WEA ZB2)	06:02	07:34 (WEA ZB1)
	17:01	18:03	3 07:48 (WEA ZB3)	24 07:33 (WEA ZB2)	20:52	06:46 (WEA ZB1)
29	08:20		07:11	08:11 (WEA ZB2)	06:00	07:34 (WEA ZB1)
	17:03		19:57	20 08:31 (WEA ZB2)	20:54	06:47 (WEA ZB1)
30	08:19		07:09	08:14 (WEA ZB2)	05:58	07:33 (WEA ZB1)
	17:05		19:59	13 08:27 (WEA ZB2)	20:55	06:47 (WEA ZB1)
31	08:17		07:07			05:07
	17:07		20:01			21:46
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung		3	865	909	465	

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO27 - Klein Depenhäusen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember	
1	05:03		05:42	07:06 (WEA ZB1)	06:36	07:03 (WEA ZB1)	07:29	07:55 (WEA ZB2)	07:26	08:21		
	22:01		21:27	07:30 (WEA ZB1)	20:21	25	07:28 (WEA ZB1)	19:07	35	08:30 (WEA ZB3)	16:57	16:14
2	05:03		05:44	07:05 (WEA ZB1)	06:38		07:05 (WEA ZB1)	07:30		07:57 (WEA ZB2)	07:28	08:22
	22:01		21:25	07:32 (WEA ZB1)	20:18	21	07:26 (WEA ZB1)	19:05	34	08:31 (WEA ZB3)	16:55	16:13
3	05:04		05:45	07:04 (WEA ZB1)	06:39		07:06 (WEA ZB1)	07:32		07:58 (WEA ZB2)	07:30	08:24
	22:01		21:23	07:34 (WEA ZB1)	20:16	16	07:22 (WEA ZB1)	19:03	32	08:30 (WEA ZB3)	16:53	16:12
4	05:05		05:47	07:02 (WEA ZB1)	06:41		07:08 (WEA ZB1)	07:34		08:00 (WEA ZB2)	07:32	08:25
	22:00		21:21	07:35 (WEA ZB1)	20:13	10	07:18 (WEA ZB1)	19:00	30	08:30 (WEA ZB3)	16:52	16:11
5	05:06		05:49	07:01 (WEA ZB1)	06:43			07:36		08:02 (WEA ZB3)	07:34	08:27
	22:00		21:19	07:37 (WEA ZB1)	20:11			18:58	28	08:30 (WEA ZB3)	16:50	16:11
6	05:07		05:50	07:00 (WEA ZB1)	06:45			07:38		08:04 (WEA ZB3)	07:36	08:28
	21:59		21:17	07:37 (WEA ZB1)	20:09			18:55	26	08:30 (WEA ZB3)	16:48	16:10
7	05:08		05:52	06:59 (WEA ZB1)	06:46			07:39		08:06 (WEA ZB3)	07:38	08:29
	21:58		21:16	07:38 (WEA ZB1)	20:06			18:53	24	08:30 (WEA ZB3)	16:46	16:10
8	05:09		05:54	06:58 (WEA ZB1)	06:48			07:41		08:08 (WEA ZB3)	07:40	08:31
	21:58		21:14	07:38 (WEA ZB1)	20:04			18:51	22	08:30 (WEA ZB3)	16:44	16:09
9	05:10		05:56	06:57 (WEA ZB1)	06:50			07:43		08:10 (WEA ZB3)	07:42	08:32
	21:57		21:12	07:39 (WEA ZB1)	20:01			18:48	19	08:29 (WEA ZB3)	16:42	16:09
10	05:11		05:57	06:57 (WEA ZB1)	06:52			07:45		08:11 (WEA ZB3)	07:44	08:33
	21:56		21:10	07:40 (WEA ZB1)	19:59			18:46	16	08:27 (WEA ZB3)	16:41	16:09
11	05:12		05:59	06:56 (WEA ZB1)	06:53			07:47		08:13 (WEA ZB3)	07:45	08:34
	21:55		21:08	07:40 (WEA ZB1)	19:56			18:43	13	08:26 (WEA ZB3)	16:39	16:09
12	05:13		06:01	06:55 (WEA ZB1)	06:55			07:48		08:15 (WEA ZB3)	07:47	08:35
	21:54		21:05	07:41 (WEA ZB1)	19:54			18:41	10	08:25 (WEA ZB3)	16:37	16:08
13	05:14		06:02	06:55 (WEA ZB1)	06:57		08:05 (WEA ZB2)	07:50		08:17 (WEA ZB3)	07:49	08:36
	21:53		21:03	07:42 (WEA ZB1)	19:52	13	08:18 (WEA ZB2)	18:39	6	08:23 (WEA ZB3)	16:36	16:08
14	05:15		06:04	06:54 (WEA ZB1)	06:59		08:02 (WEA ZB2)	07:52		08:19 (WEA ZB3)	07:51	08:37
	21:52		21:01	07:41 (WEA ZB1)	19:49	19	08:21 (WEA ZB2)	18:36	2	08:21 (WEA ZB3)	16:34	16:08
15	05:17		06:06	06:54 (WEA ZB1)	07:00		08:00 (WEA ZB2)	07:54			07:53	08:38
	21:51		20:59	07:42 (WEA ZB1)	19:47	23	08:23 (WEA ZB2)	18:34			16:32	16:08
16	05:18		06:08	06:53 (WEA ZB1)	07:02		07:57 (WEA ZB2)	07:56			07:55	08:39
	21:50		20:57	07:41 (WEA ZB1)	19:44	27	08:24 (WEA ZB2)	18:32			16:31	16:08
17	05:19		06:09	06:53 (WEA ZB1)	07:04		07:56 (WEA ZB2)	07:58			07:57	08:40
	21:49		20:55	07:41 (WEA ZB1)	19:42	29	08:25 (WEA ZB2)	18:30			16:29	16:09
18	05:21		06:11	06:53 (WEA ZB1)	07:06		07:54 (WEA ZB2)	08:00			07:59	08:41
	21:48		20:53	07:42 (WEA ZB1)	19:39	33	08:27 (WEA ZB2)	18:27			16:28	16:09
19	05:22		06:13	06:52 (WEA ZB1)	07:07		07:53 (WEA ZB2)	08:01			08:00	08:41
	21:47		20:51	07:41 (WEA ZB1)	19:37	34	08:27 (WEA ZB2)	18:25			16:27	16:09
20	05:23		06:15	06:52 (WEA ZB1)	07:09		07:52 (WEA ZB2)	08:03			08:02	08:42
	21:45		20:48	07:41 (WEA ZB1)	19:34	35	08:27 (WEA ZB2)	18:23			16:25	16:09
21	05:25		06:16	06:53 (WEA ZB1)	07:11		07:51 (WEA ZB2)	08:05			08:04	08:43
	21:44		20:46	07:41 (WEA ZB1)	19:32	37	08:28 (WEA ZB2)	18:21			16:24	16:10
22	05:26		06:18	06:52 (WEA ZB1)	07:13		07:50 (WEA ZB2)	08:07			08:06	08:43
	21:43		20:44	07:40 (WEA ZB1)	19:29	38	08:28 (WEA ZB2)	18:18			16:23	16:10
23	05:28		06:20	06:52 (WEA ZB1)	07:14		07:50 (WEA ZB2)	08:09			08:08	08:44
	21:41		20:42	07:39 (WEA ZB1)	19:27	38	08:28 (WEA ZB2)	18:16			16:21	16:11
24	05:29		06:22	06:53 (WEA ZB1)	07:16		07:49 (WEA ZB2)	08:11			08:09	08:44
	21:40		20:39	07:39 (WEA ZB1)	19:25	38	08:27 (WEA ZB2)	18:14			16:20	16:11
25	05:31		06:23	06:53 (WEA ZB1)	07:18		07:49 (WEA ZB2)	07:13			08:11	08:45
	21:38		20:37	07:38 (WEA ZB1)	19:22	38	08:27 (WEA ZB2)	17:12			16:19	16:12
26	05:32		06:25	06:53 (WEA ZB1)	07:20		07:49 (WEA ZB2)	07:15			08:13	08:45
	21:37		20:35	07:37 (WEA ZB1)	19:20	38	08:27 (WEA ZB2)	17:10			16:18	16:13
27	05:34		06:27	06:55 (WEA ZB1)	07:21		07:49 (WEA ZB2)	07:17			08:14	08:45
	21:35		20:32	07:36 (WEA ZB1)	19:17	37	08:26 (WEA ZB2)	17:08			16:17	16:13
28	05:36		06:29	06:56 (WEA ZB1)	07:23		07:49 (WEA ZB2)	07:19			08:16	08:45
	21:33		20:30	07:34 (WEA ZB1)	19:15	36	08:25 (WEA ZB3)	17:05			16:16	16:14
29	05:37	07:15 (WEA ZB1)	06:31	06:58 (WEA ZB1)	07:25		07:51 (WEA ZB2)	07:20			08:18	08:45
	21:32	7 07:22 (WEA ZB1)	20:28	07:33 (WEA ZB1)	19:12	37	08:28 (WEA ZB3)	17:03			16:15	16:15
30	05:39	07:11 (WEA ZB1)	06:32	07:00 (WEA ZB1)	07:27		07:53 (WEA ZB2)	07:22			08:19	08:46
	21:30	15 07:26 (WEA ZB1)	20:25	07:32 (WEA ZB1)	19:10	36	08:29 (WEA ZB3)	17:01			16:14	16:16
31	05:40	07:09 (WEA ZB1)	06:34	07:01 (WEA ZB1)				07:24				08:46
	21:28	20 07:29 (WEA ZB1)	20:23	07:30 (WEA ZB1)				16:59				16:17
Sonnenscheinstunden	511		459		1279	382		329		260		234
astr. max. mögl. Beschattung	42					658		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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO28 - Klein Westerhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai		Juni
1	08:45 16:18	08:16 17:09	07:19 18:04	2	07:43 (WEA ZB3) 07:04 07:45 (WEA ZB3) 20:02	66	07:41 (WEA ZB2) 05:55 08:47 (WEA ZB2) 20:57	27	07:51 (WEA ZB2) 05:06 08:18 (WEA ZB2) 21:47
2	08:45 16:20	08:14 17:11	07:16 18:06	10	07:41 (WEA ZB3) 07:02 07:51 (WEA ZB3) 20:04	67	07:40 (WEA ZB2) 05:53 08:47 (WEA ZB2) 20:59	20	07:54 (WEA ZB2) 05:06 08:14 (WEA ZB2) 21:48
3	08:45 16:21	08:12 17:13	07:14 18:08	16	07:38 (WEA ZB3) 06:59 07:54 (WEA ZB3) 20:06	68	07:39 (WEA ZB2) 05:51 08:47 (WEA ZB2) 21:01	11	07:58 (WEA ZB2) 05:05 08:09 (WEA ZB2) 21:49
4	08:45 16:22	08:10 17:15	07:12 18:10	20	07:36 (WEA ZB3) 06:57 07:56 (WEA ZB3) 20:08	69	07:38 (WEA ZB2) 05:49 08:47 (WEA ZB2) 21:03		05:04 21:50
5	08:45 16:23	08:09 17:17	07:09 18:12	24	07:34 (WEA ZB3) 06:54 07:58 (WEA ZB3) 20:10	69	07:38 (WEA ZB2) 05:47 08:47 (WEA ZB2) 21:04		05:03 21:51
6	08:44 16:24	08:07 17:19	07:07 18:14	27	07:31 (WEA ZB3) 06:52 07:58 (WEA ZB3) 20:12	69	07:38 (WEA ZB2) 05:45 08:47 (WEA ZB2) 21:06		05:02 21:52
7	08:44 16:26	08:05 17:21	07:05 18:16	31	07:29 (WEA ZB3) 06:50 08:00 (WEA ZB3) 20:13	69	07:37 (WEA ZB2) 05:43 08:46 (WEA ZB2) 21:08		05:02 21:53
8	08:43 16:27	08:03 17:23	07:02 18:18	34	07:26 (WEA ZB3) 06:47 08:00 (WEA ZB3) 20:15	69	07:37 (WEA ZB2) 05:42 08:46 (WEA ZB2) 21:10		05:01 21:54
9	08:43 16:29	08:01 17:25	07:00 18:20	37	07:24 (WEA ZB3) 06:45 08:01 (WEA ZB3) 20:17	69	07:37 (WEA ZB2) 05:40 08:46 (WEA ZB2) 21:11		05:01 21:55
10	08:42 16:30	07:59 17:27	06:58 18:22	40	07:21 (WEA ZB3) 06:42 08:01 (WEA ZB3) 20:19	69	07:36 (WEA ZB2) 05:38 08:45 (WEA ZB2) 21:13		05:00 21:56
11	08:41 16:32	07:57 17:29	06:55 18:24	40	07:21 (WEA ZB3) 06:40 08:01 (WEA ZB3) 20:21	69	07:36 (WEA ZB2) 05:36 08:45 (WEA ZB2) 21:15		05:00 21:57
12	08:41 16:33	07:55 17:31	06:53 18:25	42	07:20 (WEA ZB3) 06:38 08:02 (WEA ZB3) 20:23	69	07:36 (WEA ZB2) 05:34 08:45 (WEA ZB2) 21:17		04:59 21:58
13	08:40 16:35	07:53 17:33	06:50 18:27	42	07:19 (WEA ZB3) 06:35 08:01 (WEA ZB3) 20:24	68	07:35 (WEA ZB2) 05:33 08:43 (WEA ZB2) 21:18		04:59 21:58
14	08:39 16:36	07:51 17:35	06:48 18:29	43	07:19 (WEA ZB3) 06:33 08:02 (WEA ZB3) 20:26	67	07:36 (WEA ZB2) 05:31 08:43 (WEA ZB2) 21:20		04:59 21:59
15	08:38 16:38	07:49 17:37	06:45 18:31	42	07:19 (WEA ZB3) 06:31 08:01 (WEA ZB3) 20:28	66	07:36 (WEA ZB2) 05:29 08:42 (WEA ZB2) 21:22		04:58 22:00
16	08:37 16:40	07:47 17:39	06:43 18:33	42	07:19 (WEA ZB3) 06:28 08:01 (WEA ZB3) 20:30	65	07:36 (WEA ZB2) 05:27 08:41 (WEA ZB2) 21:23		04:58 22:00
17	08:36 16:41	07:45 17:41	06:41 18:35	42	07:18 (WEA ZB3) 06:26 08:00 (WEA ZB3) 20:32	64	07:36 (WEA ZB2) 05:26 08:40 (WEA ZB2) 21:25		04:58 22:01
18	08:35 16:43	07:43 17:43	06:38 18:37	51	07:08 (WEA ZB2) 06:24 07:59 (WEA ZB3) 20:34	62	07:37 (WEA ZB2) 05:24 08:39 (WEA ZB2) 21:27		04:58 22:01
19	08:34 16:45	07:41 17:45	06:36 18:38	55	07:03 (WEA ZB2) 06:22 07:58 (WEA ZB3) 20:35	62	07:37 (WEA ZB2) 05:23 08:39 (WEA ZB2) 21:28		04:58 22:01
20	08:33 16:47	07:39 17:47	06:33 18:40	57	07:00 (WEA ZB2) 06:19 07:57 (WEA ZB3) 20:37	60	07:38 (WEA ZB2) 05:21 08:38 (WEA ZB2) 21:30		04:58 22:02
21	08:32 16:48	07:37 17:49	06:31 18:42	59	06:57 (WEA ZB2) 06:17 07:56 (WEA ZB3) 20:39	58	07:38 (WEA ZB2) 05:20 08:36 (WEA ZB2) 21:31		04:58 22:02
22	08:30 16:50	07:34 17:51	06:28 18:44	60	06:55 (WEA ZB2) 06:15 07:55 (WEA ZB3) 20:41	57	07:38 (WEA ZB2) 05:18 08:35 (WEA ZB2) 21:33		04:58 22:02
23	08:29 16:52	07:32 17:53	06:26 18:46	61	06:53 (WEA ZB2) 06:13 07:54 (WEA ZB3) 20:43	54	07:39 (WEA ZB2) 05:17 08:33 (WEA ZB2) 21:34		04:59 22:02
24	08:28 16:54	07:30 17:55	06:24 18:48	60	06:51 (WEA ZB2) 06:10 07:51 (WEA ZB3) 20:45	52	07:40 (WEA ZB2) 05:16 08:32 (WEA ZB2) 21:36		04:59 22:02
25	08:26 16:56	07:28 17:57	06:21 18:50	59	06:50 (WEA ZB2) 06:08 07:49 (WEA ZB3) 20:46	50	07:41 (WEA ZB2) 05:14 08:31 (WEA ZB2) 21:37		04:59 22:02
26	08:25 16:58	07:25 17:59	06:19 18:51	59	06:47 (WEA ZB2) 06:06 07:46 (WEA ZB3) 20:48	47	07:42 (WEA ZB2) 05:13 08:29 (WEA ZB2) 21:39		05:00 22:02
27	08:23 17:00	07:23 18:01	06:16 18:53	58	06:47 (WEA ZB2) 06:04 07:45 (WEA ZB2) 20:50	43	07:44 (WEA ZB2) 05:12 08:27 (WEA ZB2) 21:40		05:00 22:02
28	08:22 17:01	07:21 18:03	06:14 18:55	60	06:45 (WEA ZB2) 06:02 07:45 (WEA ZB2) 20:52	40	07:45 (WEA ZB2) 05:11 08:25 (WEA ZB2) 21:42		05:01 22:02
29	08:20 17:03		07:11 19:57	62	07:44 (WEA ZB2) 06:00 08:46 (WEA ZB2) 20:54	36	07:47 (WEA ZB2) 05:10 08:23 (WEA ZB2) 21:43		05:01 22:02
30	08:19 17:05		07:09 19:59	64	07:42 (WEA ZB2) 05:57 08:46 (WEA ZB2) 20:55	33	07:48 (WEA ZB2) 05:08 08:21 (WEA ZB2) 21:44		05:02 22:02
31	08:17 17:07		07:07 20:01	65	07:42 (WEA ZB2) 05:57 08:47 (WEA ZB2) 20:55		05:07 21:45		
Sonnenscheinstunden	251	274	367		419		493		509
astr.max.mögl.Beschattung			1364		1806		58		

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO28 - Klein Westerhausen 1
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	05:03 22:01	05:42 21:27	06:36 20:21	07:35 (WEA ZB2) 19:07	07:59 (WEA ZB3) 16:57	08:21 16:13
2	05:03 22:01	05:44 21:25	06:38 20:18	07:35 (WEA ZB2) 19:05	07:59 (WEA ZB3) 16:55	08:22 16:13
3	05:04 22:01	05:45 21:23	06:39 20:16	07:34 (WEA ZB2) 19:03	07:59 (WEA ZB3) 16:53	08:24 16:12
4	05:05 22:00	05:47 21:21	06:41 20:13	07:34 (WEA ZB2) 19:00	08:00 (WEA ZB3) 16:52	08:25 16:11
5	05:06 22:00	05:49 21:19	06:43 20:11	07:34 (WEA ZB2) 18:58	08:02 (WEA ZB3) 16:50	08:27 16:11
6	05:07 21:59	05:50 21:17	06:45 20:09	07:33 (WEA ZB2) 18:55	08:04 (WEA ZB3) 16:48	08:28 16:10
7	05:08 21:58	05:52 21:15	06:46 20:06	07:33 (WEA ZB2) 18:53	08:06 (WEA ZB3) 16:46	08:29 16:10
8	05:09 21:58	05:54 21:14	06:48 20:04	07:33 (WEA ZB2) 18:51	08:08 (WEA ZB3) 16:44	08:31 16:09
9	05:10 21:57	05:56 21:12	06:50 20:01	07:33 (WEA ZB2) 18:48	08:10 (WEA ZB3) 16:42	08:32 16:09
10	05:11 21:56	05:57 21:10	06:52 19:59	07:33 (WEA ZB2) 18:46	08:11 (WEA ZB3) 16:41	08:33 16:09
11	05:12 21:55	05:59 21:08	06:53 19:56	07:33 (WEA ZB2) 18:43	08:13 (WEA ZB3) 16:39	08:34 16:09
12	05:13 21:54	06:01 21:05	06:55 19:54	07:34 (WEA ZB2) 18:41	08:15 (WEA ZB3) 16:37	08:35 16:08
13	05:14 21:53	06:02 21:03	06:57 19:52	07:33 (WEA ZB2) 18:39	08:23 (WEA ZB3) 16:36	08:36 16:08
14	05:15 21:52	06:04 21:01	06:59 19:49	07:34 (WEA ZB2) 18:36	08:26 (WEA ZB3) 16:34	08:37 16:08
15	05:17 21:51	06:06 20:59	07:00 19:47	07:35 (WEA ZB2) 18:34	08:28 (WEA ZB3) 16:32	08:38 16:08
16	05:18 21:50	06:08 20:57	07:02 19:44	07:35 (WEA ZB2) 18:32	08:30 (WEA ZB3) 16:31	08:39 16:08
17	05:19 21:49	06:09 20:55	07:04 19:42	07:36 (WEA ZB2) 18:30	08:32 (WEA ZB3) 16:29	08:40 16:08
18	05:21 21:48	06:11 20:53	07:06 19:39	07:37 (WEA ZB2) 18:27	08:34 (WEA ZB3) 16:28	08:41 16:09
19	05:22 21:47	06:13 20:50	07:07 19:37	07:38 (WEA ZB2) 18:25	08:36 (WEA ZB3) 16:27	08:41 16:09
20	05:23 21:45	06:15 20:48	07:09 19:34	07:38 (WEA ZB2) 18:23	08:38 (WEA ZB3) 16:25	08:42 16:09
21	05:25 21:44	06:16 20:46	07:11 19:32	07:40 (WEA ZB2) 18:21	08:40 (WEA ZB3) 16:24	08:43 16:10
22	05:26 21:43	06:18 20:44	07:13 19:29	07:42 (WEA ZB2) 18:18	08:42 (WEA ZB3) 16:23	08:43 16:10
23	05:28 21:41	06:20 20:42	07:14 19:27	07:43 (WEA ZB2) 18:16	08:44 (WEA ZB3) 16:21	08:44 16:11
24	05:29 21:40	06:22 20:39	07:16 19:25	07:46 (WEA ZB2) 18:14	08:46 (WEA ZB3) 16:20	08:44 16:11
25	05:31 21:38	06:23 20:37	07:18 19:22	07:49 (WEA ZB2) 18:13	08:48 (WEA ZB3) 16:19	08:45 16:12
26	05:32 21:37	06:25 20:35	07:20 19:20	07:55 (WEA ZB2) 18:10	08:50 (WEA ZB3) 16:18	08:45 16:13
27	05:34 21:35	06:27 20:32	07:21 19:17	08:01 (WEA ZB3) 18:08	08:52 (WEA ZB3) 16:17	08:45 16:13
28	05:36 21:33	06:29 20:30	07:23 19:15	07:59 (WEA ZB3) 18:05	08:54 (WEA ZB3) 16:16	08:45 16:14
29	05:37 21:32	06:30 20:28	07:25 19:12	07:59 (WEA ZB3) 18:03	08:56 (WEA ZB3) 16:15	08:45 16:15
30	05:39 21:30	06:32 20:25	07:27 19:10	07:59 (WEA ZB3) 18:01	08:58 (WEA ZB3) 16:14	08:46 16:16
31	05:40 21:28	06:34 20:23	07:35 (WEA ZB2) 18:44 (WEA ZB2)	07:24 16:59		08:45 16:17
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		1125	1799	344		

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO29 - Depenhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:
Die Sonne scheint täglich von Sonnenauf- bis -untergang
Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April		Mai		Juni	
1	08:45 16:18	08:16 17:09	07:19 18:05	07:04 20:02		05:55 20:57		05:06 21:47	05:46 (WEA ZB2) 06:32 (WEA ZB2)
2	08:45 16:20	08:14 17:11	07:16 18:06	07:02 20:04		05:53 20:59	22	05:06 21:48	05:46 (WEA ZB2) 06:32 (WEA ZB2)
3	08:45 16:21	08:12 17:13	07:14 18:08	06:59 20:06		05:51 21:01	18	05:05 21:49	05:45 (WEA ZB2) 06:32 (WEA ZB2)
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08		05:49 21:03	13	05:04 21:50	05:46 (WEA ZB2) 06:32 (WEA ZB2)
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10		05:47 21:04	5	05:03 21:51	05:46 (WEA ZB2) 06:32 (WEA ZB2)
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12		05:45 21:06		05:02 21:52	05:47 (WEA ZB2) 06:33 (WEA ZB2)
7	08:44 16:26	08:05 17:21	07:05 18:16	06:50 20:13		05:44 21:08		05:02 21:53	05:47 (WEA ZB2) 06:33 (WEA ZB2)
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15		05:42 21:10		05:01 21:54	05:47 (WEA ZB2) 06:33 (WEA ZB2)
9	08:43 16:29	08:01 17:25	07:00 18:20	06:45 20:17		05:40 21:11		05:01 21:55	05:47 (WEA ZB2) 06:33 (WEA ZB2)
10	08:42 16:30	07:59 17:27	06:58 18:22	06:42 20:19	07:06 (WEA ZB3)	05:38 21:13	6	05:00 21:56	05:47 (WEA ZB2) 06:33 (WEA ZB2)
11	08:41 16:32	07:57 17:29	06:55 18:24	06:40 20:21	07:09 (WEA ZB3)	05:36 21:15	11	05:00 21:57	05:47 (WEA ZB2) 06:33 (WEA ZB2)
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	07:12 (WEA ZB3)	05:34 21:17	15	04:59 21:58	05:47 (WEA ZB2) 06:33 (WEA ZB2)
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	07:02 (WEA ZB3)	05:33 21:18	19	04:59 21:58	05:48 (WEA ZB2) 06:34 (WEA ZB2)
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	07:14 (WEA ZB3)	05:31 21:20	22	04:59 21:59	05:48 (WEA ZB2) 06:34 (WEA ZB2)
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	07:15 (WEA ZB3)	05:29 21:22	24	04:58 22:00	05:49 (WEA ZB2) 06:35 (WEA ZB2)
16	08:37 16:40	07:47 17:39	06:43 18:33	06:28 20:30	06:57 (WEA ZB3)	05:28 21:23	27	04:58 22:01	05:49 (WEA ZB2) 06:35 (WEA ZB2)
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	06:52 (WEA ZB3)	05:26 21:25	29	04:58 22:01	05:49 (WEA ZB2) 06:35 (WEA ZB2)
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	07:17 (WEA ZB3)	05:24 21:27	32	04:58 22:01	05:49 (WEA ZB2) 06:35 (WEA ZB2)
19	08:34 16:45	07:41 17:45	06:36 18:39	06:22 20:35	06:48 (WEA ZB3)	05:23 21:28	34	04:58 22:01	05:50 (WEA ZB2) 06:35 (WEA ZB2)
20	08:33 16:47	07:39 17:47	06:33 18:40	06:19 20:37	06:46 (WEA ZB3)	05:21 21:30	36	04:58 22:02	05:50 (WEA ZB2) 06:35 (WEA ZB2)
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	06:44 (WEA ZB3)	05:20 21:31	38	04:58 22:02	05:50 (WEA ZB2) 06:35 (WEA ZB2)
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	06:43 (WEA ZB3)	05:18 21:33	40	04:59 22:02	05:50 (WEA ZB2) 06:35 (WEA ZB2)
23	08:29 16:52	07:32 17:53	06:26 18:46	06:13 20:43	06:42 (WEA ZB3)	05:17 21:34	41	04:59 22:02	05:50 (WEA ZB2) 06:35 (WEA ZB2)
24	08:28 16:54	07:30 17:55	06:24 18:48	06:10 20:45	06:41 (WEA ZB3)	05:16 21:36	43	04:59 22:02	05:50 (WEA ZB2) 06:36 (WEA ZB2)
25	08:26 16:56	07:28 17:57	06:21 18:50	06:08 20:46	06:40 (WEA ZB3)	05:14 21:37	44	04:59 22:02	05:50 (WEA ZB2) 06:36 (WEA ZB2)
26	08:25 16:58	07:25 17:59	06:19 18:51	06:06 20:48	06:44 (WEA ZB3)	05:13 21:39	44	05:00 22:02	05:51 (WEA ZB2) 06:37 (WEA ZB2)
27	08:23 17:00	07:23 18:01	06:16 18:53	06:04 20:50	06:44 (WEA ZB3)	05:12 21:40	45	05:00 22:02	05:51 (WEA ZB2) 06:37 (WEA ZB2)
28	08:22 17:01	07:21 18:03	06:14 18:55	06:02 20:52	06:45 (WEA ZB3)	05:11 21:42	45	05:01 22:02	05:51 (WEA ZB2) 06:37 (WEA ZB2)
29	08:20 17:03		07:11 19:57	06:00 20:54	06:44 (WEA ZB3)	05:10 21:43	45	05:01 22:02	05:51 (WEA ZB2) 06:37 (WEA ZB2)
30	08:19 17:05		07:09 19:59	05:58 20:55	06:47 (WEA ZB3)	05:08 21:44	46	05:02 22:02	05:52 (WEA ZB2) 06:38 (WEA ZB2)
31	08:17 17:07		07:07 20:01		07:11 (WEA ZB3)	05:07 21:45	46	05:02 22:02	05:52 (WEA ZB2) 06:38 (WEA ZB2)
Sonnenscheinstunden	251	274	367	419		493		509	
astr.max.mögl.Beschattung				536		835		1375	

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO29 - Depenhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:
Die Sonne scheint täglich von Sonnenauf- bis -untergang
Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli			August			September			Oktober	November	Dezember
1	05:03		05:51 (WEA ZB2)	05:42		06:12 (WEA ZB2)	06:36		07:03 (WEA ZB3)	07:29	07:26	08:21
	22:01	46	06:37 (WEA ZB2)	21:27	17	06:29 (WEA ZB2)	20:21	8	07:11 (WEA ZB3)	19:07	16:57	16:14
2	05:03		05:52 (WEA ZB2)	05:44		06:14 (WEA ZB2)	06:38		07:05 (WEA ZB3)	07:30	07:28	08:22
	22:01	46	06:38 (WEA ZB2)	21:25	14	06:28 (WEA ZB2)	20:18	3	07:08 (WEA ZB3)	19:05	16:55	16:13
3	05:04		05:52 (WEA ZB2)	05:45		06:16 (WEA ZB2)	06:39			07:32	07:30	08:24
	22:01	46	06:38 (WEA ZB2)	21:23	9	06:25 (WEA ZB2)	20:16			19:03	16:53	16:12
4	05:05		05:52 (WEA ZB2)	05:47		06:17 (WEA ZB2)	06:41			07:34	07:32	08:25
	22:00	47	06:39 (WEA ZB2)	21:21	2	06:19 (WEA ZB2)	20:13			19:00	16:52	16:11
5	05:06		05:52 (WEA ZB2)	05:49			06:43			07:36	07:34	08:27
	22:00	46	06:38 (WEA ZB2)	21:19			20:11			18:58	16:50	16:11
6	05:07		05:52 (WEA ZB2)	05:50			06:45			07:38	07:36	08:28
	21:59	46	06:38 (WEA ZB2)	21:17			20:09			18:55	16:48	16:10
7	05:08		05:52 (WEA ZB2)	05:52			06:46			07:39	07:38	08:29
	21:58	47	06:39 (WEA ZB2)	21:15			20:06			18:53	16:46	16:10
8	05:09		05:53 (WEA ZB2)	05:54			06:48			07:41	07:40	08:31
	21:58	46	06:39 (WEA ZB2)	21:14			20:04			18:51	16:44	16:09
9	05:10		05:53 (WEA ZB2)	05:56		07:03 (WEA ZB3)	06:50			07:43	07:42	08:32
	21:57	46	06:39 (WEA ZB2)	21:12	9	07:12 (WEA ZB3)	20:01			18:48	16:42	16:09
10	05:11		05:53 (WEA ZB2)	05:57		07:00 (WEA ZB3)	06:52			07:45	07:44	08:33
	21:56	46	06:39 (WEA ZB2)	21:10	15	07:15 (WEA ZB3)	19:59			18:46	16:41	16:09
11	05:12		05:53 (WEA ZB2)	05:59		06:58 (WEA ZB3)	06:53			07:47	07:45	08:34
	21:55	46	06:39 (WEA ZB2)	21:08	19	07:17 (WEA ZB3)	19:56			18:43	16:39	16:09
12	05:13		05:53 (WEA ZB2)	06:01		06:56 (WEA ZB3)	06:55			07:48	07:47	08:35
	21:54	46	06:39 (WEA ZB2)	21:05	23	07:19 (WEA ZB3)	19:54			18:41	16:37	16:08
13	05:14		05:53 (WEA ZB2)	06:02		06:55 (WEA ZB3)	06:57			07:50	07:49	08:36
	21:53	46	06:39 (WEA ZB2)	21:03	25	07:20 (WEA ZB3)	19:52			18:39	16:36	16:08
14	05:15		05:55 (WEA ZB2)	06:04		06:53 (WEA ZB3)	06:59			07:52	07:51	08:37
	21:52	45	06:40 (WEA ZB2)	21:01	27	07:20 (WEA ZB3)	19:49			18:36	16:34	16:08
15	05:17		05:55 (WEA ZB2)	06:06		06:53 (WEA ZB3)	07:00			07:54	07:53	08:38
	21:51	45	06:40 (WEA ZB2)	20:59	29	07:22 (WEA ZB3)	19:47			18:34	16:32	16:08
16	05:18		05:55 (WEA ZB2)	06:08		06:51 (WEA ZB3)	07:02			07:56	07:55	08:39
	21:50	45	06:40 (WEA ZB2)	20:57	30	07:21 (WEA ZB3)	19:44			18:32	16:31	16:08
17	05:19		05:55 (WEA ZB2)	06:09		06:51 (WEA ZB3)	07:04			07:58	07:57	08:40
	21:49	44	06:39 (WEA ZB2)	20:55	31	07:22 (WEA ZB3)	19:42			18:30	16:29	16:09
18	05:21		05:55 (WEA ZB2)	06:11		06:50 (WEA ZB3)	07:06			08:00	07:59	08:41
	21:48	44	06:39 (WEA ZB2)	20:53	33	07:23 (WEA ZB3)	19:39			18:27	16:28	16:09
19	05:22		05:56 (WEA ZB2)	06:13		06:49 (WEA ZB3)	07:07			08:01	08:00	08:41
	21:47	43	06:39 (WEA ZB2)	20:50	33	07:22 (WEA ZB3)	19:37			18:25	16:27	16:09
20	05:23		05:56 (WEA ZB2)	06:15		06:49 (WEA ZB3)	07:09			08:03	08:02	08:42
	21:45	43	06:39 (WEA ZB2)	20:48	34	07:23 (WEA ZB3)	19:34			18:23	16:25	16:09
21	05:25		05:56 (WEA ZB2)	06:16		06:49 (WEA ZB3)	07:11			08:05	08:04	08:43
	21:44	42	06:38 (WEA ZB2)	20:46	34	07:23 (WEA ZB3)	19:32			18:21	16:24	16:10
22	05:26		05:58 (WEA ZB2)	06:18		06:48 (WEA ZB3)	07:13			08:07	08:06	08:43
	21:43	41	06:39 (WEA ZB2)	20:44	34	07:22 (WEA ZB3)	19:29			18:18	16:23	16:10
23	05:28		05:59 (WEA ZB2)	06:20		06:48 (WEA ZB3)	07:14			08:09	08:07	08:44
	21:41	39	06:38 (WEA ZB2)	20:42	34	07:22 (WEA ZB3)	19:27			18:16	16:21	16:11
24	05:29		06:01 (WEA ZB2)	06:22		06:50 (WEA ZB3)	07:16			08:11	08:09	08:44
	21:40	37	06:38 (WEA ZB2)	20:39	32	07:22 (WEA ZB3)	19:25			18:14	16:20	16:11
25	05:31		06:02 (WEA ZB2)	06:23		06:51 (WEA ZB3)	07:18			07:13	08:11	08:45
	21:38	35	06:37 (WEA ZB2)	20:37	30	07:21 (WEA ZB3)	19:22			17:12	16:19	16:12
26	05:32		06:03 (WEA ZB2)	06:25		06:53 (WEA ZB3)	07:20			07:15	08:13	08:45
	21:37	33	06:36 (WEA ZB2)	20:35	27	07:20 (WEA ZB3)	19:20			17:10	16:18	16:13
27	05:34		06:05 (WEA ZB2)	06:27		06:55 (WEA ZB3)	07:21			07:17	08:14	08:45
	21:35	31	06:36 (WEA ZB2)	20:32	25	07:20 (WEA ZB3)	19:17			17:08	16:17	16:13
28	05:36		06:06 (WEA ZB2)	06:29		06:56 (WEA ZB3)	07:23			07:19	08:16	08:45
	21:33	28	06:34 (WEA ZB2)	20:30	22	07:18 (WEA ZB3)	19:15			17:06	16:16	16:14
29	05:37		06:08 (WEA ZB2)	06:31		06:58 (WEA ZB3)	07:25			07:20	08:18	08:45
	21:32	26	06:34 (WEA ZB2)	20:28	19	07:17 (WEA ZB3)	19:12			17:03	16:15	16:15
30	05:39		06:09 (WEA ZB2)	06:32		07:00 (WEA ZB3)	07:27			07:22	08:19	08:45
	21:30	23	06:32 (WEA ZB2)	20:25	16	07:16 (WEA ZB3)	19:10			17:01	16:14	16:16
31	05:40		06:11 (WEA ZB2)	06:34		07:01 (WEA ZB3)				07:24		08:45
	21:28	20	06:31 (WEA ZB2)	20:23	12	07:13 (WEA ZB3)				16:59		16:17
Sonnenscheinstunden	511			459			382			329	260	235
astr.max.mögl.Beschattung		1264			635			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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO3 - Utwarfe 3
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:08	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:04 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:30 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:57	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:09
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:44 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:10	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:41	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:17 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO30 - Purkswarfe 2

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:03 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:14
2	08:45 16:20	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:06 21:48	05:03 22:01	05:44 21:25	06:38 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:21	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:05 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:03	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:52	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:50	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:07 21:59	05:50 21:17	06:45 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:50 20:13	05:44 21:08	05:02 21:53	05:08 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:42 21:10	05:01 21:54	05:09 21:58	05:54 21:13	06:48 20:04	07:41 18:51	07:40 16:44	08:31 16:09
9	08:43 16:29	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:01 21:55	05:10 21:57	05:56 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:52 19:59	07:45 18:46	07:43 16:41	08:33 16:09
11	08:41 16:32	07:57 17:29	06:55 18:24	06:40 20:21	05:36 21:15	05:00 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:09
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	05:33 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:52	07:50 18:39	07:49 16:36	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:59 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:17 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:40	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:30	07:57 16:29	08:40 16:09
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:21 21:48	06:11 20:53	07:05 19:39	08:00 18:27	07:58 16:28	08:41 16:09
19	08:34 16:45	07:41 17:45	06:36 18:38	06:22 20:35	05:23 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:27	08:41 16:09
20	08:33 16:47	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:21	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:13 19:29	08:07 18:18	08:06 16:23	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:13 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:42	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:24 18:48	06:10 20:44	05:16 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:25	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:50	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:58	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:20 19:20	07:15 17:10	08:13 16:18	08:45 16:13
27	08:23 17:00	07:23 18:01	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:08	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:03	06:14 18:55	06:02 20:52	05:11 21:42	05:01 22:02	05:36 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	06:00 20:54	05:10 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:58 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:07 20:01		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	235
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO31 - Purkswarfe 3
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:03 22:01	05:42 22:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:20	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:06 21:48	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:21	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:05 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:03	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:50	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:07 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:50 20:13	05:43 21:08	05:02 21:53	05:08 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:42 21:10	05:01 21:54	05:09 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:30 16:09
9	08:43 16:29	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:01 21:55	05:10 21:57	05:56 21:11	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:41	08:33 16:09
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12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:57	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	05:33 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:52	07:50 18:39	07:49 16:36	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:59 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:17 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:40	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:21 21:48	06:11 20:53	07:05 19:39	08:00 18:27	07:58 16:28	08:41 16:09
19	08:34 16:45	07:41 17:45	06:36 18:38	06:22 20:35	05:23 21:28	04:58 22:01	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:27	08:41 16:09
20	08:33 16:47	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:23	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:13 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:24 18:48	06:10 20:44	05:16 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:50	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:44 16:12
26	08:25 16:58	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:20 19:20	07:15 17:10	08:13 16:18	08:45 16:13
27	08:23 17:00	07:23 18:01	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:08	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:03	06:14 18:55	06:02 20:52	05:11 21:41	05:01 22:02	05:36 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	06:00 20:54	05:10 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:01		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	235
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO32 - Putzwei 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

		Januar	Februar	März	April	Mai		Jun		Jul		August	September	Oktober	November	Dezember		
1	08:45	08:16	07:19	07:04	05:55			05:06		20:55 (WEA ZB2)	05:03	20:54 (WEA ZB2)	05:42	06:36	07:28	07:26	08:21	
	16:18	17:09	18:04	20:02	20:57			21:47	18	21:13 (WEA ZB2)	22:01	32	21:26 (WEA ZB2)	21:27	20:21	19:07	16:57	16:13
2	08:45	08:14	07:16	07:02	05:53			05:05		20:53 (WEA ZB2)	05:03		20:55 (WEA ZB2)	05:44	06:37	07:30	07:28	08:22
	16:19	17:11	18:06	20:04	20:59			21:48	20	21:13 (WEA ZB2)	22:01	31	21:26 (WEA ZB2)	21:25	20:18	19:05	16:55	16:13
3	08:45	08:12	07:14	06:59	05:51			05:05		20:52 (WEA ZB2)	05:04		20:55 (WEA ZB2)	05:45	06:39	07:32	07:30	08:24
	16:21	17:13	18:08	20:06	21:01			21:49	22	21:14 (WEA ZB2)	22:01	30	21:25 (WEA ZB2)	21:23	20:16	19:02	16:53	16:12
4	08:45	08:10	07:12	06:57	05:49			05:04		20:52 (WEA ZB2)	05:05		20:56 (WEA ZB2)	05:47	06:41	07:34	07:32	08:25
	16:22	17:15	18:10	20:08	21:03			21:50	24	21:16 (WEA ZB2)	22:00	29	21:25 (WEA ZB2)	21:21	20:13	19:00	16:51	16:11
5	08:44	08:09	07:09	06:54	05:47			05:03		20:52 (WEA ZB2)	05:06		20:56 (WEA ZB2)	05:49	06:43	07:36	07:34	08:26
	16:23	17:17	18:12	20:10	21:04			21:51	24	21:16 (WEA ZB2)	22:00	28	21:24 (WEA ZB2)	21:19	20:11	18:58	16:50	16:11
6	08:44	08:07	07:07	06:52	05:45			05:02		20:51 (WEA ZB2)	05:07		20:57 (WEA ZB2)	05:50	06:44	07:37	07:36	08:28
	16:24	17:18	18:14	20:12	21:06			21:52	26	21:17 (WEA ZB2)	21:57	27	21:24 (WEA ZB2)	21:17	20:04	18:56	16:50	16:12
7	08:44	08:05	07:05	06:50	05:43			05:02		20:51 (WEA ZB2)	05:08		20:58 (WEA ZB2)	05:52	06:46	07:39	07:38	08:29
	16:26	17:21	18:16	20:13	21:08			21:53	27	21:18 (WEA ZB2)	21:58	25	21:23 (WEA ZB2)	21:15	20:06	18:53	16:46	16:10
8	08:43	08:03	07:02	06:47	05:42			05:01		20:50 (WEA ZB2)	05:09		20:59 (WEA ZB2)	05:54	06:48	07:41	07:40	08:30
	16:27	17:23	18:18	20:15	21:10			21:54	29	21:19 (WEA ZB2)	21:58	24	21:23 (WEA ZB2)	21:13	20:04	18:50	16:44	16:09
9	08:43	08:01	07:00	06:45	05:40			05:00		20:50 (WEA ZB2)	05:10		20:59 (WEA ZB2)	05:55	06:50	07:43	07:42	08:32
	16:29	17:25	18:20	20:17	21:11			21:55	30	21:20 (WEA ZB2)	21:57	23	21:22 (WEA ZB2)	21:11	20:01	18:48	16:42	16:09
10	08:42	07:59	06:57	06:42	05:38			05:00		20:50 (WEA ZB2)	05:11		21:00 (WEA ZB2)	05:57	06:51	07:45	07:43	08:33
	16:30	17:27	18:22	20:19	21:13			21:56	31	21:21 (WEA ZB2)	21:56	21	21:21 (WEA ZB2)	21:09	19:59	18:46	16:41	16:09
11	08:41	07:57	06:55	06:40	05:36			05:00		20:50 (WEA ZB2)	05:12		21:01 (WEA ZB2)	05:59	06:53	07:47	07:45	08:34
	16:32	17:29	18:23	20:21	21:15			21:57	31	21:21 (WEA ZB2)	21:55	19	21:20 (WEA ZB2)	21:07	19:56	18:43	16:39	16:08
12	08:40	07:55	06:53	06:38	05:34			04:59		20:50 (WEA ZB2)	05:13		21:03 (WEA ZB2)	06:01	06:55	07:48	07:47	08:35
	16:33	17:31	18:25	20:23	21:17			21:57	32	21:22 (WEA ZB2)	21:54	17	21:20 (WEA ZB2)	21:05	19:54	18:41	16:37	16:08
13	08:40	07:53	06:50	06:35	05:32			04:59		20:50 (WEA ZB2)	05:14		21:04 (WEA ZB2)	06:02	06:57	07:50	07:49	08:36
	16:35	17:33	18:27	20:24	21:18			21:58	33	21:23 (WEA ZB2)	21:53	15	21:19 (WEA ZB2)	21:03	19:51	18:39	16:36	16:08
14	08:39	07:51	06:48	06:33	05:31			04:59		20:50 (WEA ZB2)	05:15		21:07 (WEA ZB2)	06:04	06:58	07:52	07:51	08:37
	16:36	17:35	18:29	20:26	21:20			21:59	34	21:24 (WEA ZB2)	21:52	12	21:19 (WEA ZB2)	21:01	19:49	18:36	16:34	16:09
15	08:38	07:49	06:45	06:31	05:29			04:58		20:50 (WEA ZB2)	05:17		21:09 (WEA ZB2)	06:06	07:00	07:54	07:53	08:38
	16:38	17:37	18:31	20:28	21:22			21:59	34	21:24 (WEA ZB2)	21:51	9	21:18 (WEA ZB2)	21:09	19:47	18:34	16:32	16:08
16	08:37	07:47	06:43	06:28	05:27			04:58		20:49 (WEA ZB2)	05:18		21:12 (WEA ZB2)	06:08	07:02	07:56	07:55	08:39
	16:40	17:39	18:33	20:30	21:23			22:00	35	21:24 (WEA ZB2)	21:50	4	21:16 (WEA ZB2)	21:07	19:44	18:32	16:31	16:08
17	08:36	07:45	06:41	06:26	05:26			04:58		20:50 (WEA ZB2)	05:19		21:09	07:04	07:58	07:57	08:40	
	16:41	17:41	18:35	20:32	21:25			22:00	34	21:24 (WEA ZB2)	21:49		20:55	19:42	18:29	16:29	16:08	
18	08:35	07:43	06:38	06:24	05:24			04:58		20:50 (WEA ZB2)	05:21		21:06	07:05	07:59	07:58	08:41	
	16:43	17:43	18:37	20:33	21:27			22:01	35	21:25 (WEA ZB2)	21:48		20:53	19:39	18:27	16:28	16:09	
19	08:34	07:41	06:36	06:21	05:23			04:58		20:51 (WEA ZB2)	05:22		21:03	07:07	08:01	08:00	08:41	
	16:45	17:45	18:38	20:35	21:28			22:01	35	21:26 (WEA ZB2)	21:46		20:50	19:37	18:25	16:27	16:09	
20	08:33	07:39	06:33	06:19	05:21			04:58		20:51 (WEA ZB2)	05:23		21:05	07:09	08:03	08:02	08:42	
	16:47	17:47	18:40	20:37	21:30			22:02	35	21:26 (WEA ZB2)	21:45		20:48	19:34	18:23	16:25	16:09	
21	08:32	07:37	06:31	06:17	05:20			04:58		20:51 (WEA ZB2)	05:25		21:06	07:11	08:05	08:04	08:43	
	16:48	17:49	18:42	20:39	21:31			22:02	35	21:26 (WEA ZB2)	21:44		20:46	19:32	18:20	16:24	16:10	
22	08:30	07:34	06:28	06:15	05:18			04:58		20:51 (WEA ZB2)	05:26		21:08	07:12	08:07	08:06	08:43	
	16:50	17:51	18:44	20:41	21:32			22:02	35	21:26 (WEA ZB2)	21:42		20:44	19:29	18:17	16:23	16:10	
23	08:29	07:32	06:26	06:12	05:17			04:59		20:51 (WEA ZB2)	05:28		21:06	07:14	08:09	08:07	08:44	
	16:52	17:53	18:46	20:43	21:34			22:02	35	21:26 (WEA ZB2)	21:41		20:41	19:27	18:16	16:21	16:11	
24	08:28	07:30	06:24	06:10	05:16			04:59		20:52 (WEA ZB2)	05:29		21:06	07:16	08:11	08:09	08:44	
	16:54	17:55	18:48	20:44	21:36			22:02	35	21:27 (WEA ZB2)	21:40		20:39	19:24	18:14	16:20	16:11	
25	08:26	07:28	06:21	06:08	05:14			04:59		20:52 (WEA ZB2)	05:31		21:03	07:18	08:13	08:11	08:44	
	16:56	17:57	18:49	20:46	21:37			22:02	35	21:27 (WEA ZB2)	21:38		20:37	19:22	17:12	16:19	16:12	
26	08:25	07:25	06:19	06:06	05:13			05:00		20:53 (WEA ZB2)	05:32		21:06	07:20	08:15	08:13	08:45	
	16:58	17:59	18:51	20:48	21:39			22:02	34	21:27 (WEA ZB2)	21:37		20:35	19:20	17:10	16:18	16:13	
27	08:23	07:23	06:16	06:04	05:12			05:00		20:52 (WEA ZB2)	05:34		21:06	07:21	08:17	08:14	08:45	
	16:59	18:01	18:53	20:50	21:40			22:02	35	21:27 (WEA ZB2)	21:35		20:32	19:17	17:08	16:17	16:13	
28	08:22	07:21	06:14	06:02	05:11		21:01 (WEA ZB2)	05:01		20:53 (WEA ZB2)	05:35		21:06	07:23	08:18	08:16	08:45	
	17:01	18:02	18:55	20:52	21:41	6	21:07 (WEA ZB2)	22:02	34	21:27 (WEA ZB2)	21:33		20:30	19:15	17:05	16:16	16:14	
29	08:20		07:11	06:00	05:09		20:58 (WEA ZB2)	05:01		20:53 (WEA ZB2)	05:37		21:06	07:25	08:20	08:17	08:45	
	17:03		19:57	20:54	21:43	11	21:09 (WEA ZB2)	22:02	33	21:26 (WEA ZB2)	21:32		20:28	19:12	17:03	16:15	16:15	
30	08:19		07:09	05:57	05:08		20:56 (WEA ZB2)	05:02		20:54 (WEA ZB2)	05:39		21:06	07:27	08:22	08:19	08:45	
	17:05		19:59	20:55	21:44	14	21:10 (WEA ZB2)	22:02	32	21:26 (WEA ZB2)	21:30		20:25	19:10	17:01	16:14	16:16	
31	08:17		07:06				20:56 (WEA ZB2)						20:25		16:59	08:24		
	17:07		20:01		21:45	16	21:12 (WEA ZB2)				21:28		20:23		16:59			
Sonnenscheinstunden	251	274	367	419	493			509	932		511		459	382	329	260	235	
astr. max. mögl. Beschattung					47							346						

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO33 - Westerhausen 5
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45 16:18	08:16 17:09	07:19 18:04	16:04 (WEA ZB3) 07:04 17:20 (WEA ZB3) 20:02	16:58 (WEA ZB3) 05:55 19:34 (WEA ZB2) 20:57	19:57 (WEA ZB1) 05:06 20:28 (WEA ZB1) 21:47
2	08:45 16:19	08:14 17:11	07:16 18:06	16:03 (WEA ZB3) 07:02 17:21 (WEA ZB3) 20:04	16:59 (WEA ZB3) 05:53 19:35 (WEA ZB2) 20:59	19:56 (WEA ZB1) 05:05 20:29 (WEA ZB1) 21:48
3	08:45 16:21	08:12 17:13	07:14 18:08	16:02 (WEA ZB3) 06:59 17:21 (WEA ZB3) 20:06	17:01 (WEA ZB3) 05:51 19:36 (WEA ZB2) 21:01	19:55 (WEA ZB1) 05:05 20:31 (WEA ZB1) 21:49
4	08:45 16:22	08:10 17:15	07:12 18:10	16:01 (WEA ZB3) 06:57 17:22 (WEA ZB3) 20:08	17:01 (WEA ZB3) 05:49 19:36 (WEA ZB2) 21:03	19:55 (WEA ZB1) 05:04 20:32 (WEA ZB1) 21:50
5	08:44 16:23	08:09 17:17	07:09 18:12	15:59 (WEA ZB3) 06:54 17:22 (WEA ZB3) 20:10	17:03 (WEA ZB3) 05:47 19:36 (WEA ZB2) 21:04	19:54 (WEA ZB1) 05:03 20:34 (WEA ZB1) 21:51
6	08:44 16:24	08:07 17:19	07:07 18:14	15:59 (WEA ZB3) 06:52 17:23 (WEA ZB3) 20:12	17:05 (WEA ZB3) 05:45 19:37 (WEA ZB2) 21:06	19:54 (WEA ZB1) 05:02 20:35 (WEA ZB1) 21:52
7	08:44 16:26	08:05 17:21	07:05 18:16	15:59 (WEA ZB3) 06:50 17:24 (WEA ZB3) 20:13	17:06 (WEA ZB3) 05:43 19:36 (WEA ZB2) 21:08	19:54 (WEA ZB1) 05:02 20:35 (WEA ZB1) 21:53
8	08:43 16:27	08:03 17:23	07:02 18:18	15:57 (WEA ZB3) 06:47 17:23 (WEA ZB3) 20:15	17:08 (WEA ZB3) 05:42 19:37 (WEA ZB2) 21:10	19:53 (WEA ZB1) 05:01 20:35 (WEA ZB1) 21:54
9	08:43 16:29	08:01 17:25	07:00 18:20	15:57 (WEA ZB3) 06:45 17:24 (WEA ZB3) 20:17	17:09 (WEA ZB3) 05:40 19:36 (WEA ZB2) 21:11	19:53 (WEA ZB1) 05:00 20:34 (WEA ZB1) 21:55
10	08:42 16:30	07:59 17:27	06:57 18:22	15:56 (WEA ZB3) 06:42 17:24 (WEA ZB3) 20:19	17:12 (WEA ZB3) 05:38 19:36 (WEA ZB2) 21:13	19:53 (WEA ZB1) 05:00 20:35 (WEA ZB1) 21:56
11	08:41 16:31	07:57 17:29	06:55 18:23	15:56 (WEA ZB3) 06:40 17:24 (WEA ZB3) 20:21	17:15 (WEA ZB3) 05:36 19:36 (WEA ZB2) 21:15	19:53 (WEA ZB1) 05:00 20:35 (WEA ZB1) 21:57
12	08:41 16:33	07:55 17:31	06:53 18:25	15:54 (WEA ZB3) 06:38 17:24 (WEA ZB3) 20:23	17:17 (WEA ZB3) 05:34 19:35 (WEA ZB2) 21:17	19:53 (WEA ZB1) 04:59 20:34 (WEA ZB1) 21:57
13	08:40 16:35	07:53 17:33	06:50 18:27	15:54 (WEA ZB3) 06:35 17:24 (WEA ZB3) 20:24	17:21 (WEA ZB3) 05:32 19:35 (WEA ZB2) 21:18	19:53 (WEA ZB1) 04:59 20:35 (WEA ZB1) 21:58
14	08:39 16:36	07:51 17:35	06:48 18:29	15:55 (WEA ZB3) 06:33 17:25 (WEA ZB3) 20:26	17:27 (WEA ZB3) 05:31 19:34 (WEA ZB2) 21:20	19:53 (WEA ZB1) 04:59 20:34 (WEA ZB1) 21:59
15	08:38 16:38	07:49 17:37	06:45 18:31	15:54 (WEA ZB3) 06:31 17:24 (WEA ZB3) 20:28	18:42 (WEA ZB2) 05:29 19:34 (WEA ZB2) 21:22	19:54 (WEA ZB1) 04:58 20:35 (WEA ZB1) 21:59
16	08:37 16:40	07:47 17:39	06:43 18:33	15:54 (WEA ZB3) 06:28 17:24 (WEA ZB3) 20:30	18:42 (WEA ZB2) 05:27 19:33 (WEA ZB2) 21:23	19:54 (WEA ZB1) 04:58 20:34 (WEA ZB1) 22:00
17	08:36 16:41	07:45 17:41	06:41 18:35	15:53 (WEA ZB3) 06:26 17:23 (WEA ZB3) 20:32	18:42 (WEA ZB2) 05:26 19:32 (WEA ZB2) 21:25	19:54 (WEA ZB1) 04:58 20:34 (WEA ZB1) 22:00
18	08:35 16:43	07:43 17:43	06:38 18:37	15:53 (WEA ZB3) 06:24 17:24 (WEA ZB3) 20:33	18:43 (WEA ZB2) 05:24 19:31 (WEA ZB2) 21:27	19:54 (WEA ZB1) 04:58 20:33 (WEA ZB1) 22:01
19	08:34 16:45	07:41 17:45	06:36 18:38	15:53 (WEA ZB3) 06:21 17:23 (WEA ZB3) 20:35	18:44 (WEA ZB2) 05:23 19:31 (WEA ZB2) 21:28	19:55 (WEA ZB1) 04:58 20:33 (WEA ZB1) 22:01
20	08:33 16:46	07:39 17:47	06:33 18:40	15:53 (WEA ZB3) 06:19 17:23 (WEA ZB3) 20:37	18:44 (WEA ZB2) 05:21 19:30 (WEA ZB2) 21:30	19:56 (WEA ZB1) 04:58 20:33 (WEA ZB1) 22:02
21	08:32 16:48	07:37 17:49	06:31 18:42	15:53 (WEA ZB3) 06:17 17:22 (WEA ZB3) 20:39	18:44 (WEA ZB2) 05:20 19:28 (WEA ZB2) 21:31	19:56 (WEA ZB1) 04:58 20:32 (WEA ZB1) 22:02
22	08:30 16:50	07:34 17:51	06:28 18:44	15:53 (WEA ZB3) 06:15 17:22 (WEA ZB3) 20:41	18:45 (WEA ZB2) 05:18 19:27 (WEA ZB2) 21:33	19:57 (WEA ZB1) 04:58 20:32 (WEA ZB1) 22:02
23	08:29 16:52	07:32 17:53	06:26 18:46	15:53 (WEA ZB3) 06:12 17:21 (WEA ZB3) 20:43	18:47 (WEA ZB2) 05:17 19:26 (WEA ZB2) 21:34	19:57 (WEA ZB1) 04:59 20:31 (WEA ZB1) 22:02
24	08:28 16:54	07:30 17:55	06:24 18:48	15:54 (WEA ZB3) 06:10 18:19 (WEA ZB2) 20:44	18:48 (WEA ZB2) 05:16 20:16 (WEA ZB1) 21:36	19:58 (WEA ZB1) 04:59 20:31 (WEA ZB1) 22:02
25	08:26 16:56	07:28 17:57	06:21 18:49	15:54 (WEA ZB3) 06:08 18:24 (WEA ZB2) 20:46	18:49 (WEA ZB2) 05:14 20:17 (WEA ZB1) 21:37	19:58 (WEA ZB1) 04:59 20:30 (WEA ZB1) 22:02
26	08:25 16:58	07:25 17:59	06:19 18:51	15:54 (WEA ZB3) 06:06 18:25 (WEA ZB2) 20:48	18:51 (WEA ZB2) 05:13 20:19 (WEA ZB1) 21:39	19:59 (WEA ZB1) 05:00 20:29 (WEA ZB1) 22:02
27	08:23 16:59	07:23 18:01	06:16 18:53	15:55 (WEA ZB3) 06:04 18:27 (WEA ZB2) 20:50	18:53 (WEA ZB2) 05:12 20:21 (WEA ZB1) 21:40	20:00 (WEA ZB1) 05:00 20:29 (WEA ZB1) 22:02
28	08:22 17:01	07:21 18:02	06:14 18:55	15:55 (WEA ZB3) 06:02 18:28 (WEA ZB2) 20:52	18:56 (WEA ZB2) 05:11 20:23 (WEA ZB1) 21:41	20:01 (WEA ZB1) 05:01 20:28 (WEA ZB1) 22:02
29	08:20 17:03		07:11 19:57	16:56 (WEA ZB3) 06:00 19:31 (WEA ZB2) 20:54	19:00 (WEA ZB2) 05:09 20:24 (WEA ZB1) 21:43	20:02 (WEA ZB1) 05:01 20:27 (WEA ZB1) 22:02
30	08:19 17:05		07:09 19:59	16:56 (WEA ZB3) 05:57 19:32 (WEA ZB2) 20:55	19:58 (WEA ZB1) 05:08 20:26 (WEA ZB1) 21:44	20:03 (WEA ZB1) 05:02 20:27 (WEA ZB1) 22:02
31	08:17 17:07		07:06 20:01	16:57 (WEA ZB3) 19:34 (WEA ZB2)	20:27 (WEA ZB1) 21:45 21:45	20:05 (WEA ZB1) 20:27 (WEA ZB1)
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung		676	2891	2167	1112	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 (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO33 - Westerhausen 5
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember		
1	05:03 22:01		05:42 21:27	42	20:03 (WEA ZB1) 20:45 (WEA ZB1)	06:36 20:21	94	17:14 (WEA ZB3) 19:35 (WEA ZB2)	07:28 19:07	90	16:34 (WEA ZB3) 18:04 (WEA ZB3)	07:26 16:57	08:21 16:13
2	05:04 22:01		05:44 21:25	42	20:03 (WEA ZB1) 20:45 (WEA ZB1)	06:37 20:18	100	17:11 (WEA ZB3) 19:35 (WEA ZB2)	07:30 19:05	89	16:33 (WEA ZB3) 18:02 (WEA ZB3)	07:28 16:55	08:22 16:13
3	05:04 22:01		05:45 21:23	42	20:03 (WEA ZB1) 20:45 (WEA ZB1)	06:39 20:16	105	17:07 (WEA ZB3) 19:34 (WEA ZB2)	07:32 19:02	88	16:34 (WEA ZB3) 18:02 (WEA ZB3)	07:30 16:53	08:24 16:12
4	05:05 22:00		05:47 21:21	42	20:03 (WEA ZB1) 20:45 (WEA ZB1)	06:41 20:13	108	17:05 (WEA ZB3) 19:34 (WEA ZB2)	07:34 19:00	87	16:34 (WEA ZB3) 18:01 (WEA ZB3)	07:32 16:51	08:25 16:11
5	05:06 22:00		05:49 21:19	41	20:04 (WEA ZB1) 20:45 (WEA ZB1)	06:43 20:11	111	17:03 (WEA ZB3) 19:33 (WEA ZB2)	07:36 18:58	87	16:34 (WEA ZB3) 18:01 (WEA ZB3)	07:34 16:50	08:26 16:11
6	05:07 21:59		05:50 21:17	41	20:03 (WEA ZB1) 20:44 (WEA ZB1)	06:44 20:09	114	17:00 (WEA ZB3) 19:32 (WEA ZB2)	07:37 18:55	86	16:34 (WEA ZB3) 18:00 (WEA ZB3)	07:36 16:48	08:28 16:10
7	05:08 21:58	20:20 (WEA ZB1)	05:52 21:15	40	20:04 (WEA ZB1) 20:44 (WEA ZB1)	06:46 20:06	117	16:58 (WEA ZB3) 19:32 (WEA ZB2)	07:39 18:53	84	16:35 (WEA ZB3) 17:59 (WEA ZB3)	07:38 16:46	08:29 16:10
8	05:09 21:58	5 20:25 (WEA ZB1)	05:54 21:13	40	20:03 (WEA ZB1) 20:43 (WEA ZB1)	06:48 20:04	118	16:57 (WEA ZB3) 19:31 (WEA ZB2)	07:41 18:50	83	16:35 (WEA ZB3) 17:58 (WEA ZB3)	07:40 16:44	08:30 16:09
9	05:10 21:57	10 20:18 (WEA ZB1)	05:55 21:11	37	20:04 (WEA ZB1) 20:41 (WEA ZB1)	06:50 20:01	119	16:54 (WEA ZB3) 19:29 (WEA ZB2)	07:43 18:48	82	16:35 (WEA ZB3) 17:57 (WEA ZB3)	07:42 16:42	08:32 16:09
10	05:11 21:56	14 20:16 (WEA ZB1)	05:57 21:09	35	20:05 (WEA ZB1) 20:40 (WEA ZB1)	06:51 19:59	121	16:53 (WEA ZB3) 19:29 (WEA ZB2)	07:45 18:46	81	16:35 (WEA ZB3) 17:56 (WEA ZB3)	07:43 16:41	08:33 16:09
11	05:12 21:55	16 20:31 (WEA ZB1)	05:59 21:07	32	20:05 (WEA ZB1) 20:37 (WEA ZB1)	06:53 19:56	122	16:51 (WEA ZB3) 19:28 (WEA ZB2)	07:47 18:43	79	16:36 (WEA ZB3) 17:55 (WEA ZB3)	07:45 16:39	08:34 16:08
12	05:13 21:54	19 20:33 (WEA ZB1)	06:01 21:05	30	20:06 (WEA ZB1) 20:36 (WEA ZB1)	06:55 19:54	121	16:49 (WEA ZB3) 19:26 (WEA ZB2)	07:48 18:41	76	16:37 (WEA ZB3) 17:53 (WEA ZB3)	07:47 16:37	08:35 16:08
13	05:14 21:53	21 20:12 (WEA ZB1)	06:02 21:03	27	20:06 (WEA ZB1) 20:33 (WEA ZB1)	06:57 19:52	119	16:48 (WEA ZB3) 19:23 (WEA ZB2)	07:50 18:39	74	16:38 (WEA ZB3) 17:52 (WEA ZB3)	07:49 16:36	08:36 16:08
14	05:15 21:52	23 20:35 (WEA ZB1)	06:04 21:01	38	19:06 (WEA ZB2) 20:31 (WEA ZB1)	06:58 19:49	118	16:47 (WEA ZB3) 19:21 (WEA ZB2)	07:52 18:36	72	16:39 (WEA ZB3) 17:51 (WEA ZB3)	07:51 16:34	08:37 16:08
15	05:17 21:51	24 20:36 (WEA ZB1)	06:06 20:59	42	19:03 (WEA ZB2) 20:30 (WEA ZB1)	07:00 19:47	115	16:46 (WEA ZB3) 19:19 (WEA ZB2)	07:54 18:34	70	16:40 (WEA ZB3) 17:50 (WEA ZB3)	07:53 16:32	08:38 16:08
16	05:18 21:50	26 20:11 (WEA ZB1)	06:08 20:57	45	20:10 (WEA ZB1) 20:27 (WEA ZB1)	07:02 19:44	114	20:30 (WEA ZB1) 19:16 (WEA ZB2)	07:02 18:32	67	16:41 (WEA ZB3) 17:48 (WEA ZB3)	07:55 16:31	08:39 16:08
17	05:19 21:49	28 20:10 (WEA ZB1)	06:09 20:55	45	20:38 (WEA ZB1) 20:25 (WEA ZB1)	07:04 19:42	110	20:59 (WEA ZB1) 19:14 (WEA ZB2)	07:04 18:29	65	16:42 (WEA ZB3) 17:47 (WEA ZB3)	07:57 16:29	08:40 16:08
18	05:21 21:48	30 20:08 (WEA ZB1)	06:11 20:53	44	18:57 (WEA ZB2) 20:24 (WEA ZB1)	07:05 19:39	107	16:43 (WEA ZB3) 19:12 (WEA ZB2)	07:59 18:27	62	16:43 (WEA ZB3) 17:45 (WEA ZB3)	07:58 16:28	08:41 16:09
19	05:22 21:46	31 20:39 (WEA ZB1)	06:13 20:50	40	18:56 (WEA ZB2) 20:21 (WEA ZB1)	07:07 19:37	101	16:42 (WEA ZB3) 19:08 (WEA ZB2)	08:01 18:25	58	16:45 (WEA ZB3) 17:43 (WEA ZB3)	08:00 16:27	08:41 16:09
20	05:23 21:45	32 20:08 (WEA ZB1)	06:15 20:48	40	20:40 (WEA ZB1) 19:32 (WEA ZB2)	07:09 19:34	87	20:50 (WEA ZB1) 18:07 (WEA ZB3)	07:09 18:23	54	16:47 (WEA ZB3) 17:41 (WEA ZB3)	08:02 16:25	08:42 16:09
21	05:25 21:44	34 20:07 (WEA ZB1)	06:16 20:46	42	20:07 (WEA ZB1) 18:51 (WEA ZB2)	07:11 19:32	88	20:48 (WEA ZB1) 16:39 (WEA ZB3)	07:11 08:05	50	16:49 (WEA ZB3) 17:39 (WEA ZB3)	08:04 16:24	08:43 16:10
22	05:26 21:42	34 20:41 (WEA ZB1)	06:18 20:44	44	20:07 (WEA ZB1) 18:49 (WEA ZB2)	07:12 19:29	89	20:46 (WEA ZB1) 16:38 (WEA ZB3)	07:12 08:07	45	16:50 (WEA ZB3) 17:36 (WEA ZB3)	08:06 16:23	08:43 16:10
23	05:28 21:41	35 20:42 (WEA ZB1)	06:20 20:41	46	20:06 (WEA ZB1) 19:33 (WEA ZB2)	07:14 19:27	89	20:44 (WEA ZB1) 16:37 (WEA ZB3)	07:14 08:09	41	16:53 (WEA ZB3) 17:34 (WEA ZB3)	08:07 16:21	08:44 16:11
24	05:29 21:40	37 20:43 (WEA ZB1)	06:22 20:39	48	20:05 (WEA ZB1) 18:47 (WEA ZB2)	06:22 19:24	90	20:41 (WEA ZB1) 16:36 (WEA ZB3)	06:22 08:11	34	16:56 (WEA ZB3) 17:30 (WEA ZB3)	08:09 16:20	08:44 16:11
25	05:31 21:38	38 20:43 (WEA ZB1)	06:23 20:37	49	20:05 (WEA ZB1) 18:45 (WEA ZB2)	06:23 19:22	90	20:44 (WEA ZB1) 16:36 (WEA ZB3)	06:23 07:13	26	16:00 (WEA ZB3) 16:26 (WEA ZB3)	08:11 16:19	08:45 16:12
26	05:32 21:37	39 20:44 (WEA ZB1)	06:25 20:35	50	20:07 (WEA ZB1) 18:45 (WEA ZB2)	06:25 19:20	90	20:45 (WEA ZB1) 16:36 (WEA ZB3)	06:25 17:10	14	16:06 (WEA ZB3) 16:20 (WEA ZB3)	08:13 16:18	08:45 16:13
27	05:34 21:35	40 20:04 (WEA ZB1)	06:27 20:32	51	20:05 (WEA ZB1) 18:44 (WEA ZB2)	06:27 19:21	90	20:06 (WEA ZB3) 16:35 (WEA ZB3)	06:27 07:17			08:14 16:17	08:45 16:13
28	05:35 21:33	39 20:44 (WEA ZB1)	06:29 20:30	52	20:04 (WEA ZB1) 18:43 (WEA ZB2)	06:29 19:17	90	20:07 (WEA ZB3) 16:34 (WEA ZB3)	06:29 07:18			08:16 16:16	08:45 16:14
29	05:37 21:32	40 20:44 (WEA ZB1)	06:30 20:28	69	20:04 (WEA ZB1) 18:45 (WEA ZB2)	06:30 19:12	91	20:05 (WEA ZB3) 16:34 (WEA ZB3)	06:30 17:05			08:18 16:15	08:45 16:15
30	05:39 21:30	41 20:04 (WEA ZB1)	06:32 20:25	81	20:03 (WEA ZB1) 19:36 (WEA ZB2)	06:32 19:10	90	20:05 (WEA ZB3) 18:05 (WEA ZB3)	06:32 17:03			08:19 16:14	08:45 16:16
31	05:40 21:28	42 20:04 (WEA ZB1)	06:34 20:23	89	20:04 (WEA ZB1) 19:35 (WEA ZB2)	06:34 19:17		20:06 (WEA ZB3) 16:59	06:34 16:59			08:45 16:17	
Sonnenscheinstunden		511	459			382		329		260	235		
astr.max.mögl.Beschattung		739	1406			3119		1744					

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)

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO34 - Westerhausen 6
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai			Juni	
1	08:45	13:19 (WEA ZB3)	08:16	13:27 (WEA ZB3)	07:19	16:30 (WEA ZB2)	07:04	17:40 (WEA ZB2)	05:55	19:07 (WEA ZB1)	05:06						
	16:18	87	14:46 (WEA ZB3)	17:09	92	14:59 (WEA ZB3)	18:04	60	17:30 (WEA ZB2)	20:02	27	18:07 (WEA ZB2)	20:57	54	20:01 (WEA ZB1)	21:47	
2	08:45		13:20 (WEA ZB3)	08:14		13:27 (WEA ZB3)	07:16		16:29 (WEA ZB2)	07:02		17:44 (WEA ZB2)	05:53		19:08 (WEA ZB1)	05:05	
	16:19	86	14:46 (WEA ZB3)	17:11	91	14:58 (WEA ZB3)	18:06	62	17:31 (WEA ZB2)	20:04	18	18:02 (WEA ZB2)	20:59	52	20:00 (WEA ZB1)	21:48	
3	08:45		13:19 (WEA ZB3)	08:12		13:27 (WEA ZB3)	07:14		16:27 (WEA ZB2)	06:59			05:51		19:08 (WEA ZB1)	05:05	
	16:21	87	14:46 (WEA ZB3)	17:13	91	14:58 (WEA ZB3)	18:08	64	17:31 (WEA ZB2)	20:06			21:01	52	20:00 (WEA ZB1)	21:49	
4	08:45		13:20 (WEA ZB3)	08:10		13:29 (WEA ZB3)	07:12		16:27 (WEA ZB2)	06:57			05:49		19:08 (WEA ZB1)	05:04	
	16:22	87	14:47 (WEA ZB3)	17:15	90	14:59 (WEA ZB3)	18:10	65	17:32 (WEA ZB2)	20:08			21:03	51	19:59 (WEA ZB1)	21:50	
5	08:44		13:21 (WEA ZB3)	08:09		13:29 (WEA ZB3)	07:09		16:26 (WEA ZB2)	06:54			05:47		19:09 (WEA ZB1)	05:03	
	16:23	88	14:49 (WEA ZB3)	17:17	90	14:59 (WEA ZB3)	18:12	66	17:32 (WEA ZB2)	20:10			21:04	49	19:58 (WEA ZB1)	21:51	
6	08:44		13:21 (WEA ZB3)	08:07		13:30 (WEA ZB3)	07:07		16:25 (WEA ZB2)	06:52			05:45		19:10 (WEA ZB1)	05:02	
	16:24	88	14:49 (WEA ZB3)	17:19	88	14:58 (WEA ZB3)	18:14	67	17:32 (WEA ZB2)	20:12			21:06	48	19:58 (WEA ZB1)	21:52	
7	08:44		13:21 (WEA ZB3)	08:05		13:30 (WEA ZB3)	07:05		16:25 (WEA ZB2)	06:50		19:31 (WEA ZB1)	05:43		19:10 (WEA ZB1)	05:02	
	16:26	88	14:49 (WEA ZB3)	17:21	88	14:58 (WEA ZB3)	18:16	68	17:33 (WEA ZB2)	20:13	15	19:46 (WEA ZB1)	21:08	47	19:57 (WEA ZB1)	21:53	
8	08:43		13:21 (WEA ZB3)	08:03		13:31 (WEA ZB3)	07:02		16:24 (WEA ZB2)	06:47		19:27 (WEA ZB1)	05:42		19:11 (WEA ZB1)	05:01	
	16:27	89	14:50 (WEA ZB3)	17:23	87	14:58 (WEA ZB3)	18:18	68	17:32 (WEA ZB2)	20:15	21	19:48 (WEA ZB1)	21:10	45	19:56 (WEA ZB1)	21:54	
9	08:43		13:21 (WEA ZB3)	08:01		13:32 (WEA ZB3)	07:00		16:24 (WEA ZB2)	06:45		19:23 (WEA ZB1)	05:40		19:11 (WEA ZB1)	05:00	
	16:29	90	14:51 (WEA ZB3)	17:25	85	14:57 (WEA ZB3)	18:20	69	17:33 (WEA ZB2)	20:17	26	19:49 (WEA ZB1)	21:11	44	19:55 (WEA ZB1)	21:55	
10	08:42		13:22 (WEA ZB3)	07:59		13:32 (WEA ZB3)	06:57		16:23 (WEA ZB2)	06:42		19:21 (WEA ZB1)	05:38		19:13 (WEA ZB1)	05:00	
	16:30	89	14:51 (WEA ZB3)	17:27	85	14:57 (WEA ZB3)	18:22	69	17:32 (WEA ZB2)	20:19	30	19:51 (WEA ZB1)	21:13	42	19:55 (WEA ZB1)	21:56	
11	08:41		13:22 (WEA ZB3)	07:57		13:33 (WEA ZB3)	06:55		16:23 (WEA ZB2)	06:40		19:19 (WEA ZB1)	05:36		19:14 (WEA ZB1)	05:00	
	16:32	90	14:52 (WEA ZB3)	17:29	83	14:56 (WEA ZB3)	18:23	70	17:33 (WEA ZB2)	20:21	35	19:54 (WEA ZB1)	21:15	40	19:54 (WEA ZB1)	21:57	
12	08:41		13:22 (WEA ZB3)	07:55		13:33 (WEA ZB3)	06:53		16:22 (WEA ZB2)	06:38		19:17 (WEA ZB1)	05:34		19:14 (WEA ZB1)	04:59	
	16:33	90	14:52 (WEA ZB3)	17:31	82	14:55 (WEA ZB3)	18:25	70	17:32 (WEA ZB2)	20:23	38	19:55 (WEA ZB1)	21:17	38	19:52 (WEA ZB1)	21:58	
13	08:40		13:22 (WEA ZB3)	07:53		13:35 (WEA ZB3)	06:50		16:23 (WEA ZB2)	06:35		19:16 (WEA ZB1)	05:32		19:16 (WEA ZB1)	04:59	
	16:35	91	14:53 (WEA ZB3)	17:33	79	14:54 (WEA ZB3)	18:27	69	17:32 (WEA ZB2)	20:24	41	19:57 (WEA ZB1)	21:18	36	19:52 (WEA ZB1)	21:58	
14	08:39		13:22 (WEA ZB3)	07:51		13:36 (WEA ZB3)	06:48		16:23 (WEA ZB2)	06:33		19:15 (WEA ZB1)	05:31		19:17 (WEA ZB1)	04:59	
	16:36	91	14:53 (WEA ZB3)	17:35	77	14:53 (WEA ZB3)	18:29	69	17:32 (WEA ZB2)	20:26	44	19:59 (WEA ZB1)	21:20	33	19:50 (WEA ZB1)	21:59	
15	08:38		13:23 (WEA ZB3)	07:49		13:37 (WEA ZB3)	06:45		16:22 (WEA ZB2)	06:31		19:14 (WEA ZB1)	05:29		19:19 (WEA ZB1)	04:58	
	16:38	91	14:54 (WEA ZB3)	17:37	76	14:53 (WEA ZB3)	18:31	69	17:31 (WEA ZB2)	20:28	47	20:01 (WEA ZB1)	21:22	30	19:49 (WEA ZB1)	21:59	
16	08:37		13:23 (WEA ZB3)	07:47		13:38 (WEA ZB3)	06:43		16:23 (WEA ZB2)	06:28		19:12 (WEA ZB1)	05:27		19:20 (WEA ZB1)	04:58	
	16:40	92	14:55 (WEA ZB3)	17:39	74	14:52 (WEA ZB3)	18:33	68	17:31 (WEA ZB2)	20:30	49	20:01 (WEA ZB1)	21:23	27	19:47 (WEA ZB1)	22:00	
17	08:36		13:23 (WEA ZB3)	07:45		13:40 (WEA ZB3)	06:41		16:22 (WEA ZB2)	06:26		19:11 (WEA ZB1)	05:26		19:23 (WEA ZB1)	04:58	
	16:41	92	14:55 (WEA ZB3)	17:41	71	14:51 (WEA ZB3)	18:35	68	17:30 (WEA ZB2)	20:32	50	20:01 (WEA ZB1)	21:25	23	19:46 (WEA ZB1)	22:01	
18	08:35		13:23 (WEA ZB3)	07:43		13:41 (WEA ZB3)	06:38		16:23 (WEA ZB2)	06:24		19:10 (WEA ZB1)	05:24		19:24 (WEA ZB1)	04:58	
	16:43	92	14:55 (WEA ZB3)	17:43	85	17:09 (WEA ZB2)	18:37	67	17:30 (WEA ZB2)	20:34	52	20:02 (WEA ZB1)	21:27	19	19:43 (WEA ZB1)	22:01	
19	08:34		13:23 (WEA ZB3)	07:41		13:43 (WEA ZB3)	06:36		16:23 (WEA ZB2)	06:21		19:10 (WEA ZB1)	05:23		19:26 (WEA ZB1)	04:58	
	16:45	93	14:56 (WEA ZB3)	17:45	91	17:14 (WEA ZB2)	18:38	65	17:28 (WEA ZB2)	20:35	53	20:03 (WEA ZB1)	21:28	12	19:40 (WEA ZB1)	22:01	
20	08:33		13:24 (WEA ZB3)	07:39		13:45 (WEA ZB3)	06:33		16:24 (WEA ZB2)	06:19		19:09 (WEA ZB1)	05:21			04:58	
	16:47	93	14:57 (WEA ZB3)	17:47	93	17:17 (WEA ZB2)	18:40	64	17:28 (WEA ZB2)	20:37	54	20:03 (WEA ZB1)	21:30			22:02	
21	08:32		13:23 (WEA ZB3)	07:37		13:47 (WEA ZB3)	06:31		16:24 (WEA ZB2)	06:17		19:08 (WEA ZB1)	05:20			04:58	
	16:48	93	14:56 (WEA ZB3)	17:49	96	17:20 (WEA ZB2)	18:42	62	17:26 (WEA ZB2)	20:39	54	20:02 (WEA ZB1)	21:31			22:02	
22	08:30		13:24 (WEA ZB3)	07:34		13:49 (WEA ZB3)	06:28		16:25 (WEA ZB2)	06:15		19:08 (WEA ZB1)	05:18			04:58	
	16:50	93	14:57 (WEA ZB3)	17:51	94	17:21 (WEA ZB2)	18:44	61	17:26 (WEA ZB2)	20:41	54	20:02 (WEA ZB1)	21:33			22:02	
23	08:29		13:24 (WEA ZB3)	07:32		13:52 (WEA ZB3)	06:26		16:25 (WEA ZB2)	06:12		19:07 (WEA ZB1)	05:17			04:59	
	16:52	93	14:57 (WEA ZB3)	17:53	92	17:23 (WEA ZB2)	18:46	59	17:24 (WEA ZB2)	20:43	56	20:03 (WEA ZB1)	21:34			22:02	
24	08:28		13:25 (WEA ZB3)	07:30		13:56 (WEA ZB3)	06:24		16:26 (WEA ZB2)	06:10		19:07 (WEA ZB1)	05:16			04:59	
	16:54	93	14:58 (WEA ZB3)	17:55	90	17:25 (WEA ZB2)	18:48	57	17:23 (WEA ZB2)	20:44	56	20:03 (WEA ZB1)	21:36			22:02	
25	08:26		13:24 (WEA ZB3)	07:28		13:59 (WEA ZB3)	06:21		16:28 (WEA ZB2)	06:08		19:07 (WEA ZB1)	05:14			04:59	
	16:56	94	14:58 (WEA ZB3)	17:57	85	17:26 (WEA ZB2)	18:50	55	17:23 (WEA ZB2)	20:46	56	20:03 (WEA ZB1)	21:37			22:02	
26	08:25		13:25 (WEA ZB3)	07:25		14:05 (WEA ZB3)	06:19		16:28 (WEA ZB2)	06:06		19:07 (WEA ZB1)	05:13			05:00	
	16:58	94	14:59 (WEA ZB3)	17:59	76	17:27 (WEA ZB2)	18:51	52	17:20 (WEA ZB2)	20:48	55	20:02 (WEA ZB1)	21:39			22:02	
27	08:23		13:25 (WEA ZB3)	07:23		16:32 (WEA ZB2)	06:16		16:30 (WEA ZB2)	06:04		19:07 (WEA ZB1)	05:12			05:00	
	16:59	93	14:58 (WEA ZB3)	18:01	57	17:29 (WEA ZB2)	18:53	49	17:19 (WEA ZB2)	20:50	55	20:02 (WEA ZB1)	21:40			22:02	
28	08:22		13:25 (WEA ZB3)	07:21		16:30 (WEA ZB2)	06:14		16:31 (WEA ZB2)	06:02		19:07 (WEA ZB1)	05:11			05:01	
	17:01	93	14:58 (WEA ZB3)	18:02	59	17:29 (WEA ZB2)	18:55	46	17:17 (WEA ZB2)	20:52	55	20:02 (WEA ZB1)	21:42			22:02	
29	08:20		13:26 (WEA ZB3)				07:11		17:33 (WEA ZB2)	06:00		19:07 (WEA ZB1)	05:09			05:01	
	17:03	93	14:59 (WEA ZB3)				19:57	42	18:15 (WEA ZB2)	20:54	55	20:02 (WEA ZB1)	21:43			22:02	
30	08:19		13:26 (WEA ZB3)				07:09		17:34 (WEA ZB2)	05:57		19:07 (WEA ZB1)	05:08			05:02	
	17:05	93	14:59 (WEA ZB3)				19:59	38	18:12 (WEA ZB2)	20:55	54	20:01 (WEA ZB1)	21:44			22:02	
31	08:17		13:26 (WEA ZB3)				07:06		17:37 (WEA ZB2)				05:07				
	17:07	93	14:59 (WEA ZB3)				20:01	33	18:10 (WEA ZB2)				21:45				
Sonnenscheinstunden		251		274			367			419			493			509	
astr.max.mögl.Beschattung		2819		2347			1891			1150			742				

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:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO34 - Westerhausen 6

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	05:03	05:42	19:24 (WEA ZB1)	06:36	19:18 (WEA ZB1)	07:28	17:02 (WEA ZB2)	07:26	13:01 (WEA ZB3)	08:21	13:04 (WEA ZB3)
2	05:03	05:44	20:03 (WEA ZB1)	06:37	19:52 (WEA ZB1)	07:30	18:12 (WEA ZB2)	07:28	14:26 (WEA ZB3)	08:22	14:34 (WEA ZB3)
3	05:04	05:45	20:04 (WEA ZB1)	06:39	19:21 (WEA ZB1)	07:32	18:10 (WEA ZB2)	07:30	14:27 (WEA ZB3)	08:24	14:34 (WEA ZB3)
4	05:05	05:47	20:05 (WEA ZB1)	06:41	19:24 (WEA ZB1)	07:34	18:10 (WEA ZB2)	07:32	14:28 (WEA ZB3)	08:25	14:34 (WEA ZB3)
5	05:06	05:49	20:06 (WEA ZB1)	06:43	19:28 (WEA ZB1)	07:36	18:10 (WEA ZB2)	07:34	14:29 (WEA ZB3)	08:27	14:34 (WEA ZB3)
6	05:07	05:50	20:07 (WEA ZB1)	06:44	19:43 (WEA ZB1)	07:38	18:09 (WEA ZB2)	07:36	14:30 (WEA ZB3)	08:28	14:34 (WEA ZB3)
7	05:08	05:52	20:08 (WEA ZB1)	06:46	19:18 (WEA ZB1)	07:40	18:08 (WEA ZB2)	07:38	14:31 (WEA ZB3)	08:30	14:34 (WEA ZB3)
8	05:09	05:54	20:09 (WEA ZB1)	06:48	19:16 (WEA ZB1)	07:42	18:07 (WEA ZB2)	07:40	14:32 (WEA ZB3)	08:32	14:34 (WEA ZB3)
9	05:10	05:55	20:10 (WEA ZB1)	06:50	19:15 (WEA ZB1)	07:44	18:06 (WEA ZB2)	07:42	14:33 (WEA ZB3)	08:34	14:34 (WEA ZB3)
10	05:11	05:57	20:11 (WEA ZB1)	06:51	19:14 (WEA ZB1)	07:46	18:05 (WEA ZB2)	07:44	14:34 (WEA ZB3)	08:36	14:34 (WEA ZB3)
11	05:12	05:59	20:12 (WEA ZB1)	06:53	19:13 (WEA ZB1)	07:48	18:04 (WEA ZB2)	07:46	14:35 (WEA ZB3)	08:38	14:34 (WEA ZB3)
12	05:13	06:01	20:13 (WEA ZB1)	06:55	19:12 (WEA ZB1)	07:50	18:03 (WEA ZB2)	07:48	14:36 (WEA ZB3)	08:40	14:34 (WEA ZB3)
13	05:14	06:02	20:14 (WEA ZB1)	06:57	19:11 (WEA ZB1)	07:52	18:02 (WEA ZB2)	07:50	14:37 (WEA ZB3)	08:42	14:34 (WEA ZB3)
14	05:15	06:03	20:15 (WEA ZB1)	06:58	19:10 (WEA ZB1)	07:54	18:01 (WEA ZB2)	07:52	14:38 (WEA ZB3)	08:44	14:34 (WEA ZB3)
15	05:17	06:06	20:16 (WEA ZB1)	07:00	19:09 (WEA ZB1)	07:56	18:00 (WEA ZB2)	07:54	14:39 (WEA ZB3)	08:46	14:34 (WEA ZB3)
16	05:18	06:08	20:17 (WEA ZB1)	07:02	19:08 (WEA ZB1)	07:58	17:59 (WEA ZB2)	07:56	14:40 (WEA ZB3)	08:48	14:34 (WEA ZB3)
17	05:19	06:09	20:18 (WEA ZB1)	07:04	19:07 (WEA ZB1)	08:00	17:58 (WEA ZB2)	07:58	14:41 (WEA ZB3)	08:50	14:34 (WEA ZB3)
18	05:21	06:11	20:19 (WEA ZB1)	07:06	19:06 (WEA ZB1)	08:02	17:57 (WEA ZB2)	08:00	14:42 (WEA ZB3)	08:52	14:34 (WEA ZB3)
19	05:22	06:13	20:20 (WEA ZB1)	07:07	19:05 (WEA ZB1)	08:04	17:56 (WEA ZB2)	08:02	14:43 (WEA ZB3)	08:54	14:34 (WEA ZB3)
20	05:23	06:15	20:21 (WEA ZB1)	07:09	19:04 (WEA ZB1)	08:06	17:55 (WEA ZB2)	08:04	14:44 (WEA ZB3)	08:56	14:34 (WEA ZB3)
21	05:25	06:16	20:22 (WEA ZB1)	07:11	19:03 (WEA ZB1)	08:08	17:54 (WEA ZB2)	08:06	14:45 (WEA ZB3)	08:58	14:34 (WEA ZB3)
22	05:26	06:18	20:23 (WEA ZB1)	07:12	19:02 (WEA ZB1)	08:10	17:53 (WEA ZB2)	08:08	14:46 (WEA ZB3)	09:00	14:34 (WEA ZB3)
23	05:28	06:20	20:24 (WEA ZB1)	07:14	19:01 (WEA ZB1)	08:12	17:52 (WEA ZB2)	08:10	14:47 (WEA ZB3)	09:02	14:34 (WEA ZB3)
24	05:29	06:22	20:25 (WEA ZB1)	07:16	19:00 (WEA ZB1)	08:14	17:51 (WEA ZB2)	08:12	14:48 (WEA ZB3)	09:04	14:34 (WEA ZB3)
25	05:31	06:23	20:26 (WEA ZB1)	07:18	18:59 (WEA ZB1)	08:16	17:50 (WEA ZB2)	08:14	14:49 (WEA ZB3)	09:06	14:34 (WEA ZB3)
26	05:32	06:25	20:27 (WEA ZB1)	07:20	18:58 (WEA ZB1)	08:18	17:49 (WEA ZB2)	08:16	14:50 (WEA ZB3)	09:08	14:34 (WEA ZB3)
27	05:34	06:27	20:28 (WEA ZB1)	07:21	18:57 (WEA ZB1)	08:20	17:48 (WEA ZB2)	08:18	14:51 (WEA ZB3)	09:10	14:34 (WEA ZB3)
28	05:35	06:29	20:29 (WEA ZB1)	07:23	18:56 (WEA ZB1)	08:22	17:47 (WEA ZB2)	08:20	14:52 (WEA ZB3)	09:12	14:34 (WEA ZB3)
29	05:37	06:30	20:30 (WEA ZB1)	07:25	18:55 (WEA ZB1)	08:24	17:46 (WEA ZB2)	08:22	14:53 (WEA ZB3)	09:14	14:34 (WEA ZB3)
30	05:39	06:32	20:31 (WEA ZB1)	07:27	18:54 (WEA ZB1)	08:26	17:45 (WEA ZB2)	08:24	14:54 (WEA ZB3)	09:16	14:34 (WEA ZB3)
31	05:40	06:34	20:32 (WEA ZB1)	07:29	18:53 (WEA ZB1)	08:28	17:44 (WEA ZB2)	08:26	14:55 (WEA ZB3)	09:18	14:34 (WEA ZB3)
Sonnenscheinstunden		511	459	382	329	2335	2738	2679			
astr.max.mögl.Beschattung		195	1537	1255	929	2335	2738	2679			

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO35 - Westerhausen 7
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45 16:18 79	12:47 (WEA ZB3) 14:06 (WEA ZB3) 17:09	08:16 17:09 94	13:09 (WEA ZB3) 16:36 (WEA ZB2) 18:04	07:19 18:04 65	15:45 (WEA ZB2) 16:50 (WEA ZB2) 20:02	07:04 20:02 51	18:43 (WEA ZB1) 19:34 (WEA ZB1) 20:57	05:55 20:57 15	18:55 (WEA ZB1) 19:10 (WEA ZB1) 21:47	05:06 21:47 05:05
2	08:45 16:19 79	12:48 (WEA ZB3) 14:07 (WEA ZB3) 17:11	08:14 17:11 95	13:11 (WEA ZB3) 16:38 (WEA ZB2) 18:06	07:16 18:06 63	15:46 (WEA ZB2) 16:49 (WEA ZB2) 20:04	07:02 20:04 53	18:41 (WEA ZB1) 19:34 (WEA ZB1) 20:59	05:53 20:59 51	18:41 (WEA ZB1) 19:34 (WEA ZB1) 21:48	05:05 21:48 05:04
3	08:45 16:21 78	12:48 (WEA ZB3) 14:06 (WEA ZB3) 17:13	08:12 17:13 96	13:13 (WEA ZB3) 16:41 (WEA ZB2) 18:08	07:14 18:08 62	15:46 (WEA ZB2) 16:48 (WEA ZB2) 20:06	06:59 20:06 54	18:41 (WEA ZB1) 19:35 (WEA ZB1) 21:01	05:51 21:01 50	18:41 (WEA ZB1) 19:39 (WEA ZB1) 21:49	05:05 21:49 05:04
4	08:45 16:22 78	12:49 (WEA ZB3) 14:07 (WEA ZB3) 17:15	08:10 17:15 94	13:15 (WEA ZB3) 16:42 (WEA ZB2) 18:10	07:12 18:10 60	15:47 (WEA ZB2) 16:47 (WEA ZB2) 20:08	06:57 20:08 56	18:39 (WEA ZB1) 19:35 (WEA ZB1) 21:03	05:49 21:03 50	18:39 (WEA ZB1) 19:38 (WEA ZB1) 21:50	05:04 21:50 05:03
5	08:44 16:23 78	12:50 (WEA ZB3) 14:08 (WEA ZB3) 17:17	08:09 17:17 93	13:17 (WEA ZB3) 16:43 (WEA ZB2) 18:12	07:09 18:12 58	15:48 (WEA ZB2) 16:46 (WEA ZB2) 20:10	06:54 20:10 56	18:39 (WEA ZB1) 19:35 (WEA ZB1) 21:04	05:47 21:04 51	18:39 (WEA ZB1) 19:38 (WEA ZB1) 21:51	05:03 21:51 05:02
6	08:44 16:24 78	12:50 (WEA ZB3) 14:08 (WEA ZB3) 17:19	08:07 17:19 91	13:20 (WEA ZB3) 16:45 (WEA ZB2) 18:14	07:07 18:14 56	15:49 (WEA ZB2) 16:45 (WEA ZB2) 20:12	06:52 20:12 58	18:38 (WEA ZB1) 19:36 (WEA ZB1) 21:06	05:45 21:06 51	18:38 (WEA ZB1) 19:37 (WEA ZB1) 21:52	05:02 21:52 05:01
7	08:44 16:26 78	12:51 (WEA ZB3) 14:08 (WEA ZB3) 17:21	08:05 17:21 87	13:23 (WEA ZB3) 16:46 (WEA ZB2) 18:16	07:05 18:16 54	15:50 (WEA ZB2) 16:44 (WEA ZB2) 20:13	06:50 20:13 58	18:37 (WEA ZB1) 19:35 (WEA ZB1) 21:08	05:43 21:08 51	18:37 (WEA ZB1) 19:35 (WEA ZB1) 21:52	05:01 21:52 05:00
8	08:43 16:27 78	12:51 (WEA ZB3) 14:09 (WEA ZB3) 17:23	08:03 17:23 81	13:27 (WEA ZB3) 16:47 (WEA ZB2) 18:18	07:02 18:18 51	15:51 (WEA ZB2) 16:42 (WEA ZB2) 20:15	06:47 20:15 58	18:37 (WEA ZB1) 19:35 (WEA ZB1) 21:10	05:42 21:10 51	18:37 (WEA ZB1) 19:36 (WEA ZB1) 21:54	05:01 21:54 05:00
9	08:43 16:29 78	12:51 (WEA ZB3) 14:09 (WEA ZB3) 17:25	08:01 17:25 70	13:34 (WEA ZB3) 16:48 (WEA ZB2) 18:20	07:00 18:20 48	15:53 (WEA ZB2) 16:41 (WEA ZB2) 20:17	06:45 20:17 59	18:36 (WEA ZB1) 19:35 (WEA ZB1) 21:11	05:40 21:11 51	18:36 (WEA ZB1) 19:35 (WEA ZB1) 21:55	05:00 21:55 05:00
10	08:42 16:30 77	12:52 (WEA ZB3) 14:09 (WEA ZB3) 17:27	07:59 17:27 60	13:34 (WEA ZB3) 16:49 (WEA ZB2) 18:22	06:57 18:22 45	15:54 (WEA ZB2) 16:39 (WEA ZB2) 20:19	06:42 20:19 59	18:36 (WEA ZB1) 19:35 (WEA ZB1) 21:13	05:39 21:13 51	18:36 (WEA ZB1) 19:35 (WEA ZB1) 21:56	05:00 21:56 05:00
11	08:41 16:31 78	12:52 (WEA ZB3) 14:10 (WEA ZB3) 17:29	07:57 17:29 60	13:34 (WEA ZB3) 16:49 (WEA ZB2) 18:23	06:55 18:23 41	15:56 (WEA ZB2) 16:37 (WEA ZB2) 20:21	06:40 20:21 59	18:36 (WEA ZB1) 19:35 (WEA ZB1) 21:15	05:36 21:15 51	18:36 (WEA ZB1) 19:35 (WEA ZB1) 21:57	05:00 21:57 05:00
12	08:41 16:33 77	12:53 (WEA ZB3) 14:10 (WEA ZB3) 17:31	07:55 17:31 62	13:34 (WEA ZB3) 16:49 (WEA ZB2) 18:25	06:53 18:25 36	15:58 (WEA ZB2) 16:34 (WEA ZB2) 20:23	06:38 20:23 59	18:35 (WEA ZB1) 19:34 (WEA ZB1) 21:17	05:34 21:17 51	18:35 (WEA ZB1) 19:34 (WEA ZB1) 21:58	04:59 21:58 05:00
13	08:40 16:35 77	12:53 (WEA ZB3) 14:10 (WEA ZB3) 17:33	07:53 17:33 63	13:34 (WEA ZB3) 16:50 (WEA ZB2) 18:27	06:50 18:27 31	16:01 (WEA ZB2) 16:32 (WEA ZB2) 20:24	06:35 20:24 59	18:35 (WEA ZB1) 19:34 (WEA ZB1) 21:18	05:32 21:18 51	18:35 (WEA ZB1) 19:34 (WEA ZB1) 21:58	04:59 21:58 05:00
14	08:39 16:36 76	12:54 (WEA ZB3) 14:10 (WEA ZB3) 17:35	07:51 17:35 65	13:34 (WEA ZB3) 16:51 (WEA ZB2) 18:29	06:48 18:29 23	16:05 (WEA ZB2) 16:28 (WEA ZB2) 20:26	06:33 20:26 58	18:35 (WEA ZB1) 19:34 (WEA ZB1) 21:20	05:31 21:20 51	18:36 (WEA ZB1) 19:34 (WEA ZB1) 21:59	04:59 21:59 05:00
15	08:38 16:38 77	12:54 (WEA ZB3) 14:11 (WEA ZB3) 17:37	07:49 17:37 65	13:34 (WEA ZB3) 16:51 (WEA ZB2) 18:31	06:45 18:31 12	16:10 (WEA ZB2) 16:22 (WEA ZB2) 20:28	06:31 20:28 57	18:36 (WEA ZB1) 19:33 (WEA ZB1) 21:22	05:29 21:22 51	18:36 (WEA ZB1) 19:33 (WEA ZB1) 21:59	04:58 21:59 05:00
16	08:37 16:40 76	12:55 (WEA ZB3) 14:11 (WEA ZB3) 17:39	07:47 17:39 66	13:34 (WEA ZB3) 16:52 (WEA ZB2) 18:33	06:43 18:33 13	16:11 (WEA ZB2) 16:23 (WEA ZB2) 20:30	06:28 20:30 56	18:36 (WEA ZB1) 19:32 (WEA ZB1) 21:23	05:27 21:23 51	18:36 (WEA ZB1) 19:32 (WEA ZB1) 21:58	04:58 21:58 05:00
17	08:36 16:41 75	12:56 (WEA ZB3) 14:11 (WEA ZB3) 17:41	07:45 17:41 66	13:34 (WEA ZB3) 16:52 (WEA ZB2) 18:35	06:41 18:35 13	16:12 (WEA ZB2) 16:24 (WEA ZB2) 20:32	06:26 20:32 55	18:36 (WEA ZB1) 19:31 (WEA ZB1) 21:25	05:26 21:25 51	18:36 (WEA ZB1) 19:31 (WEA ZB1) 21:59	04:58 21:59 05:00
18	08:35 16:43 75	12:56 (WEA ZB3) 14:11 (WEA ZB3) 17:43	07:43 17:43 68	13:34 (WEA ZB3) 16:52 (WEA ZB2) 18:37	06:38 18:37 13	16:13 (WEA ZB2) 16:25 (WEA ZB2) 20:34	06:24 20:34 54	18:37 (WEA ZB1) 19:31 (WEA ZB1) 21:27	05:24 21:27 51	18:37 (WEA ZB1) 19:31 (WEA ZB1) 21:59	04:58 21:59 05:00
19	08:34 16:45 74	12:57 (WEA ZB3) 14:11 (WEA ZB3) 17:45	07:41 17:45 68	13:34 (WEA ZB3) 16:52 (WEA ZB2) 18:38	06:36 18:38 13	16:14 (WEA ZB2) 16:26 (WEA ZB2) 20:36	06:22 20:36 53	18:37 (WEA ZB1) 19:30 (WEA ZB1) 21:28	05:23 21:28 51	18:37 (WEA ZB1) 19:30 (WEA ZB1) 21:59	04:58 21:59 05:00
20	08:33 16:46 73	12:58 (WEA ZB3) 14:11 (WEA ZB3) 17:47	07:39 17:47 69	13:34 (WEA ZB3) 16:53 (WEA ZB2) 18:40	06:33 18:40 13	16:15 (WEA ZB2) 16:27 (WEA ZB2) 20:38	06:19 20:38 52	18:38 (WEA ZB1) 19:30 (WEA ZB1) 21:30	05:21 21:30 51	18:38 (WEA ZB1) 19:30 (WEA ZB1) 21:59	04:58 21:59 05:00
21	08:32 16:48 73	12:58 (WEA ZB3) 14:11 (WEA ZB3) 17:49	07:37 17:49 68	13:34 (WEA ZB3) 16:53 (WEA ZB2) 18:42	06:31 18:42 13	16:16 (WEA ZB2) 16:28 (WEA ZB2) 20:40	06:17 20:40 50	18:38 (WEA ZB1) 19:28 (WEA ZB1) 21:31	05:20 21:31 51	18:38 (WEA ZB1) 19:28 (WEA ZB1) 21:59	04:58 21:59 05:00
22	08:30 16:50 72	12:59 (WEA ZB3) 14:11 (WEA ZB3) 17:51	07:34 17:51 68	13:34 (WEA ZB3) 16:54 (WEA ZB2) 18:44	06:28 18:44 13	16:17 (WEA ZB2) 16:29 (WEA ZB2) 20:42	06:15 20:42 48	18:39 (WEA ZB1) 19:27 (WEA ZB1) 21:33	05:18 21:33 51	18:39 (WEA ZB1) 19:27 (WEA ZB1) 21:59	04:58 21:59 05:00
23	08:29 16:52 71	12:59 (WEA ZB3) 14:10 (WEA ZB3) 17:53	07:32 17:53 68	13:34 (WEA ZB3) 16:54 (WEA ZB2) 18:46	06:26 18:46 13	16:18 (WEA ZB2) 16:30 (WEA ZB2) 20:44	06:12 20:44 46	18:40 (WEA ZB1) 19:26 (WEA ZB1) 21:34	05:17 21:34 51	18:40 (WEA ZB1) 19:26 (WEA ZB1) 21:59	04:59 21:59 05:00
24	08:28 16:54 70	13:01 (WEA ZB3) 14:11 (WEA ZB3) 17:55	07:30 17:55 68	13:34 (WEA ZB3) 16:54 (WEA ZB2) 18:48	06:24 18:48 22	16:19 (WEA ZB2) 16:31 (WEA ZB2) 20:46	06:10 20:46 44	18:41 (WEA ZB1) 19:25 (WEA ZB1) 21:36	05:16 21:36 51	18:41 (WEA ZB1) 19:25 (WEA ZB1) 21:59	04:59 21:59 05:00
25	08:26 16:56 69	13:01 (WEA ZB3) 14:10 (WEA ZB3) 17:57	07:28 17:57 67	13:34 (WEA ZB3) 16:54 (WEA ZB2) 18:50	06:21 18:50 28	16:20 (WEA ZB2) 16:32 (WEA ZB2) 20:48	06:08 20:48 41	18:42 (WEA ZB1) 19:23 (WEA ZB1) 21:37	05:14 21:37 51	18:42 (WEA ZB1) 19:23 (WEA ZB1) 21:59	04:59 21:59 05:00
26	08:25 16:58 67	13:03 (WEA ZB3) 14:10 (WEA ZB3) 17:59	07:25 17:59 67	13:34 (WEA ZB3) 16:54 (WEA ZB2) 18:51	06:19 18:51 32	16:21 (WEA ZB2) 16:33 (WEA ZB2) 20:50	06:06 20:50 39	18:43 (WEA ZB1) 19:22 (WEA ZB1) 21:39	05:13 21:39 51	18:43 (WEA ZB1) 19:22 (WEA ZB1) 21:59	05:00 21:59 05:00
27	08:23 16:59 75	13:03 (WEA ZB3) 16:21 (WEA ZB2) 18:01	07:23 18:01 66	13:34 (WEA ZB3) 16:54 (WEA ZB2) 18:53	06:16 18:53 36	16:22 (WEA ZB2) 16:34 (WEA ZB2) 20:52	06:04 20:52 35	18:45 (WEA ZB1) 19:20 (WEA ZB1) 21:40	05:12 21:40 51	18:45 (WEA ZB1) 19:20 (WEA ZB1) 21:59	05:00 21:59 05:00
28	08:22 17:01 83	13:04 (WEA ZB3) 16:26 (WEA ZB2) 18:02	07:21 18:02 65	13:34 (WEA ZB3) 16:55 (WEA ZB2) 18:55	06:14 18:55 40	16:23 (WEA ZB2) 16:35 (WEA ZB2) 20:54	06:02 20:54 31	18:47 (WEA ZB1) 19:18 (WEA ZB1) 21:42	05:11 21:42 51	18:47 (WEA ZB1) 19:18 (WEA ZB1) 21:59	05:01 21:59 05:00
29	08:20 17:03 88	13:06 (WEA ZB3) 16:30 (WEA ZB2) 18:07	07:19 18:07 65	13:34 (WEA ZB3) 16:56 (WEA ZB2) 18:57	06:11 18:57 44	16:24 (WEA ZB2) 16:36 (WEA ZB2) 20:56	06:00 20:56 27	18:49 (WEA ZB1) 19:16 (WEA ZB1) 21:43	05:09 21:43 51	18:49 (WEA ZB1) 19:16 (WEA ZB1) 21:59	05:01 21:59 05:00
30	08:19 17:05 91	13:07 (WEA ZB3) 16:32 (WEA ZB2) 18:08	07:17 18:08 65	13:34 (WEA ZB3) 16:56 (WEA ZB2) 18:59	06:09 18:59 47	16:25 (WEA ZB2) 16:37 (WEA ZB2) 20:58	05:57 20:58 22	18:51 (WEA ZB1) 19:13 (WEA ZB1) 21:44	05:08 21:44 51	18:51 (WEA ZB1) 19:13 (WEA ZB1) 21:59	05:02 21:59 05:00
31	08:17 17:07 93	13:08 (WEA ZB3) 16:35 (WEA ZB2) 18:09	07:15 18:09 65	13:34 (WEA ZB3) 16:57 (WEA ZB2) 19:00	06:06 19:00 49	16:26 (WEA ZB2) 16:38 (WEA ZB2) 21:00	05:55 21:00 22	18:53 (WEA ZB1) 19:15 (WEA ZB1) 21:45	05:07 21:45 51	18:53 (WEA ZB1) 19:15 (WEA ZB1) 21:59	05:02 21:59 05:00
Sonnenscheinstunden		251	274	367	419	493	509				
astr.max.mögl.Beschattung		2391	2050	1016	1507	15	509				

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO35 - Westerhausen 7
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	05:03 22:01	05:42 21:27	06:36 20:21	18:35 (WEA ZB1) 07:28 19:34 (WEA ZB1) 19:07	16:39 (WEA ZB2) 07:26 17:13 (WEA ZB2) 16:57	15:18 (WEA ZB2) 08:21 16:17 (WEA ZB2) 16:13
2	05:03 22:01	05:44 21:25	06:37 20:18	18:35 (WEA ZB1) 07:30 19:34 (WEA ZB1) 19:05	16:35 (WEA ZB2) 07:28 17:14 (WEA ZB2) 16:55	13:02 (WEA ZB3) 08:22 16:17 (WEA ZB2) 16:13
3	05:04 22:01	05:45 21:23	06:39 20:16	18:34 (WEA ZB1) 07:32 19:33 (WEA ZB1) 19:02	16:33 (WEA ZB2) 07:30 17:16 (WEA ZB2) 16:53	12:56 (WEA ZB3) 08:24 16:31 (WEA ZB2) 07:32
4	05:05 22:00	05:47 21:21	06:41 20:13	18:34 (WEA ZB1) 07:34 19:32 (WEA ZB1) 19:00	16:31 (WEA ZB2) 07:32 17:17 (WEA ZB2) 16:51	12:52 (WEA ZB3) 08:25 16:15 (WEA ZB2) 16:11
5	05:06 22:00	05:49 21:19	06:43 20:11	18:34 (WEA ZB1) 07:36 19:32 (WEA ZB1) 18:58	16:29 (WEA ZB2) 07:34 17:19 (WEA ZB2) 16:50	12:49 (WEA ZB3) 08:27 16:14 (WEA ZB2) 16:11
6	05:07 21:59	05:50 21:17	06:44 20:09	18:34 (WEA ZB1) 07:37 19:31 (WEA ZB1) 18:55	16:27 (WEA ZB2) 07:36 17:20 (WEA ZB2) 16:48	12:47 (WEA ZB3) 08:28 16:13 (WEA ZB2) 16:10
7	05:08 21:58	05:52 21:15	06:46 20:06	18:34 (WEA ZB1) 07:39 19:30 (WEA ZB1) 18:53	16:26 (WEA ZB2) 07:38 17:21 (WEA ZB2) 16:46	12:45 (WEA ZB3) 08:29 16:12 (WEA ZB2) 16:10
8	05:09 21:58	05:54 21:13	06:48 20:04	18:34 (WEA ZB1) 07:41 19:30 (WEA ZB1) 18:50	16:24 (WEA ZB2) 07:40 17:21 (WEA ZB2) 16:44	12:43 (WEA ZB3) 08:31 16:10 (WEA ZB2) 16:09
9	05:10 21:57	05:55 21:11	06:50 20:01	18:34 (WEA ZB1) 07:43 19:28 (WEA ZB1) 18:48	16:22 (WEA ZB2) 07:42 17:21 (WEA ZB2) 16:42	12:41 (WEA ZB3) 08:32 16:09 (WEA ZB2) 16:09
10	05:11 21:56	05:57 21:09	06:51 19:59	18:35 (WEA ZB1) 07:45 19:27 (WEA ZB1) 18:46	16:21 (WEA ZB2) 07:43 17:22 (WEA ZB2) 16:41	12:40 (WEA ZB3) 08:33 16:07 (WEA ZB2) 16:09
11	05:12 21:55	05:59 21:07	06:53 19:59 (WEA ZB1) 19:56	18:35 (WEA ZB1) 07:47 19:27 (WEA ZB1) 18:43	16:20 (WEA ZB2) 07:45 17:22 (WEA ZB2) 16:39	12:39 (WEA ZB3) 08:34 16:05 (WEA ZB2) 16:08
12	05:13 21:54	06:01 21:05	06:55 19:02 (WEA ZB1) 19:54	18:35 (WEA ZB1) 07:48 19:25 (WEA ZB1) 18:41	16:19 (WEA ZB2) 07:47 17:23 (WEA ZB2) 16:37	12:38 (WEA ZB3) 08:35 16:03 (WEA ZB2) 16:08
13	05:14 21:53	06:02 21:03	06:57 19:22 (WEA ZB1) 19:52	18:36 (WEA ZB1) 07:50 19:23 (WEA ZB1) 18:39	16:18 (WEA ZB2) 07:49 17:23 (WEA ZB2) 16:36	12:38 (WEA ZB3) 08:36 16:02 (WEA ZB2) 16:08
14	05:15 21:52	06:04 21:01	06:58 19:24 (WEA ZB1) 19:49	18:37 (WEA ZB1) 07:52 19:21 (WEA ZB1) 18:36	16:18 (WEA ZB2) 07:51 17:23 (WEA ZB2) 16:34	12:37 (WEA ZB3) 08:37 15:59 (WEA ZB2) 16:08
15	05:17 21:51	06:06 20:59	07:00 19:26 (WEA ZB1) 19:47	18:39 (WEA ZB1) 07:54 19:19 (WEA ZB1) 18:34	16:17 (WEA ZB2) 07:53 17:23 (WEA ZB2) 16:32	12:36 (WEA ZB3) 08:38 15:53 (WEA ZB2) 16:08
16	05:18 21:50	06:08 20:57	07:02 19:27 (WEA ZB1) 19:44	18:39 (WEA ZB1) 07:56 19:16 (WEA ZB1) 18:32	16:16 (WEA ZB2) 07:55 17:24 (WEA ZB2) 16:31	12:36 (WEA ZB3) 08:39 15:53 (WEA ZB2) 16:08
17	05:19 21:49	06:09 20:55	07:04 19:29 (WEA ZB1) 19:42	18:41 (WEA ZB1) 07:58 19:14 (WEA ZB1) 18:29	16:16 (WEA ZB2) 07:57 17:24 (WEA ZB2) 16:29	12:35 (WEA ZB3) 08:40 13:44 (WEA ZB3) 16:08
18	05:21 21:48	06:11 20:53	07:05 19:30 (WEA ZB1) 19:39	18:43 (WEA ZB1) 08:00 19:12 (WEA ZB1) 18:27	16:16 (WEA ZB2) 07:58 17:24 (WEA ZB2) 16:28	12:35 (WEA ZB3) 08:41 13:45 (WEA ZB3) 16:09
19	05:22 21:47	06:13 20:50	07:07 19:31 (WEA ZB1) 19:37	18:45 (WEA ZB1) 08:01 19:08 (WEA ZB1) 18:25	16:15 (WEA ZB2) 08:00 17:23 (WEA ZB2) 16:27	12:34 (WEA ZB3) 08:41 13:45 (WEA ZB3) 16:09
20	05:23 21:45	06:15 20:48	07:09 19:32 (WEA ZB1) 19:34	18:49 (WEA ZB1) 08:03 19:05 (WEA ZB1) 18:23	16:15 (WEA ZB2) 08:02 17:23 (WEA ZB2) 16:25	12:34 (WEA ZB3) 08:42 13:46 (WEA ZB3) 16:09
21	05:25 21:44	06:16 20:46	07:11 19:33 (WEA ZB1) 19:32	08:05 18:20	16:15 (WEA ZB2) 08:04 17:23 (WEA ZB2) 16:24	12:34 (WEA ZB3) 08:43 13:47 (WEA ZB3) 16:10
22	05:26 21:43	06:18 20:44	07:12 19:33 (WEA ZB1) 19:29	08:07 18:18	16:15 (WEA ZB2) 08:06 17:23 (WEA ZB2) 16:23	12:34 (WEA ZB3) 08:43 13:47 (WEA ZB3) 16:10
23	05:28 21:41	06:20 20:41	07:14 19:33 (WEA ZB1) 19:27	08:09 18:16	16:15 (WEA ZB2) 08:07 17:23 (WEA ZB2) 16:21	12:34 (WEA ZB3) 08:44 13:48 (WEA ZB3) 16:11
24	05:29 21:40	06:22 20:39	07:16 19:34 (WEA ZB1) 19:24	08:11 18:14	16:15 (WEA ZB2) 08:09 17:22 (WEA ZB2) 16:20	12:34 (WEA ZB3) 08:44 13:49 (WEA ZB3) 16:11
25	05:31 21:38	06:23 20:37	07:18 19:39 (WEA ZB1) 19:22	08:13 17:12	16:15 (WEA ZB2) 08:11 17:22 (WEA ZB2) 16:19	12:33 (WEA ZB3) 08:45 13:48 (WEA ZB3) 16:12
26	05:32 21:37	06:25 20:35	07:20 19:39 (WEA ZB1) 19:20	08:15 17:10	16:15 (WEA ZB2) 08:13 17:21 (WEA ZB2) 16:18	12:33 (WEA ZB3) 08:45 13:49 (WEA ZB3) 16:13
27	05:34 21:35	06:27 20:32	07:21 19:38 (WEA ZB1) 19:17	08:17 17:08	16:15 (WEA ZB2) 08:14 17:21 (WEA ZB2) 16:17	12:34 (WEA ZB3) 08:45 13:50 (WEA ZB3) 16:13
28	05:35 21:33	06:29 20:30	07:23 19:37 (WEA ZB1) 19:15	08:18 17:05	16:16 (WEA ZB2) 08:16 17:20 (WEA ZB2) 16:16	12:34 (WEA ZB3) 08:45 13:50 (WEA ZB3) 16:14
29	05:37 21:32	06:30 20:28	07:25 19:37 (WEA ZB1) 19:12	08:20 17:07 (WEA ZB2) 17:03	16:16 (WEA ZB2) 08:18 16:19 (WEA ZB2) 16:15	12:34 (WEA ZB3) 08:45 13:51 (WEA ZB3) 16:15
30	05:39 21:30	06:32 20:25	07:27 19:36 (WEA ZB1) 19:10	08:22 17:10 (WEA ZB2) 17:01	16:17 (WEA ZB2) 08:19 16:19 (WEA ZB2) 16:14	12:34 (WEA ZB3) 08:45 13:51 (WEA ZB3) 16:15
31	05:40 21:28	06:34 20:23	07:29 19:35 (WEA ZB1)	08:24 16:59	16:17 (WEA ZB2) 16:14 16:18 (WEA ZB2)	12:34 (WEA ZB3) 08:45 16:17
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		917	988	1879	2391	2431

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)	Zeitpunkt (SS:MM)	Schattenende (WEA mit letztem Schatten)

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO36 - Westerhausen 10
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45 16:18 76	13:19 (WEA ZB3) 14:35 (WEA ZB3) 17:09	08:16 13:38 (WEA ZB3) 17:19	16:03 (WEA ZB2) 17:03 (WEA ZB2) 20:02	18:46 (WEA ZB1) 19:34 (WEA ZB1) 20:57	05:55 20:57 21:47
2	08:45 16:19 75	13:20 (WEA ZB3) 14:35 (WEA ZB3) 17:11	08:14 13:39 (WEA ZB3) 17:16	16:03 (WEA ZB2) 17:03 (WEA ZB2) 20:04	18:46 (WEA ZB1) 19:35 (WEA ZB1) 20:59	05:53 20:59 21:48
3	08:45 16:21 75	13:20 (WEA ZB3) 14:35 (WEA ZB3) 17:13	08:12 13:41 (WEA ZB3) 17:14	16:03 (WEA ZB2) 17:01 (WEA ZB2) 20:06	18:45 (WEA ZB1) 19:36 (WEA ZB1) 21:01	05:51 21:01 21:49
4	08:45 16:22 75	13:21 (WEA ZB3) 14:36 (WEA ZB3) 17:15	08:10 13:43 (WEA ZB3) 17:12	16:04 (WEA ZB2) 17:01 (WEA ZB2) 20:08	18:44 (WEA ZB1) 19:35 (WEA ZB1) 21:03	05:49 21:03 21:50
5	08:44 16:23 75	13:22 (WEA ZB3) 14:37 (WEA ZB3) 17:17	08:09 13:45 (WEA ZB3) 17:09	16:04 (WEA ZB2) 17:00 (WEA ZB2) 20:10	18:44 (WEA ZB1) 19:36 (WEA ZB1) 21:04	05:47 21:04 21:51
6	08:44 16:24 75	13:22 (WEA ZB3) 14:37 (WEA ZB3) 17:19	08:07 13:47 (WEA ZB3) 17:07	16:05 (WEA ZB2) 16:59 (WEA ZB2) 20:12	18:43 (WEA ZB1) 19:36 (WEA ZB1) 21:06	05:45 21:06 21:52
7	08:44 16:26 75	13:22 (WEA ZB3) 14:37 (WEA ZB3) 17:21	08:05 13:49 (WEA ZB3) 17:05	16:06 (WEA ZB2) 16:58 (WEA ZB2) 20:13	18:42 (WEA ZB1) 19:35 (WEA ZB1) 21:08	05:43 21:08 21:53
8	08:43 16:27 75	13:23 (WEA ZB3) 14:38 (WEA ZB3) 17:23	08:03 13:51 (WEA ZB3) 17:02	16:07 (WEA ZB2) 16:57 (WEA ZB2) 20:15	18:42 (WEA ZB1) 19:36 (WEA ZB1) 21:10	05:42 21:10 21:54
9	08:43 16:29 75	13:23 (WEA ZB3) 14:38 (WEA ZB3) 17:25	08:01 13:55 (WEA ZB3) 17:00	16:08 (WEA ZB2) 16:56 (WEA ZB2) 20:17	18:41 (WEA ZB1) 19:35 (WEA ZB1) 21:11	05:40 21:11 21:55
10	08:42 16:30 76	13:23 (WEA ZB3) 14:39 (WEA ZB3) 17:27	07:59 13:59 (WEA ZB3) 16:57	16:09 (WEA ZB2) 16:53 (WEA ZB2) 20:19	18:42 (WEA ZB1) 19:35 (WEA ZB1) 21:13	05:38 21:13 21:56
11	08:41 16:31 75	13:24 (WEA ZB3) 14:39 (WEA ZB3) 17:29	07:57 14:05 (WEA ZB3) 16:55	16:11 (WEA ZB2) 16:52 (WEA ZB2) 20:21	18:42 (WEA ZB1) 19:34 (WEA ZB1) 21:15	05:36 21:15 21:57
12	08:41 16:33 75	13:24 (WEA ZB3) 14:39 (WEA ZB3) 17:31	07:55 16:08 (WEA ZB2) 16:53	16:12 (WEA ZB2) 16:50 (WEA ZB2) 20:23	18:41 (WEA ZB1) 19:33 (WEA ZB1) 21:17	05:34 21:17 21:58
13	08:40 16:35 74	13:25 (WEA ZB3) 14:39 (WEA ZB3) 17:33	07:53 16:07 (WEA ZB2) 16:50	16:15 (WEA ZB2) 16:48 (WEA ZB2) 20:24	18:42 (WEA ZB1) 19:33 (WEA ZB1) 21:18	05:32 21:18 21:58
14	08:39 16:36 75	13:25 (WEA ZB3) 14:40 (WEA ZB3) 17:35	07:51 16:07 (WEA ZB2) 16:48	16:18 (WEA ZB2) 16:45 (WEA ZB2) 20:26	18:42 (WEA ZB1) 19:33 (WEA ZB1) 21:20	05:31 21:20 21:59
15	08:38 16:38 74	13:26 (WEA ZB3) 14:40 (WEA ZB3) 17:37	07:49 16:06 (WEA ZB2) 16:45	16:21 (WEA ZB2) 16:41 (WEA ZB2) 20:28	18:43 (WEA ZB1) 19:32 (WEA ZB1) 21:22	05:29 21:22 21:59
16	08:37 16:40 75	13:26 (WEA ZB3) 14:41 (WEA ZB3) 17:39	07:47 16:06 (WEA ZB2) 16:43	16:29 (WEA ZB2) 16:33 (WEA ZB2) 20:30	18:42 (WEA ZB1) 19:30 (WEA ZB1) 21:23	05:27 21:23 22:00
17	08:36 16:41 74	13:27 (WEA ZB3) 14:41 (WEA ZB3) 17:41	07:45 16:05 (WEA ZB2) 16:41	16:33 (WEA ZB2) 17:03 (WEA ZB2) 18:35	18:43 (WEA ZB1) 19:30 (WEA ZB1) 21:25	05:26 21:25 22:01
18	08:35 16:43 73	13:27 (WEA ZB3) 14:40 (WEA ZB3) 17:43	07:43 16:04 (WEA ZB2) 16:38	16:38 (WEA ZB2) 17:03 (WEA ZB2) 18:37	18:44 (WEA ZB1) 19:29 (WEA ZB1) 21:27	05:24 21:27 22:01
19	08:34 16:45 73	13:28 (WEA ZB3) 14:41 (WEA ZB3) 17:45	07:41 16:04 (WEA ZB2) 16:36	16:38 (WEA ZB2) 17:04 (WEA ZB2) 18:38	18:45 (WEA ZB1) 19:28 (WEA ZB1) 21:28	05:23 21:28 22:01
20	08:33 16:46 72	13:29 (WEA ZB3) 14:41 (WEA ZB3) 17:47	07:39 16:04 (WEA ZB2) 16:33	16:39 (WEA ZB2) 17:04 (WEA ZB2) 18:40	18:46 (WEA ZB1) 19:27 (WEA ZB1) 21:30	05:21 21:30 22:02
21	08:32 16:48 72	13:29 (WEA ZB3) 14:41 (WEA ZB3) 17:49	07:37 16:03 (WEA ZB2) 16:31	16:41 (WEA ZB2) 17:05 (WEA ZB2) 18:42	18:46 (WEA ZB1) 19:25 (WEA ZB1) 21:31	05:20 21:31 22:02
22	08:30 16:50 71	13:30 (WEA ZB3) 14:41 (WEA ZB3) 17:51	07:34 16:02 (WEA ZB2) 16:28	16:43 (WEA ZB2) 17:04 (WEA ZB2) 18:44	18:48 (WEA ZB1) 19:23 (WEA ZB1) 21:33	05:18 21:33 22:02
23	08:29 16:52 71	13:30 (WEA ZB3) 14:41 (WEA ZB3) 17:53	07:32 16:03 (WEA ZB2) 16:26	16:46 (WEA ZB2) 17:04 (WEA ZB2) 18:46	18:49 (WEA ZB1) 19:22 (WEA ZB1) 21:34	05:17 21:34 22:02
24	08:28 16:54 70	13:31 (WEA ZB3) 14:41 (WEA ZB3) 17:55	07:30 16:03 (WEA ZB2) 16:24	16:48 (WEA ZB2) 17:05 (WEA ZB2) 18:48	18:51 (WEA ZB1) 19:20 (WEA ZB1) 21:36	05:16 21:36 22:02
25	08:26 16:56 69	13:31 (WEA ZB3) 14:40 (WEA ZB3) 17:57	07:28 16:02 (WEA ZB2) 16:21	16:50 (WEA ZB2) 17:59 (WEA ZB1) 20:08	18:53 (WEA ZB1) 19:17 (WEA ZB1) 21:37	05:14 21:37 22:02
26	08:25 16:58 68	13:33 (WEA ZB3) 14:41 (WEA ZB3) 17:59	07:25 16:02 (WEA ZB2) 16:19	16:56 (WEA ZB1) 17:56 (WEA ZB1) 20:06	18:56 (WEA ZB1) 19:14 (WEA ZB1) 21:39	05:13 21:39 22:02
27	08:23 16:59 67	13:33 (WEA ZB3) 14:40 (WEA ZB3) 18:01	07:23 16:03 (WEA ZB2) 16:16	17:55 (WEA ZB1) 18:25 (WEA ZB1) 20:04	19:01 (WEA ZB1) 19:14 (WEA ZB1) 21:39	05:12 21:39 22:02
28	08:22 17:01 65	13:34 (WEA ZB3) 14:39 (WEA ZB3) 18:02	07:21 16:02 (WEA ZB2) 16:14	17:52 (WEA ZB1) 18:27 (WEA ZB1) 20:50	19:09 (WEA ZB1) 19:09 (WEA ZB1) 21:40	05:11 21:40 22:02
29	08:20 17:03 64	13:36 (WEA ZB3) 14:40 (WEA ZB3) 18:04	07:19 16:04 (WEA ZB2) 16:26	17:54 (WEA ZB1) 18:28 (WEA ZB1) 20:52	19:11 (WEA ZB1) 19:11 (WEA ZB1) 21:42	05:10 21:42 22:02
30	08:19 17:05 63	13:36 (WEA ZB3) 14:39 (WEA ZB3) 18:06	07:17 16:05 (WEA ZB2) 16:28	17:56 (WEA ZB1) 18:49 (WEA ZB1) 20:55	19:13 (WEA ZB1) 19:13 (WEA ZB1) 21:44	05:09 21:44 22:02
31	08:17 17:07 61	13:37 (WEA ZB3) 14:38 (WEA ZB3) 18:08	07:15 16:06 (WEA ZB2) 16:30	17:58 (WEA ZB1) 18:48 (WEA ZB1) 20:55	19:15 (WEA ZB1) 19:15 (WEA ZB1) 21:45	05:08 21:45 22:02
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung	2233	1775	985	1183		

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 15:56/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO36 - Westerhausen 10
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	05:03 22:01	05:42 21:27	06:36 20:21	18:41 (WEA ZB1) 07:28 19:33 (WEA ZB1) 19:07	16:53 (WEA ZB2) 07:26 17:29 (WEA ZB2) 16:57	13:26 (WEA ZB3) 08:21 16:26 (WEA ZB2) 16:13
2	05:03 22:01	05:44 21:25	06:37 20:18	18:41 (WEA ZB1) 07:30 19:34 (WEA ZB1) 19:05	16:50 (WEA ZB2) 07:28 17:29 (WEA ZB2) 16:55	13:24 (WEA ZB3) 08:22 16:25 (WEA ZB2) 16:13
3	05:04 22:01	05:45 21:23	06:39 20:16	18:39 (WEA ZB1) 07:32 19:33 (WEA ZB1) 19:02	16:48 (WEA ZB2) 07:30 17:31 (WEA ZB2) 16:53	13:21 (WEA ZB3) 08:24 16:22 (WEA ZB2) 16:12
4	05:05 22:00	05:47 21:21	06:41 20:13	18:39 (WEA ZB1) 07:34 19:33 (WEA ZB1) 19:00	16:46 (WEA ZB2) 07:32 17:32 (WEA ZB2) 16:51	13:18 (WEA ZB3) 08:25 16:20 (WEA ZB2) 16:11
5	05:06 22:00	05:49 21:19	06:43 20:11	18:39 (WEA ZB1) 07:36 19:32 (WEA ZB1) 18:58	16:44 (WEA ZB2) 07:34 17:33 (WEA ZB2) 16:50	13:16 (WEA ZB3) 08:27 16:18 (WEA ZB2) 16:11
6	05:07 21:59	05:50 21:17	06:44 20:09	18:39 (WEA ZB1) 07:37 19:31 (WEA ZB1) 18:55	16:43 (WEA ZB2) 07:36 17:34 (WEA ZB2) 16:48	13:14 (WEA ZB3) 08:28 16:16 (WEA ZB2) 16:10
7	05:08 21:58	05:52 21:15	06:46 20:06	18:39 (WEA ZB1) 07:39 19:31 (WEA ZB1) 18:53	16:42 (WEA ZB2) 07:38 17:35 (WEA ZB2) 16:46	13:13 (WEA ZB3) 08:29 16:14 (WEA ZB2) 16:10
8	05:09 21:58	05:54 21:13	06:48 20:04	18:39 (WEA ZB1) 07:41 19:30 (WEA ZB1) 18:50	16:41 (WEA ZB2) 07:40 17:35 (WEA ZB2) 16:44	13:11 (WEA ZB3) 08:31 16:12 (WEA ZB2) 16:09
9	05:10 21:57	05:55 21:11	06:50 20:01	18:38 (WEA ZB1) 07:43 19:29 (WEA ZB1) 18:48	16:39 (WEA ZB2) 07:42 17:35 (WEA ZB2) 16:42	13:10 (WEA ZB3) 08:32 14:07 (WEA ZB3) 16:09
10	05:11 21:56	05:57 21:09	06:51 19:59	18:39 (WEA ZB1) 07:45 19:28 (WEA ZB1) 18:46	16:38 (WEA ZB2) 07:43 17:35 (WEA ZB2) 16:41	13:09 (WEA ZB3) 08:33 14:08 (WEA ZB3) 16:09
11	05:12 21:55	05:59 21:07	06:53 19:56	18:39 (WEA ZB1) 07:47 19:28 (WEA ZB1) 18:43	16:37 (WEA ZB2) 07:45 17:36 (WEA ZB2) 16:39	13:08 (WEA ZB3) 08:34 14:09 (WEA ZB3) 16:08
12	05:13 21:54	06:01 21:05	06:55 19:54	18:39 (WEA ZB1) 07:48 19:26 (WEA ZB1) 18:41	16:36 (WEA ZB2) 07:47 17:36 (WEA ZB2) 16:37	13:07 (WEA ZB3) 08:35 14:10 (WEA ZB3) 16:08
13	05:14 21:53	06:02 21:03	06:57 19:52	18:40 (WEA ZB1) 07:50 19:23 (WEA ZB1) 18:39	16:36 (WEA ZB2) 07:49 17:36 (WEA ZB2) 16:36	13:07 (WEA ZB3) 08:36 14:12 (WEA ZB3) 16:08
14	05:15 21:52	06:04 21:01	06:58 19:49	18:41 (WEA ZB1) 07:52 19:21 (WEA ZB1) 18:36	16:35 (WEA ZB2) 07:51 17:36 (WEA ZB2) 16:34	13:07 (WEA ZB3) 08:37 14:12 (WEA ZB3) 16:08
15	05:17 21:51	06:06 20:59	07:00 19:47	18:42 (WEA ZB1) 07:54 19:19 (WEA ZB1) 18:34	16:35 (WEA ZB2) 07:53 17:36 (WEA ZB2) 16:32	13:06 (WEA ZB3) 08:38 14:13 (WEA ZB3) 16:08
16	05:18 21:50	06:08 20:57	07:02 19:44	18:43 (WEA ZB1) 07:56 19:16 (WEA ZB1) 18:32	16:34 (WEA ZB2) 07:55 17:36 (WEA ZB2) 16:31	13:06 (WEA ZB3) 08:39 14:14 (WEA ZB3) 16:08
17	05:19 21:49	06:09 20:55	07:04 19:42	18:44 (WEA ZB1) 07:58 19:14 (WEA ZB1) 18:29	16:34 (WEA ZB2) 07:57 17:36 (WEA ZB2) 16:29	13:05 (WEA ZB3) 08:40 14:14 (WEA ZB3) 16:08
18	05:21 21:48	06:11 20:53	07:05 19:39	18:46 (WEA ZB1) 08:00 19:12 (WEA ZB1) 18:27	16:34 (WEA ZB2) 07:58 17:36 (WEA ZB2) 16:28	13:05 (WEA ZB3) 08:41 14:15 (WEA ZB3) 16:09
19	05:22 21:47	06:13 20:50	07:07 19:37	18:48 (WEA ZB1) 08:01 19:08 (WEA ZB1) 18:25	16:34 (WEA ZB2) 08:00 17:36 (WEA ZB2) 16:27	13:05 (WEA ZB3) 08:41 14:16 (WEA ZB3) 16:09
20	05:23 21:45	06:15 20:48	07:09 19:34	18:51 (WEA ZB1) 08:03 19:06 (WEA ZB1) 18:23	16:34 (WEA ZB2) 08:02 17:35 (WEA ZB2) 16:25	13:05 (WEA ZB3) 08:42 14:16 (WEA ZB3) 16:09
21	05:25 21:44	06:16 20:46	07:11 19:32	18:53 (WEA ZB1) 08:05 19:29 (WEA ZB1) 18:20	16:34 (WEA ZB2) 08:04 17:35 (WEA ZB2) 16:24	13:05 (WEA ZB3) 08:43 14:17 (WEA ZB3) 16:10
22	05:26 21:42	06:18 20:44	07:12 19:29	18:51 (WEA ZB1) 08:07 19:30 (WEA ZB1) 18:18	16:34 (WEA ZB2) 08:06 17:34 (WEA ZB2) 16:23	13:05 (WEA ZB3) 08:43 14:17 (WEA ZB3) 16:10
23	05:28 21:41	06:20 20:41	07:14 19:27	18:50 (WEA ZB1) 08:09 19:31 (WEA ZB1) 18:16	16:34 (WEA ZB2) 08:07 17:34 (WEA ZB2) 16:21	13:05 (WEA ZB3) 08:44 14:18 (WEA ZB3) 16:11
24	05:29 21:40	06:22 20:39	07:16 19:24	18:48 (WEA ZB1) 08:11 19:32 (WEA ZB1) 18:14	16:34 (WEA ZB2) 08:09 17:33 (WEA ZB2) 16:20	13:05 (WEA ZB3) 08:44 14:18 (WEA ZB3) 16:11
25	05:31 21:38	06:23 20:37	07:18 19:22	18:47 (WEA ZB1) 08:13 19:32 (WEA ZB1) 18:12	15:35 (WEA ZB2) 08:11 16:33 (WEA ZB2) 16:19	13:04 (WEA ZB3) 08:45 14:18 (WEA ZB3) 16:12
26	05:32 21:37	06:25 20:35	07:20 19:20	18:46 (WEA ZB1) 08:15 19:33 (WEA ZB1) 18:10	15:35 (WEA ZB2) 08:13 16:32 (WEA ZB2) 16:18	13:04 (WEA ZB3) 08:45 14:19 (WEA ZB3) 16:13
27	05:34 21:35	06:27 20:32	07:21 19:17	18:45 (WEA ZB1) 08:17 19:33 (WEA ZB1) 18:07	15:36 (WEA ZB2) 08:14 16:31 (WEA ZB2) 16:17	13:05 (WEA ZB3) 08:45 14:19 (WEA ZB3) 16:13
28	05:35 21:33	06:29 20:30	07:23 19:15	18:43 (WEA ZB1) 08:19 17:20 (WEA ZB2) 17:05	15:36 (WEA ZB2) 08:16 16:30 (WEA ZB2) 16:16	13:05 (WEA ZB3) 08:45 14:20 (WEA ZB3) 16:14
29	05:37 21:32	06:30 20:28	07:25 19:12	18:43 (WEA ZB1) 08:21 17:24 (WEA ZB2) 17:03	15:37 (WEA ZB2) 08:18 16:29 (WEA ZB2) 16:15	13:06 (WEA ZB3) 08:45 14:21 (WEA ZB3) 16:15
30	05:39 21:30	06:32 20:25	07:27 19:10	18:42 (WEA ZB1) 08:23 17:26 (WEA ZB2) 17:01	15:38 (WEA ZB2) 08:19 16:28 (WEA ZB2) 16:14	13:05 (WEA ZB3) 08:45 14:20 (WEA ZB3) 16:15
31	05:40 21:28	06:34 20:23	18:41 (WEA ZB1) 08:25 19:33 (WEA ZB1) 18:17	17:01 16:59	13:32 (WEA ZB3) 08:45 16:27 (WEA ZB2) 16:17	14:20 (WEA ZB3) 16:16 16:17
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		625	932	1722	2122	2329

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)	Zeitpunkt (SS:MM)	Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten		

SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO37 - Westerhausen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai		Juni
1	08:45 16:18	08:16 17:09	07:19 18:04		07:04 20:02	19:15 (WEA ZB3) 20:57	05:55 61	19:05 (WEA ZB3) 20:28 (WEA ZB1)	05:06 21:47
2	08:45 16:19	08:14 17:11	07:16 18:06		07:02 20:04	19:12 (WEA ZB3) 25 19:37 (WEA ZB3)	05:53 20:59	19:06 (WEA ZB3) 20:29 (WEA ZB1)	05:05 21:48
3	08:45 16:21	08:12 17:13	07:14 18:08		06:59 20:06	19:10 (WEA ZB3) 30 19:40 (WEA ZB3)	05:51 21:01	19:08 (WEA ZB3) 20:31 (WEA ZB1)	05:05 21:49
4	08:45 16:22	08:10 17:15	07:12 18:10		06:57 20:08	19:07 (WEA ZB3) 34 19:41 (WEA ZB3)	05:49 21:03	19:10 (WEA ZB3) 20:32 (WEA ZB1)	05:04 21:50
5	08:44 16:23	08:09 17:17	07:09 18:12		06:54 20:10	19:06 (WEA ZB3) 37 19:43 (WEA ZB3)	05:47 21:04	19:14 (WEA ZB3) 20:34 (WEA ZB1)	05:03 21:51
6	08:44 16:24	08:07 17:19	07:07 18:14		06:52 20:11	19:04 (WEA ZB3) 40 19:44 (WEA ZB3)	05:45 21:06	19:45 (WEA ZB2) 20:35 (WEA ZB1)	05:02 21:52
7	08:44 16:26	08:05 17:21	07:05 18:16		06:50 20:13	19:03 (WEA ZB3) 43 19:46 (WEA ZB3)	05:43 21:08	20:19 (WEA ZB1) 20:38 (WEA ZB1)	05:02 21:53
8	08:43 16:27	08:03 17:23	07:02 18:18		06:47 20:15	19:02 (WEA ZB3) 46 19:48 (WEA ZB3)	05:42 21:10	20:18 (WEA ZB1) 20:39 (WEA ZB1)	05:01 21:54
9	08:43 16:29	08:01 17:25	07:00 18:20		06:45 20:17	19:01 (WEA ZB3) 46 19:47 (WEA ZB3)	05:40 21:11	20:18 (WEA ZB1) 20:40 (WEA ZB1)	05:00 21:55
10	08:42 16:30	07:59 17:27	06:57 18:22		06:42 20:19	19:00 (WEA ZB3) 48 19:48 (WEA ZB3)	05:38 21:13	20:18 (WEA ZB1) 20:43 (WEA ZB1)	05:00 21:56
11	08:41 16:31	07:57 17:29	06:55 18:23		06:40 20:21	18:59 (WEA ZB3) 50 19:49 (WEA ZB3)	05:36 21:15	20:18 (WEA ZB1) 20:44 (WEA ZB1)	05:00 21:57
12	08:40 16:33	07:55 17:31	06:53 18:25		06:38 20:22	18:58 (WEA ZB3) 57 19:55 (WEA ZB2)	05:34 21:17	20:17 (WEA ZB1) 20:45 (WEA ZB1)	04:59 21:57
13	08:40 16:35	07:53 17:33	06:50 18:27		06:35 20:24	18:58 (WEA ZB3) 59 19:57 (WEA ZB2)	05:32 21:18	20:18 (WEA ZB1) 20:47 (WEA ZB1)	04:59 21:58
14	08:39 16:36	07:51 17:35	06:48 18:29		06:33 20:26	18:58 (WEA ZB3) 61 19:59 (WEA ZB2)	05:31 21:20	20:18 (WEA ZB1) 20:46 (WEA ZB1)	04:59 21:59
15	08:38 16:38	07:49 17:37	06:45 18:31		06:31 20:28	18:58 (WEA ZB3) 63 20:01 (WEA ZB2)	05:29 21:22	20:18 (WEA ZB1) 20:46 (WEA ZB1)	04:58 21:59
16	08:37 16:40	07:47 17:39	06:43 18:33		06:28 20:30	18:56 (WEA ZB3) 66 20:02 (WEA ZB2)	05:27 21:23	20:18 (WEA ZB1) 20:46 (WEA ZB1)	04:58 22:00
17	08:36 16:41	07:45 17:41	06:41 18:35		06:26 20:32	18:57 (WEA ZB3) 67 20:04 (WEA ZB2)	05:26 21:25	20:19 (WEA ZB1) 20:46 (WEA ZB1)	04:58 22:00
18	08:35 16:43	07:43 17:43	06:38 18:37		06:24 20:33	18:57 (WEA ZB3) 68 20:05 (WEA ZB2)	05:24 21:27	20:19 (WEA ZB1) 20:45 (WEA ZB1)	04:58 22:01
19	08:34 16:45	07:41 17:45	06:36 18:38		06:21 20:35	18:57 (WEA ZB3) 70 20:07 (WEA ZB2)	05:23 21:28	20:20 (WEA ZB1) 20:45 (WEA ZB1)	04:58 22:01
20	08:33 16:46	07:39 17:47	06:33 18:40		06:19 20:37	18:57 (WEA ZB3) 72 20:09 (WEA ZB2)	05:21 21:30	20:21 (WEA ZB1) 20:45 (WEA ZB1)	04:58 22:02
21	08:31 16:48	07:36 17:49	06:31 18:42		06:17 20:39	18:56 (WEA ZB3) 74 20:10 (WEA ZB2)	05:20 21:31	20:21 (WEA ZB1) 20:43 (WEA ZB1)	04:58 22:02
22	08:30 16:50	07:34 17:51	06:28 18:44		06:15 20:41	18:57 (WEA ZB3) 74 20:11 (WEA ZB2)	05:18 21:33	20:22 (WEA ZB1) 20:43 (WEA ZB1)	04:58 22:02
23	08:29 16:52	07:32 17:53	06:26 18:46		06:12 20:43	18:57 (WEA ZB3) 74 20:11 (WEA ZB2)	05:17 21:34	20:23 (WEA ZB1) 20:43 (WEA ZB1)	04:59 22:02
24	08:28 16:54	07:30 17:55	06:23 18:48		06:10 20:44	18:58 (WEA ZB3) 73 20:11 (WEA ZB2)	05:16 21:36	20:24 (WEA ZB1) 20:42 (WEA ZB1)	04:59 22:02
25	08:26 16:56	07:28 17:57	06:21 18:49		06:08 20:46	18:59 (WEA ZB3) 71 20:10 (WEA ZB2)	05:14 21:37	20:24 (WEA ZB1) 20:40 (WEA ZB1)	04:59 22:02
26	08:25 16:58	07:25 17:59	06:19 18:51		06:06 20:48	18:59 (WEA ZB3) 71 20:10 (WEA ZB2)	05:13 21:39	20:26 (WEA ZB1) 20:39 (WEA ZB1)	05:00 22:02
27	08:23 16:59	07:23 18:01	06:16 18:53		06:04 20:50	19:00 (WEA ZB3) 69 20:09 (WEA ZB2)	05:12 21:40	20:28 (WEA ZB1) 20:37 (WEA ZB1)	05:00 22:02
28	08:22 17:01	07:21 18:02	06:14 18:55		06:02 20:52	19:01 (WEA ZB3) 68 20:09 (WEA ZB2)	05:11 21:41	20:30 (WEA ZB1) 20:35 (WEA ZB1)	05:01 22:02
29	08:20 17:03		07:11 19:57		06:00 20:54	19:02 (WEA ZB3) 66 20:08 (WEA ZB2)	05:09 21:43		05:01 22:02
30	08:19 17:05		07:09 19:59		05:57 20:55	19:03 (WEA ZB3) 64 20:07 (WEA ZB2)	05:08 21:44		05:02 22:02
31	08:17 17:07		07:06 20:00	19:19 (WEA ZB3) 15 19:34 (WEA ZB3)			05:07 21:45		
Sonnenscheinstunden	251	274	367	15	419	1706	493	777	509
astr.max.mögl.Beschattung				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	(WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO37 - Westerhausen 1
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September	Oktober	November	Dezember
1	05:03 22:01	05:42 21:27	20:28 (WEA ZB1) 06:36 19:55 (WEA ZB1) 20:21	18:58 (WEA ZB3) 07:28 19:48 (WEA ZB3) 19:07	07:26 16:57	08:21 16:13
2	05:03 22:01	05:44 21:25	20:28 (WEA ZB1) 06:37 20:54 (WEA ZB1) 20:18	18:59 (WEA ZB3) 07:30 19:47 (WEA ZB3) 19:05	07:28 16:55	08:22 16:13
3	05:04 22:01	05:45 21:23	20:28 (WEA ZB1) 06:39 20:51 (WEA ZB1) 20:16	18:59 (WEA ZB3) 07:32 19:45 (WEA ZB3) 19:02	07:30 16:53	08:24 16:12
4	05:05 22:00	05:47 21:21	20:28 (WEA ZB1) 06:41 20:50 (WEA ZB1) 20:13	18:59 (WEA ZB3) 07:34 19:45 (WEA ZB3) 19:00	07:32 16:51	08:25 16:11
5	05:06 22:00	05:49 21:19	20:29 (WEA ZB1) 06:43 20:49 (WEA ZB1) 20:11	19:00 (WEA ZB3) 07:36 19:43 (WEA ZB3) 18:58	07:34 16:50	08:26 16:11
6	05:07 21:59	05:50 21:17	19:58 (WEA ZB2) 06:44 20:46 (WEA ZB1) 20:09	19:00 (WEA ZB3) 07:37 19:40 (WEA ZB3) 18:55	07:36 16:48	08:28 16:10
7	05:08 21:58	05:52 21:15	19:55 (WEA ZB2) 06:46 20:45 (WEA ZB1) 20:06	19:01 (WEA ZB3) 07:39 19:38 (WEA ZB3) 18:53	07:38 16:46	08:29 16:10
8	05:09 21:58	05:54 21:13	19:22 (WEA ZB3) 06:48 20:43 (WEA ZB1) 20:04	19:03 (WEA ZB3) 07:41 19:36 (WEA ZB3) 18:50	07:40 16:44	08:30 16:09
9	05:10 21:57	05:55 21:11	19:19 (WEA ZB3) 06:50 20:41 (WEA ZB1) 20:01	19:03 (WEA ZB3) 07:43 19:33 (WEA ZB3) 18:48	07:42 16:42	08:32 16:09
10	05:11 21:56	05:57 21:09	19:17 (WEA ZB3) 06:51 20:40 (WEA ZB1) 19:59	19:05 (WEA ZB3) 07:45 19:31 (WEA ZB3) 18:46	07:43 16:41	08:33 16:09
11	05:12 21:55	05:59 21:07	19:14 (WEA ZB3) 06:53 20:37 (WEA ZB1) 19:56	19:07 (WEA ZB3) 07:47 19:29 (WEA ZB3) 18:43	07:45 16:39	08:34 16:08
12	05:13 21:54	06:01 21:05	19:13 (WEA ZB3) 06:55 20:15 (WEA ZB2) 19:54	19:10 (WEA ZB3) 07:48 19:26 (WEA ZB3) 18:41	07:47 16:37	08:35 16:08
13	05:14 21:53	06:02 21:03	19:10 (WEA ZB3) 06:57 20:15 (WEA ZB2) 19:51	19:18 (WEA ZB3) 07:50 19:19 (WEA ZB3) 18:39	07:49 16:36	08:36 16:08
14	05:15 21:52	06:04 21:01	19:09 (WEA ZB3) 06:58 20:16 (WEA ZB2) 19:49	19:18 (WEA ZB3) 07:51 18:36	07:51 16:34	08:37 16:08
15	05:17 21:51	06:06 20:59	19:08 (WEA ZB3) 07:00 20:17 (WEA ZB2) 19:47	19:19 (WEA ZB3) 07:52 18:34	07:53 16:32	08:38 16:08
16	05:18 21:50	06:08 20:57	19:06 (WEA ZB3) 07:02 20:16 (WEA ZB2) 19:44	19:17 (WEA ZB3) 07:54 18:32	07:55 16:31	08:39 16:08
17	05:19 21:49	06:09 20:55	19:06 (WEA ZB3) 07:04 20:17 (WEA ZB2) 19:42	19:17 (WEA ZB3) 07:55 18:29	07:57 16:29	08:40 16:08
18	05:21 21:48	06:11 20:53	19:05 (WEA ZB3) 07:05 20:17 (WEA ZB2) 19:39	19:17 (WEA ZB3) 07:56 18:27	07:58 16:28	08:41 16:09
19	05:22 21:46	06:13 20:50	19:03 (WEA ZB3) 07:07 20:16 (WEA ZB2) 19:37	19:17 (WEA ZB3) 07:57 18:25	08:00 16:27	08:41 16:09
20	05:23 21:45	06:15 20:48	19:03 (WEA ZB3) 07:09 20:16 (WEA ZB2) 19:34	19:17 (WEA ZB3) 07:58 18:23	08:02 16:25	08:42 16:09
21	05:25 21:44	06:16 20:46	19:02 (WEA ZB3) 07:11 20:16 (WEA ZB2) 19:32	19:17 (WEA ZB3) 07:59 18:20	08:04 16:24	08:43 16:10
22	05:26 21:42	06:18 20:44	19:01 (WEA ZB3) 07:12 20:15 (WEA ZB2) 19:29	19:17 (WEA ZB3) 08:00 18:18	08:06 16:23	08:43 16:10
23	05:28 21:41	06:20 20:41	19:01 (WEA ZB3) 07:14 20:13 (WEA ZB2) 19:27	19:17 (WEA ZB3) 08:01 18:16	08:07 16:21	08:44 16:11
24	05:29 21:40	06:22 20:39	19:01 (WEA ZB3) 07:16 20:11 (WEA ZB2) 19:24	19:17 (WEA ZB3) 08:02 18:14	08:08 16:20	08:44 16:11
25	05:31 21:38	06:23 20:37	18:59 (WEA ZB3) 07:18 20:08 (WEA ZB2) 19:22	19:17 (WEA ZB3) 08:03 17:12	08:11 16:19	08:44 16:12
26	05:32 21:37	06:25 20:35	18:59 (WEA ZB3) 07:20 20:06 (WEA ZB2) 19:20	19:17 (WEA ZB3) 08:04 17:10	08:13 16:18	08:45 16:13
27	05:34 21:35	06:27 20:32	18:59 (WEA ZB3) 07:21 20:04 (WEA ZB2) 19:17	19:17 (WEA ZB3) 08:05 17:07	08:14 16:17	08:45 16:13
28	05:35 21:33	06:29 20:30	18:58 (WEA ZB3) 07:23 20:01 (WEA ZB2) 19:15	19:17 (WEA ZB3) 08:06 17:05	08:16 16:16	08:45 16:14
29	05:37 21:32	06:30 20:28	18:59 (WEA ZB3) 07:25 19:59 (WEA ZB2) 19:12	19:17 (WEA ZB3) 08:07 17:03	08:17 16:15	08:45 16:15
30	05:39 21:30	06:32 20:25	18:59 (WEA ZB3) 07:27 19:57 (WEA ZB2) 19:10	19:17 (WEA ZB3) 08:08 17:01	08:19 16:14	08:45 16:16
31	05:40 21:28	06:34 20:23	18:58 (WEA ZB3) 19:54 (WEA ZB2)	19:17 (WEA ZB3) 08:09 16:59	08:20 16:17	08:45 16:17
Sonnenscheinstunden	511	459	382	329	260	235
astr.max.mögl.Beschattung	352	1733	438			

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO4 - Utwarfe 4
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:08	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:04 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:30 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:57	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:09
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:44 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:10	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:41	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:17 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO5 - Klein Buschhausen 3
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 22:27	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:30 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:58	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
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20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
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26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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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)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO6 - Bohnenburg 20
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:02	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:48 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:26 16:11
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7	08:44 16:26	08:05 17:21	07:04 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
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9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:39 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	05:10 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:57	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:16 21:51	06:06 20:59	07:00 19:46	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:26	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:21 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:44 16:12
26	08:25 16:57	07:25 17:58	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:36	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	05:10 21:41	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:53	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:17 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO7 - Sengwarder Chausseehaus
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:02	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:08	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:04 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
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9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
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12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:57	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
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14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:16 21:51	06:06 20:59	07:00 19:46	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:26	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:44 16:12
26	08:25 16:57	07:25 17:58	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:36	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:41	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:53	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:17 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO8 - Idschenhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:00	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:11 18:10	06:57 20:08	05:49 21:02	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:08 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 21:59	05:48 21:19	06:43 20:11	07:35 18:57	07:34 16:49	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:08	07:37 18:55	07:36 16:48	08:28 16:10
7	08:43 16:26	08:05 17:21	07:04 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:57	05:54 21:13	06:48 20:04	07:41 18:50	07:39 16:44	08:30 16:09
9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
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15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:16 21:51	06:06 20:59	07:00 19:46	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:19 21:49	06:09 20:55	07:04 19:42	07:57 18:29	07:56 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:26	04:58 22:01	05:20 21:48	06:11 20:52	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
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21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
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24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:39	06:21 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
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27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
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30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
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SHADOW - Kalender

Berechnung: M180777_02 Zusatzbelastung Schattenrezeptor: IO9 - Idschenhausen 2
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:26	06:36 20:20	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:00	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:11 18:10	06:57 20:08	05:49 21:02	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:08 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 21:59	05:48 21:19	06:43 20:11	07:35 18:57	07:34 16:49	08:26 16:11
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8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:57	05:54 21:13	06:48 20:04	07:41 18:50	07:39 16:44	08:30 16:09
9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:11	06:50 20:01	07:43 18:48	07:41 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:46 18:43	07:45 16:39	08:34 16:08
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21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:42	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
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24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:39	06:21 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
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26	08:25 16:57	07:25 17:58	06:18 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:36	06:25 20:34	07:19 19:19	07:14 17:09	08:12 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:16 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	05:10 21:41	05:01 22:02	05:35 21:33	06:29 20:30	07:23 19:14	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:53	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:27	07:25 19:12	07:20 17:03	08:17 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:26 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:00		05:07 21:45		05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	234
astr.max.mögl.Beschattung												

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Anhang C

Berechnungsergebnisse Gesamtbelastung

\\S-GKN-FS02.MBBM-GROUP.COM\ALLEFIRMEN\M\PROJ\180\M180777\M180777_02_BER_1D.DOCX: 13. 11. 2024

SHADOW - Hauptergebnis

Berechnung: M180777_02 Gesamtbelastung
Annahmen für Schattenwurfberechnung

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

Die dargestellten Zeiten sind die astronomisch maximal mögliche
Beschattungsdauer, berechnet unter folgenden Annahmen:
Die Sonne scheint täglich von Sonnenauf- bis -untergang
Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
Die Windenergieanlage/n ist/sind immer in Betrieb

Eine WEA wird nicht berücksichtigt, wenn sie von keinem Teil der
Rezeptorfläche aus sichtbar ist. Die Sichtbarkeitsberechnung basiert auf
den folgenden Annahmen:
Verwendete Höhenlinien: Höhenraster-Objekt: M180777_02_EMDGrid_0.wpg
Rasterauflösung: 1,0 m

Alle Koordinatenangaben in:
UTM (north)-WGS84 Zone: 32

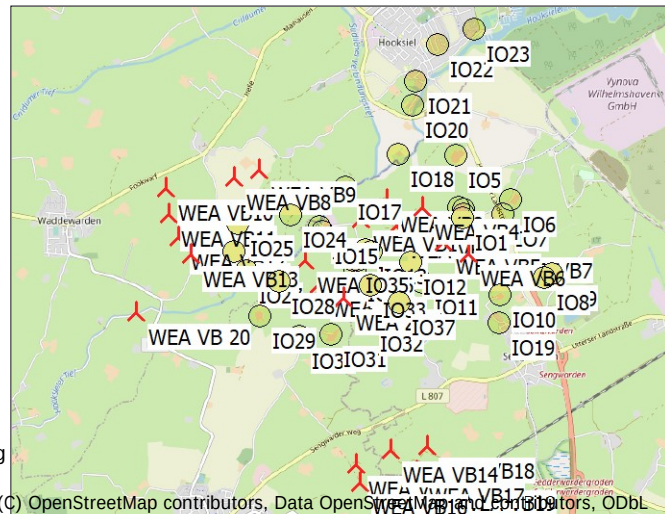
WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ			Nenn- leistung	Rotor- durch- messer	NH	Schattendaten	
					Ak- tu- ell	Hersteller	Typ				Beschatt.- Bereich	U/min
			[m]					[kW]	[m]	[m]	[m]	[U/min]
WEA VB 20	431.787	5.939.386	1,2	VESTAS V39 50...	Nein	VESTAS	V39-500	500	39,0	41,5	765	30,1
WEA VB1	434.774	5.940.580	1,2	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	94,0	1.711	13,1
WEA VB10	432.205	5.941.014	1,3	ENERCON E-82 ...	Ja	ENERCON	E-82 E2-2.300	2.300	82,0	108,4	1.601	18,0
WEA VB11	432.241	5.940.674	1,5	ENERCON E-82 ...	Ja	ENERCON	E-82 E2-2.300	2.300	82,0	108,4	1.601	18,0
WEA VB12	432.356	5.940.371	1,0	ENERCON E-10...	Nein	ENERCON	E-101-3.000	3.000	101,0	99,0	2.216	14,5
WEA VB13	432.527	5.940.125	1,1	ENERCON E-10...	Nein	ENERCON	E-101-3.000	3.000	101,0	99,0	2.216	14,5
WEA VB14	435.137	5.937.518	2,2	Siemens SWT-6...	Nein	Siemens	SWT-6.0-6.000	6.000	154,0	120,0	2.500	-
WEA VB15	434.680	5.937.333	1,1	MICON NM900-...	Nein	MICON	NM900-52-900	900	52,0	49,0	2.500	-
WEA VB16	434.720	5.937.091	1,0	MICON NM900-...	Nein	MICON	NM900-52-900	900	52,0	49,0	2.500	-
WEA VB17	435.480	5.937.236	1,0	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	112,0	1.710	13,1
WEA VB18	435.622	5.937.556	2,0	NORDEX N117 ...	Nein	NORDEX	N117-2.400	2.400	117,0	91,0	1.489	11,8
WEA VB19	435.903	5.937.129	2,4	Siemens SWT-6...	Nein	Siemens	SWT-6.0-6.000	6.000	154,0	120,0	2.500	-
WEA VB2	435.138	5.940.834	1,2	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	119,0	1.709	13,1
WEA VB3	435.257	5.940.480	1,3	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	119,0	1.709	13,1
WEA VB4	435.599	5.940.725	1,0	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	119,0	1.709	13,1
WEA VB5	435.874	5.940.249	1,6	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	119,0	1.709	13,1
WEA VB6	436.206	5.940.107	1,4	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	119,0	1.709	13,1
WEA VB7	436.556	5.940.198	1,5	VESTAS V112-3...	Ja	VESTAS	V112-3.3 Gridstreame-3.300	3.300	112,0	94,0	1.711	13,1
WEA VB8	433.106	5.941.146	2,5	MICON M1500 ...	Nein	MICON	M1500-650/150	600	43,0	46,0	2.500	27,0
WEA VB9	433.437	5.941.235	2,0	MICON M750 2...	Nein	MICON	M750-250/150	250	31,0	36,0	2.500	30,5
WEA ZB1	434.029	5.940.044	1,1	NORDEX N163/...	Ja	NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	10,7
WEA ZB2	434.212	5.939.722	0,7	NORDEX N163/...	Ja	NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	10,7
WEA ZB3	434.540	5.939.539	0,5	NORDEX N163/...	Ja	NORDEX	N163/6.X-7.000	7.000	163,0	118,0	1.788	10,7

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]
IO1	Utwarfe 1	436.131	5.940.572	3,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO10	Remmelhausen 4	436.614	5.939.542	2,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO11	Westerhausen 3	435.587	5.939.724	2,1	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO12	Westerhausen 4	435.445	5.939.994	2,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO13	Westerhausen 11	434.919	5.940.137	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO14	Westerhausen 12	434.838	5.940.170	3,7	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO15	Westerhausen 9A	434.262	5.940.420	1,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO16	Westerhausen 9	434.230	5.940.481	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO17	Rüschstede 1	434.591	5.941.001	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0

(Fortsetzung nächste Seite)...



SHADOW - Hauptergebnis

Berechnung: M180777_02 Gesamtbelastung

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
IO18	Langengroden 1	435.289	5.941.414	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO19	WA Sengwarden BP207	436.605	5.939.173	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO2	Utwarfe 2	436.140	5.940.625	3,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO20	Langengrodener Weg 17	435.491	5.942.055	1,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO21	Am Sudring 15	435.532	5.942.394	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO22	Georg-Adden-Straße 55	435.830	5.942.859	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO23	Hooksiel	436.324	5.943.054	0,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO24	Depenhausen/Pakens 1	433.854	5.940.646	0,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO25	Tain 3	433.154	5.940.529	2,7	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO26	Waterpott 1	433.089	5.940.168	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO27	Klein Depenhausen 1	433.254	5.939.909	2,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO28	Klein Westerhausen 1	433.683	5.939.767	2,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO29	Depenhausen 1	433.437	5.939.318	1,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO3	Utwarfe 3	436.153	5.940.685	2,8	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO30	Purkswarfe 2	433.950	5.939.029	1,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO31	Purkswarfe 3	434.370	5.939.047	1,6	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO32	Putzwei 1	434.854	5.939.246	2,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO33	Westerhausen 5	434.903	5.939.704	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO34	Westerhausen 6	434.704	5.939.918	4,2	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO35	Westerhausen 7	434.664	5.940.034	4,0	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO36	Westerhausen 10	434.732	5.940.032	4,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO37	Westerhausen 1	435.270	5.939.464	1,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO4	Utwarfe 4	436.089	5.940.708	3,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO5	Klein Buschhausen 3	436.045	5.941.392	1,9	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO6	Bohnenburg 20	436.785	5.940.793	1,5	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO7	Sengwarder Chausseehaus	436.664	5.940.615	1,4	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO8	Idschenhausen 1	437.215	5.939.770	3,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0
IO9	Idschenhausen 2	437.310	5.939.811	2,3	1,0	1,0	2,0	90,0	"Gewächshaus-Modus"	3,0

Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
IO1	Utwarfe 1	297:19	314	2:15
IO10	Rommelhausen 4	11:52	54	0:17
IO11	Westerhausen 3	70:32	185	0:39
IO12	Westerhausen 4	82:54	198	0:44
IO13	Westerhausen 11	166:53	239	1:04
IO14	Westerhausen 12	164:08	237	1:02
IO15	Westerhausen 9A	352:23	338	2:26
IO16	Westerhausen 9	253:47	284	2:10
IO17	Rüschentede 1	167:08	184	1:32
IO18	Langengroden 1	87:02	66	1:57
IO19	WA Sengwarden BP207	8:29	40	0:16
IO2	Utwarfe 2	256:54	252	2:08
IO20	Langengrodener Weg 17	0:00	0	0:00
IO21	Am Sudring 15	0:00	0	0:00
IO22	Georg-Adden-Straße 55	0:00	0	0:00
IO23	Hooksiel	0:00	0	0:00
IO24	Depenhausen/Pakens 1	122:46	217	1:38
IO25	Tain 3	94:05	211	1:13
IO26	Waterpott 1	109:11	228	1:17
IO27	Klein Depenhausen 1	122:21	211	1:19
IO28	Klein Westerhausen 1	122:54	183	1:09
IO29	Depenhausen 1	81:42	174	0:47
IO3	Utwarfe 3	242:00	222	2:01
IO30	Purkswarfe 2	12:33	68	0:19
IO31	Purkswarfe 3	4:08	37	0:11
IO32	Putzwei 1	35:33	57	0:51
IO33	Westerhausen 5	265:31	253	2:02
IO34	Westerhausen 6	342:36	298	1:36
IO35	Westerhausen 7	275:15	270	1:36

(Fortsetzung nächste Seite)...

SHADOW - Hauptergebnis

Berechnung: M180777_02 Gesamtbelastung

...(Fortsetzung von vorheriger Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
IO36	Westerhausen 10	245:55	243	1:17
IO37	Westerhausen 1	102:47	167	1:14
IO4	Utwarfe 4	243:17	223	1:59
IO5	Klein Buschhausen 3	73:22	119	0:59
IO6	Bohnenburg 20	87:39	173	1:00
IO7	Sengwarder Chausseehaus	152:49	203	1:31
IO8	Idschenhausen 1	46:26	108	0:36
IO9	Idschenhausen 2	51:02	127	0:33

Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]
WEA VB 20	VESTAS V39 500 39.0 !#! NH: 41,5 m (Ges:61,0 m) (24)	0:00
WEA VB1	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 94,0 m (Ges:150,0 m) (4)	238:08
WEA VB10	ENERCON E-82 E2 2300 82.0 !O! NH: 108,4 m (Ges:149,4 m) (13)	10:52
WEA VB11	ENERCON E-82 E2 2300 82.0 !O! NH: 108,4 m (Ges:149,4 m) (14)	32:03
WEA VB12	ENERCON E-101 3000 101.0 !-! NH: 99,0 m (Ges:149,5 m) (15)	56:41
WEA VB13	ENERCON E-101 3000 101.0 !-! NH: 99,0 m (Ges:149,5 m) (16)	81:06
WEA VB14	Siemens SWT-6.0 6000 154.0 !O! NH: 120,0 m (Ges:197,0 m) (17)	22:37
WEA VB15	MICON NM900-52 900 52.0 !-! NH: 49,0 m (Ges:75,0 m) (18)	0:00
WEA VB16	MICON NM900-52 900 52.0 !-! NH: 49,0 m (Ges:75,0 m) (19)	0:00
WEA VB17	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 112,0 m (Ges:168,0 m) (20)	0:00
WEA VB18	NORDEX N117 2400 117.0 !O! NH: 91,0 m (Ges:149,5 m) (21)	0:00
WEA VB19	Siemens SWT-6.0 6000 154.0 !O! NH: 120,0 m (Ges:197,0 m) (22)	3:04
WEA VB2	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 119,0 m (Ges:175,0 m) (5)	175:38
WEA VB3	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 119,0 m (Ges:175,0 m) (6)	116:28
WEA VB4	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 119,0 m (Ges:175,0 m) (7)	248:01
WEA VB5	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 119,0 m (Ges:175,0 m) (8)	293:07
WEA VB6	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 119,0 m (Ges:175,0 m) (9)	238:24
WEA VB7	VESTAS V112-3.3 Gridstreame 3300 112.0 !O! NH: 94,0 m (Ges:150,0 m) (10)	298:19
WEA VB8	MICON M1500 600-150 43.0 !O! NH: 46,0 m (Ges:67,5 m) (11)	2:43
WEA VB9	MICON M750 250-50 31.0 !O! NH: 36,0 m (Ges:51,5 m) (12)	0:00
WEA ZB1	NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (1)	578:16
WEA ZB2	NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (2)	500:59
WEA ZB3	NORDEX N163/6.X 7000 163.0 !O! NH: 118,0 m (Ges:199,5 m) (3)	564:49

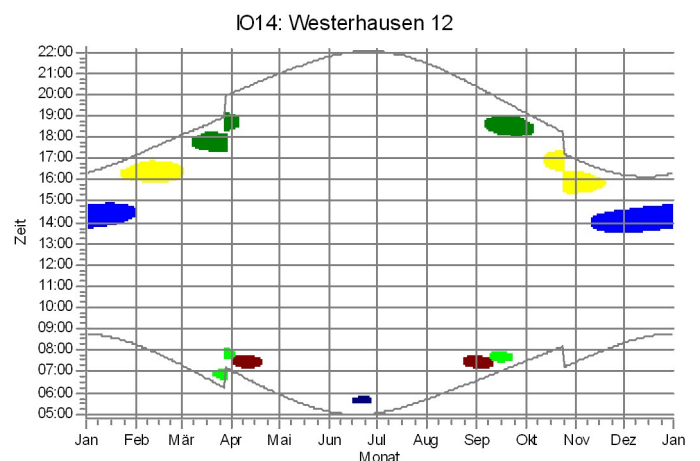
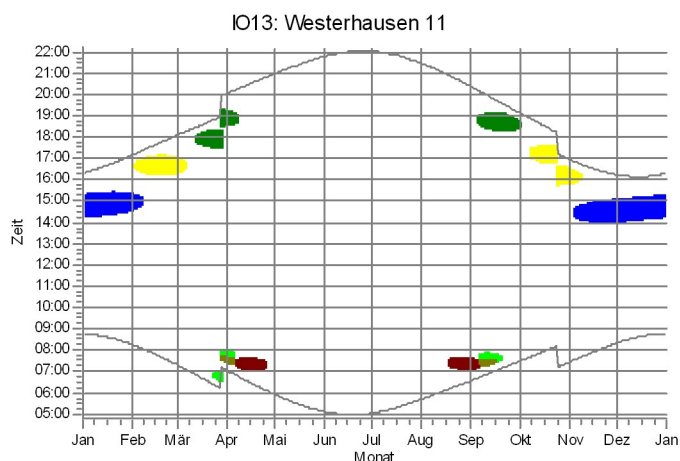
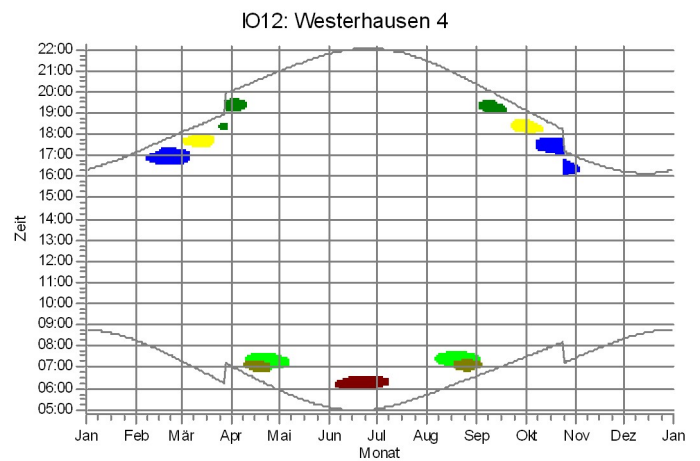
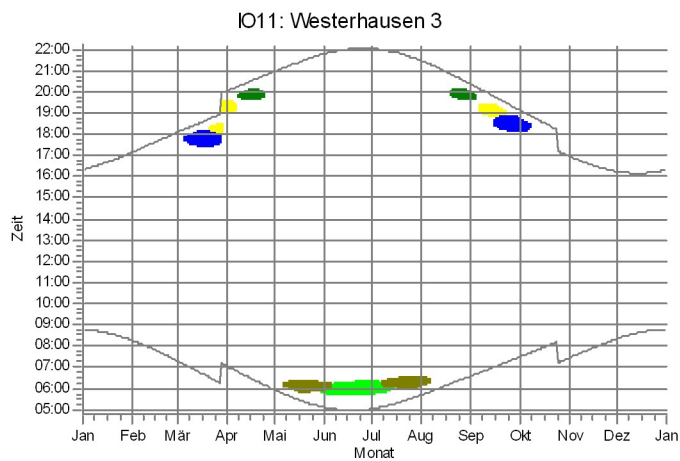
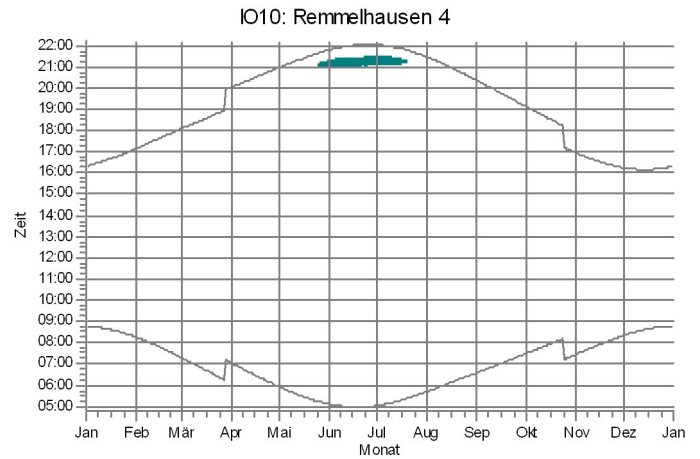
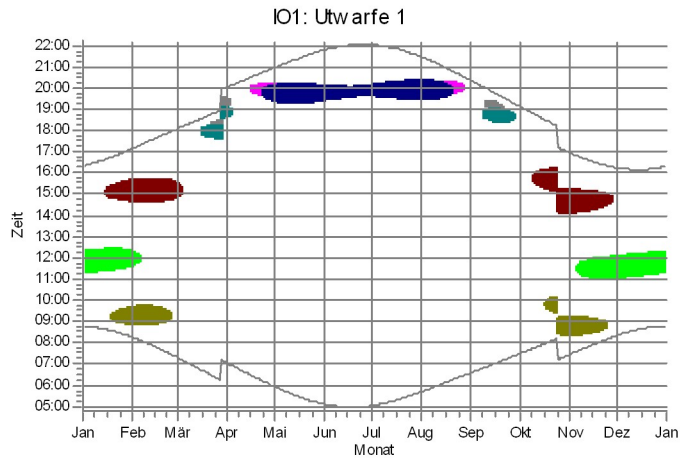
Summen in Rezeptortabelle und WEA-Tabelle können sich unterscheiden, da eine WEA gleichzeitig an zwei oder mehr Rezeptoren Beschattung verursachen kann und/oder ein Rezeptor gleichzeitig von zwei oder mehr WEA beschattet werden kann.

Projekt:
M180777

Lizenzierte Anwender:
Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
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0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Gesamtbelastung



WEA

WEA ZB1: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (1)
WEA ZB2: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (2)
WEA ZB3: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (3)
WEA VB1: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (4)
WEA VB2: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (5)

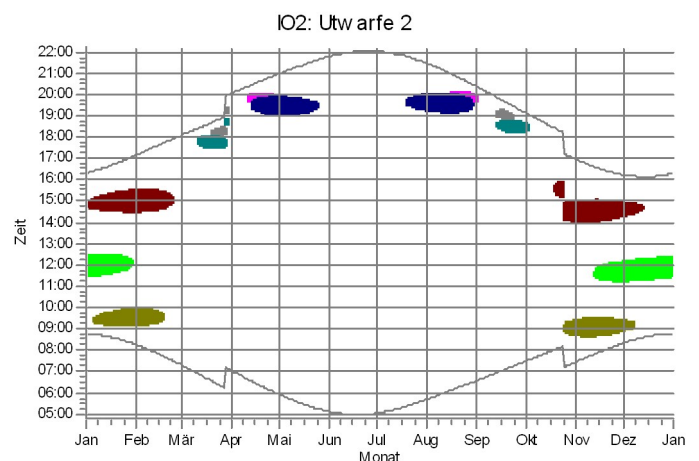
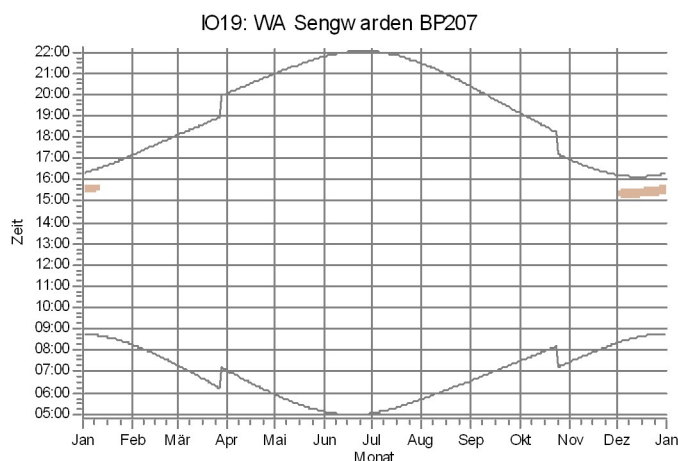
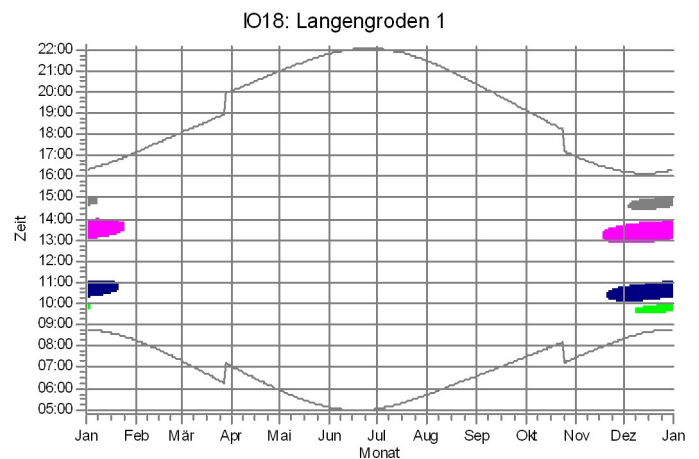
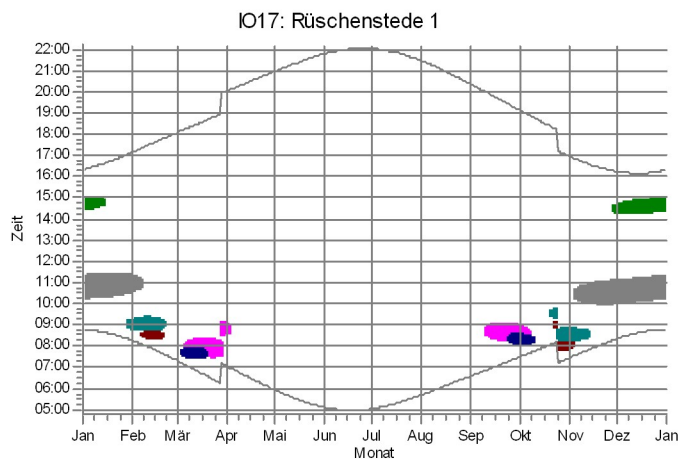
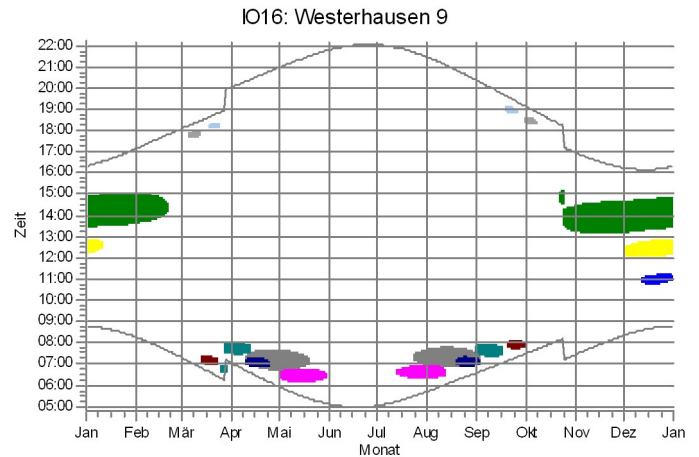
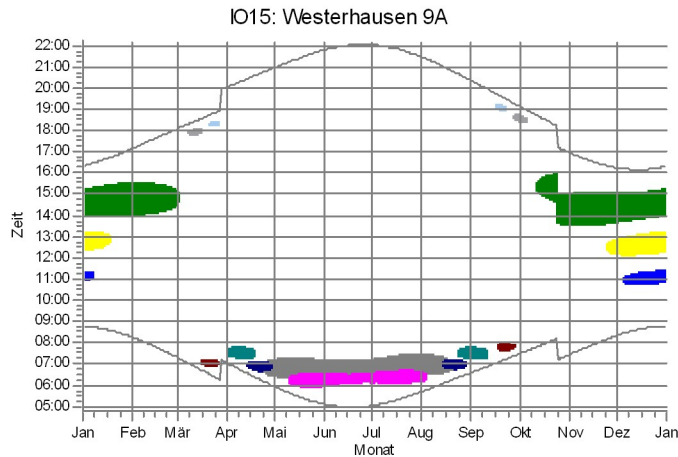
WEA VB3: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (6)
WEA VB4: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (7)
WEA VB5: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (8)
WEA VB6: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (9)
WEA VB7: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (10)

Projekt:
M180777

Lizenzierter Anwender:
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0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Gesamtbelastung



WEA

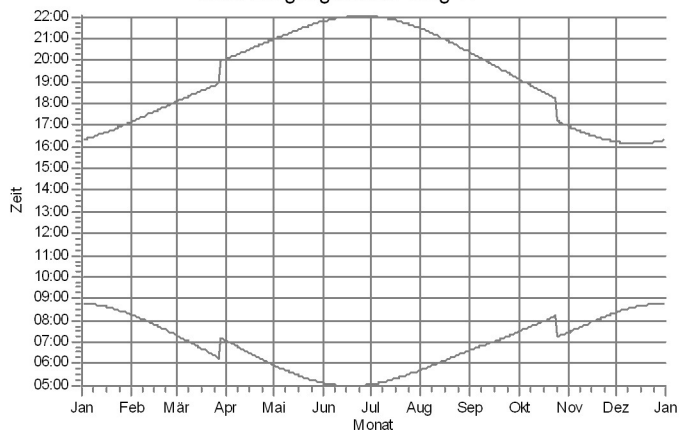
WEA ZB1: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (1)
WEA ZB2: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (2)
WEA ZB3: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (3)
WEA VB1: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (4)
WEA VB2: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (5)
WEA VB3: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (6)
WEA VB4: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (7)

WEA VB5: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (8)
WEA VB6: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (9)
WEA VB7: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (10)
WEA VB12: ENERCON E-101 3000 101.0 IO! NH: 99,0 m (Ges:149,5 m) (15)
WEA VB13: ENERCON E-101 3000 101.0 IO! NH: 99,0 m (Ges:149,5 m) (16)
WEA VB14: Siemens SWT-6.0 6000 154.0 IO! NH: 120,0 m (Ges:197,0 m) (17)

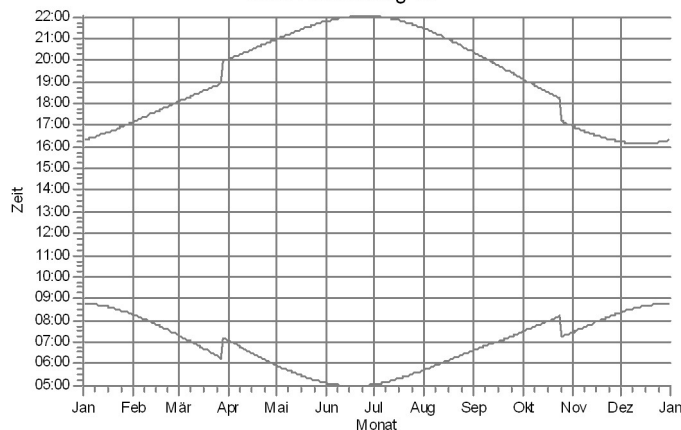
SHADOW - Grafischer Kalender

Berechnung: M180777_02 Gesamtbelastung

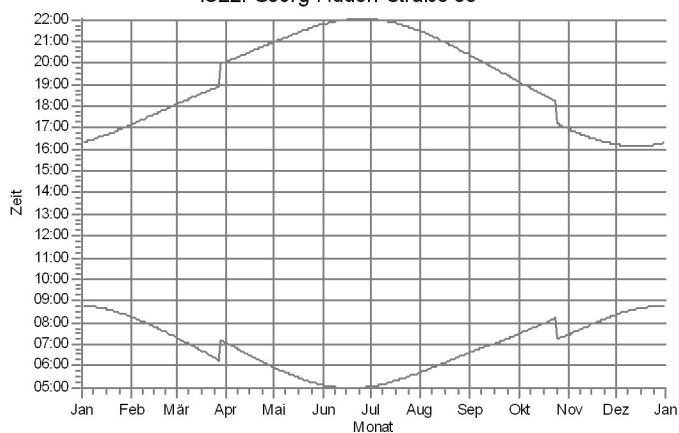
IO20: Langengrodener Weg 17



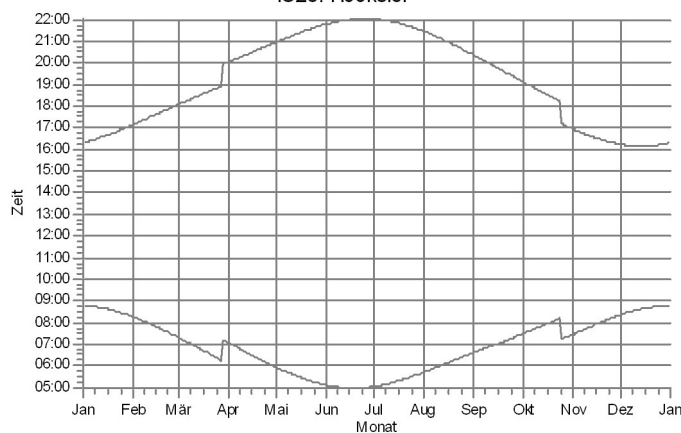
IO21: Am Sudring 15



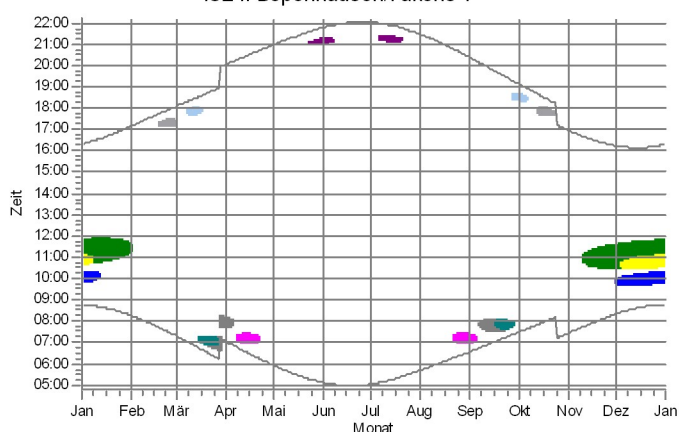
IO22: Georg-Adden-Straße 55



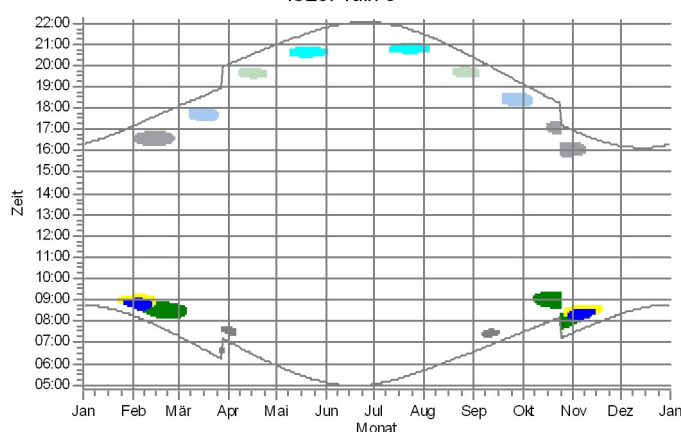
IO23: Hooksiel



IO24: Depenhausen/Pakens 1



IO25: Tain 3



WEA

WEA ZB1: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (1)
WEA ZB2: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (2)
WEA ZB3: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (3)
WEA VB1: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (4)
WEA VB2: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (5)
WEA VB3: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (6)

WEA VB8: MICON M1500 600-150 43.0 IO! NH: 46,0 m (Ges:67,5 m) (11)
WEA VB10: ENERCON E-82 E2 2300 82.0 IO! NH: 108,4 m (Ges:149,4 m) (13)
WEA VB11: ENERCON E-82 E2 2300 82.0 IO! NH: 108,4 m (Ges:149,4 m) (14)
WEA VB12: ENERCON E-101 3000 101.0 IO! NH: 99,0 m (Ges:149,5 m) (15)
WEA VB13: ENERCON E-101 3000 101.0 IO! NH: 99,0 m (Ges:149,5 m) (16)

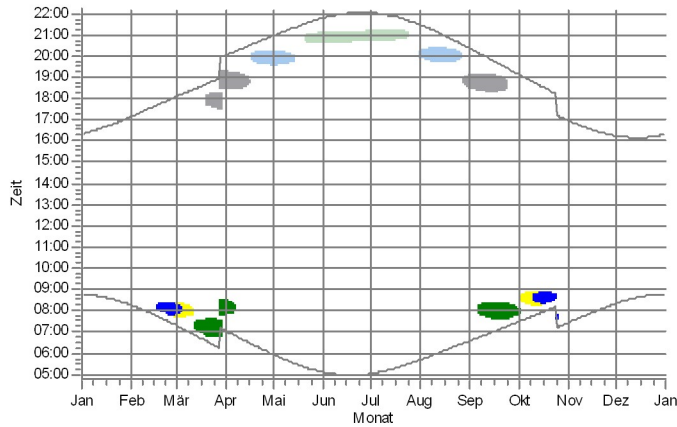
Projekt:
M180777

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0049 89 85 602 0
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Berechnet:
17.09.2024 16:15/4.0.531

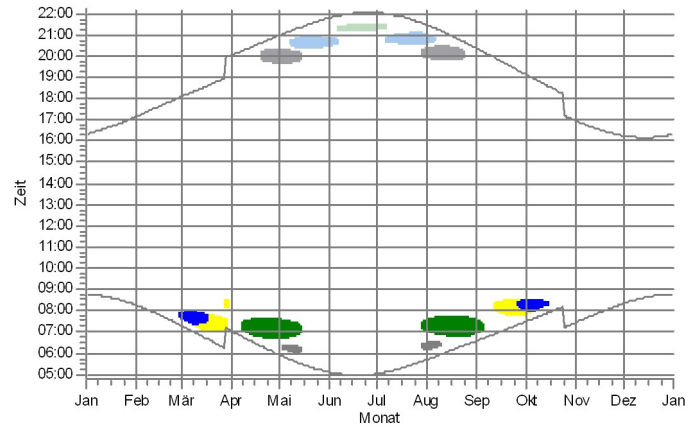
SHADOW - Grafischer Kalender

Berechnung: M180777_02 Gesamtbelastung

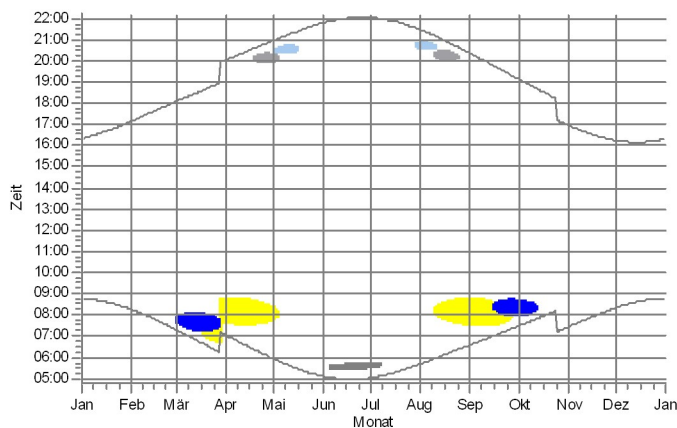
IO26: Waterpott 1



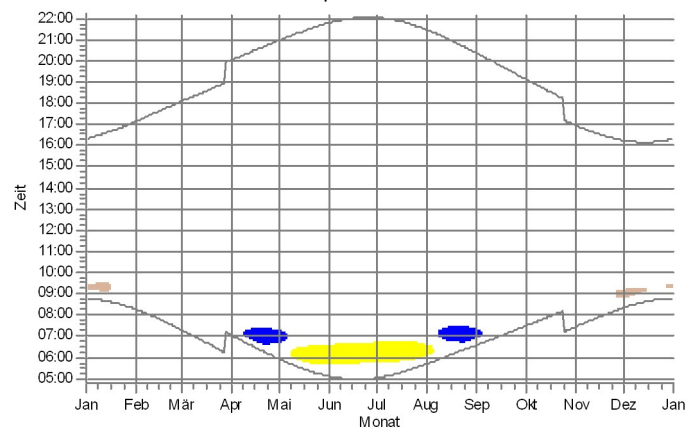
IO27: Klein Depenhäusen 1



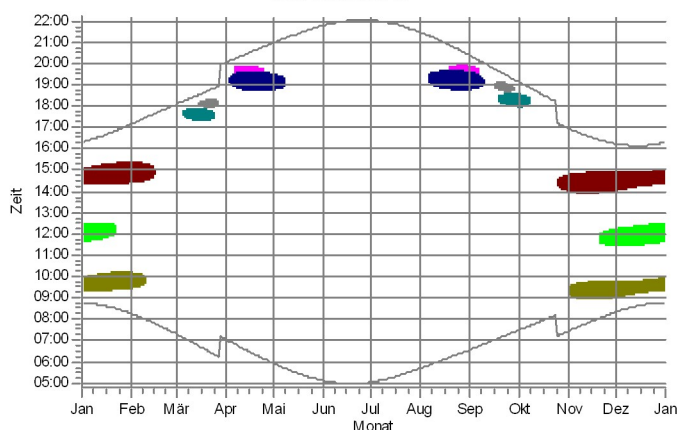
IO28: Klein Westerhausen 1



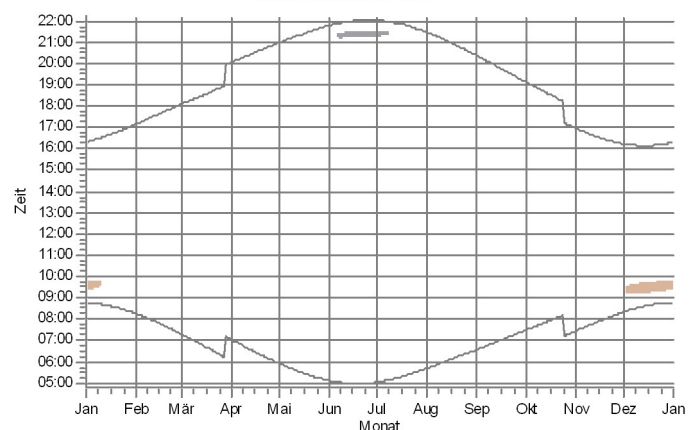
IO29: Depenhäusen 1



IO3: Utwarfe 3



IO30: Purkswarfe 2



WEA

WEA ZB1: NORDEX N163/6.X 7000 163.0 IO! NH: 118.0 m (Ges:199.5 m) (1)
WEA ZB2: NORDEX N163/6.X 7000 163.0 IO! NH: 118.0 m (Ges:199.5 m) (2)
WEA ZB3: NORDEX N163/6.X 7000 163.0 IO! NH: 118.0 m (Ges:199.5 m) (3)
WEA VB1: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 94.0 m (Ges:150.0 m) (4)
WEA VB2: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119.0 m (Ges:175.0 m) (5)
WEA VB3: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119.0 m (Ges:175.0 m) (6)
WEA VB4: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119.0 m (Ges:175.0 m) (7)

WEA VB5: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119.0 m (Ges:175.0 m) (8)
WEA VB6: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119.0 m (Ges:175.0 m) (9)
WEA VB7: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 94.0 m (Ges:150.0 m) (10)
WEA VB11: ENERCON E-82 E2 2300 82.0 IO! NH: 108.4 m (Ges:149.4 m) (14)
WEA VB12: ENERCON E-101 3000 101.0 IO! NH: 99.0 m (Ges:149.5 m) (15)
WEA VB13: ENERCON E-101 3000 101.0 IO! NH: 99.0 m (Ges:149.5 m) (16)
WEA VB14: Siemens SWT-6.0 6000 154.0 IO! NH: 120.0 m (Ges:197.0 m) (17)

Projekt:

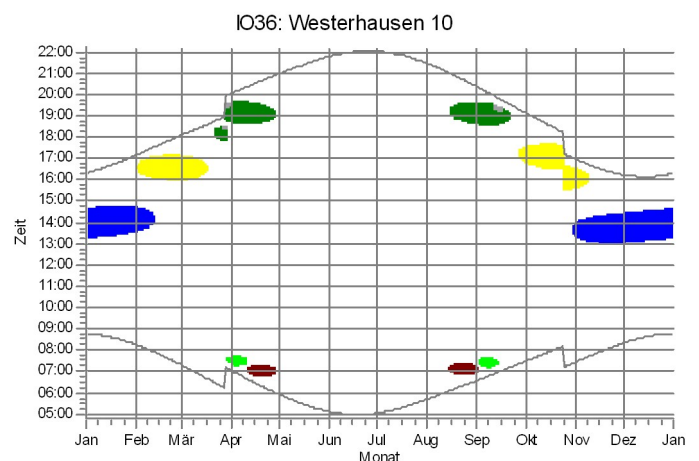
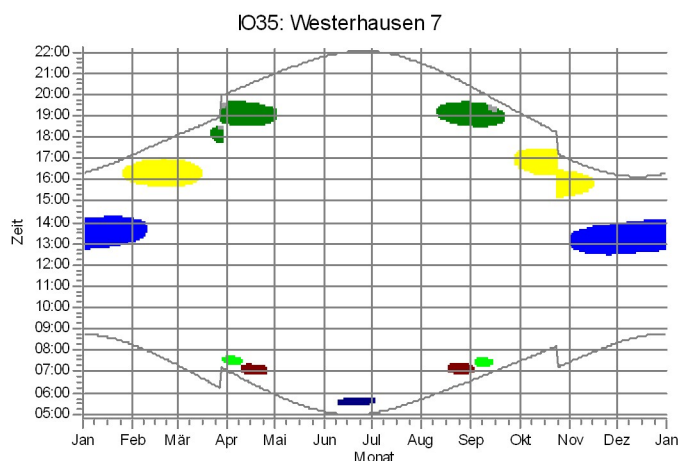
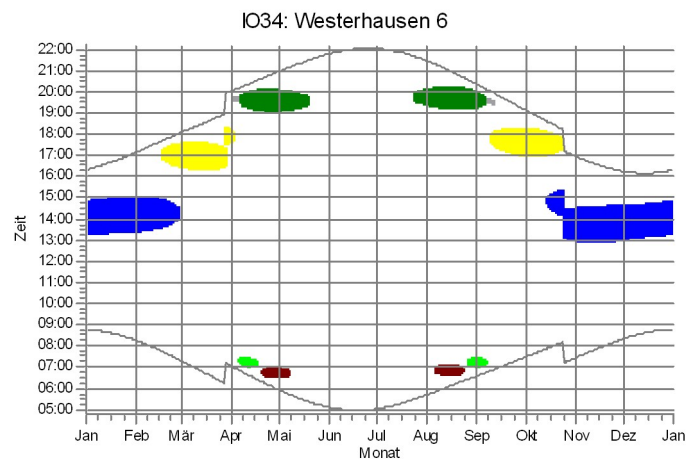
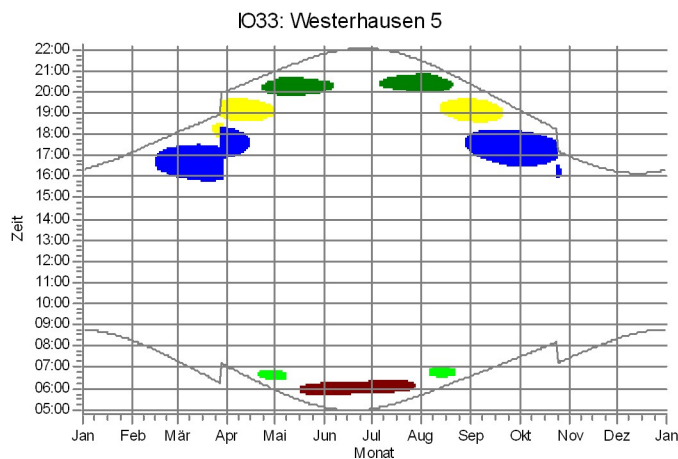
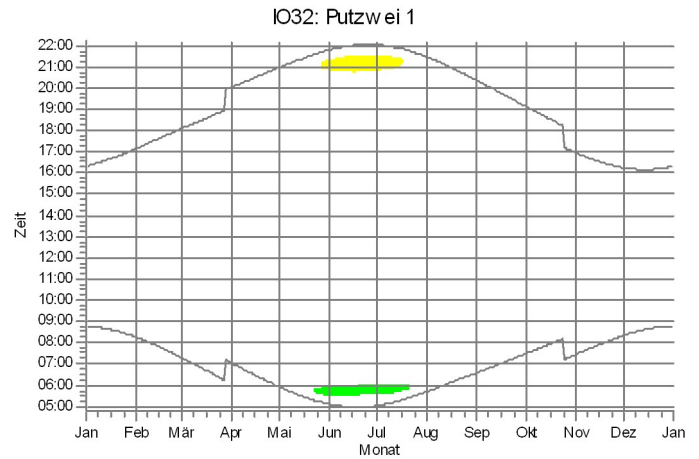
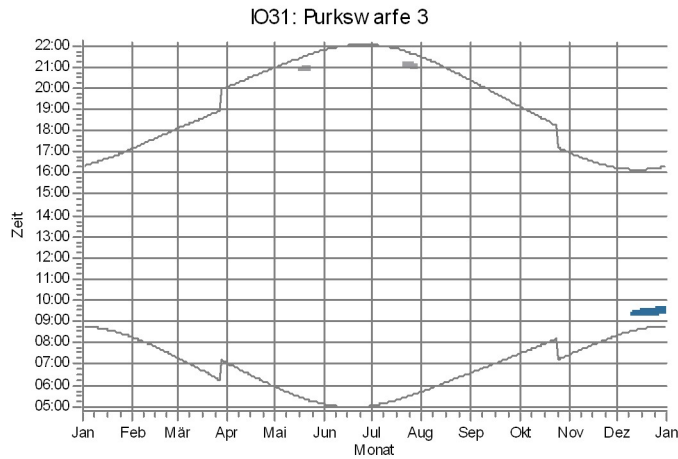
M180777

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Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Grafischer Kalender

Berechnung: M180777_02 Gesamtbelastung



WEA

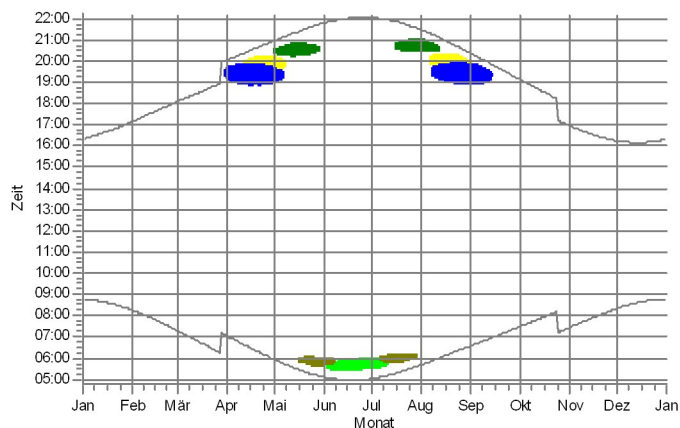
WEA ZB1: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (1)
WEA ZB2: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (2)
WEA ZB3: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (3)
WEA VB4: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (7)

WEA VB5: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (8)
WEA VB6: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (9)
WEA VB13: ENERCON E-101 3000 101.0 IO! NH: 99,0 m (Ges:149,5 m) (16)
WEA VB19: Siemens SWT-6.0 6000 154.0 IO! NH: 120,0 m (Ges:197,0 m) (22)

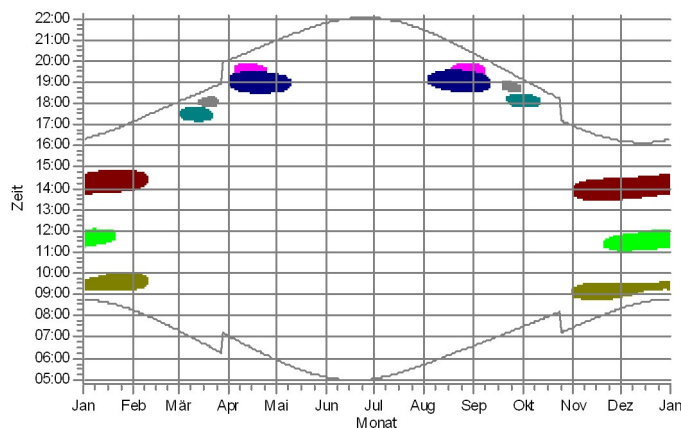
SHADOW - Grafischer Kalender

Berechnung: M180777_02 Gesamtbelastung

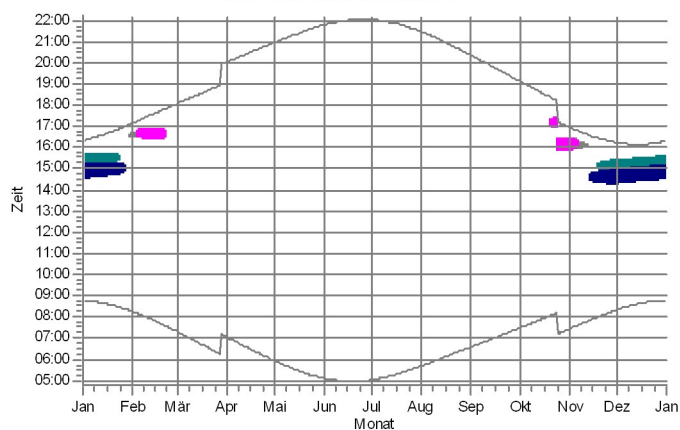
IO37: Westerhausen 1



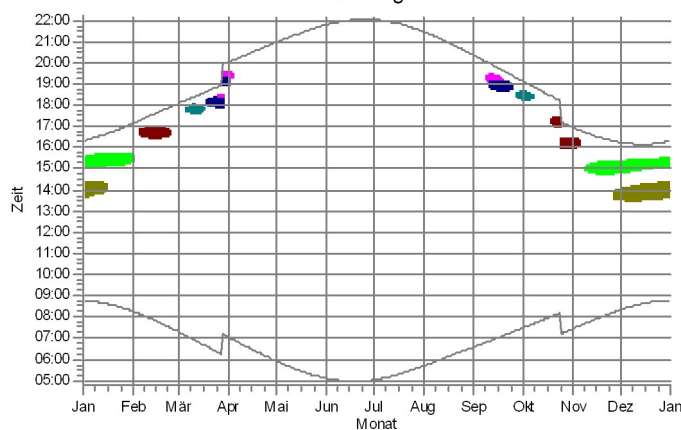
IO4: Utwarfe 4



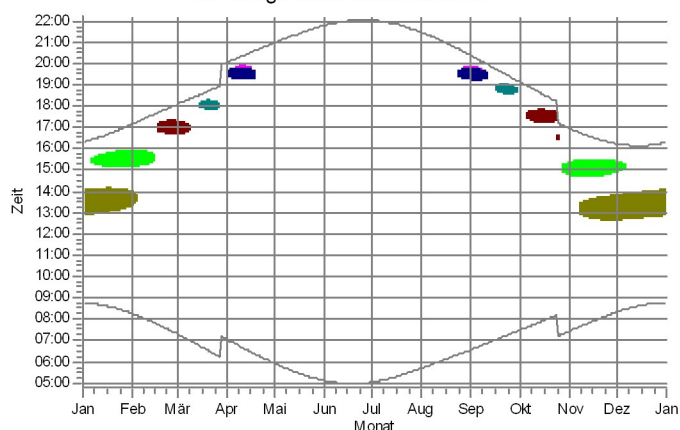
IO5: Klein Buschhausen 3



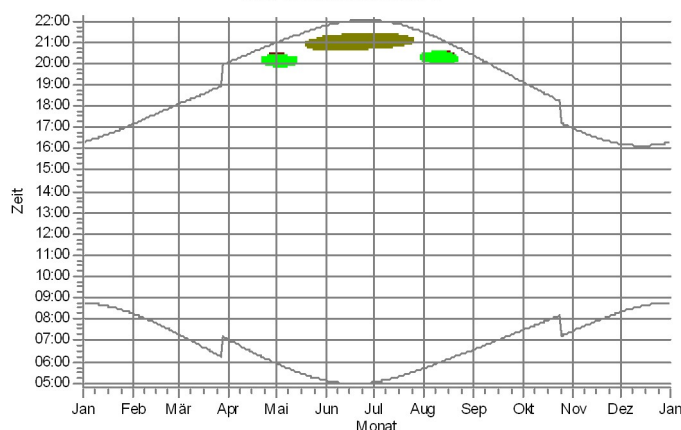
IO6: Bohnenburg 20



IO7: Sengwarder Chausseehaus



IO8: Idschenhausen 1



WEA

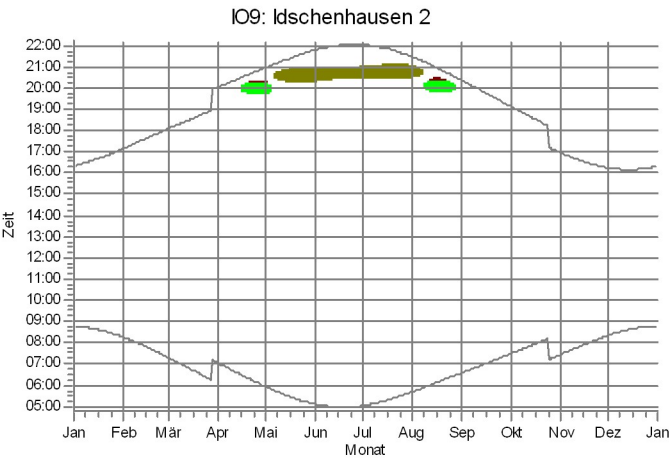
WEA ZB1: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (1)
WEA ZB2: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (2)
WEA ZB3: NORDEX N163/6.X 7000 163.0 IO! NH: 118,0 m (Ges:199,5 m) (3)
WEA VB1: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (4)
WEA VB2: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (5)

WEA VB3: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (6)
WEA VB4: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (7)
WEA VB5: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (8)
WEA VB6: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (9)
WEA VB7: VESTAS V112-3.3 Gridstream 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (10)

Projekt:
M180777

Lizenziierter Anwender:
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Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Grafischer Kalender
Berechnung: M180777_02 Gesamtbelastung



WEA

WEA VB5: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (8)
WEA VB6: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 119,0 m (Ges:175,0 m) (9)

WEA VB7: VESTAS V112-3.3 Gridstreame 3300 112.0 IO! NH: 94,0 m (Ges:150,0 m) (10)

Projekt:

M180777

Lizenzierter Anwender:

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Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO1 - Utwarfe 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai			Juni			
1	08:45		11:20 (WEA VB6)	08:15		10:55 (WEA VB7)	07:18		14:55 (WEA VB5)	07:04		18:42 (WEA VB3)	05:55		19:26 (WEA VB4)	05:06		19:29 (WEA VB4)	
	16:18	57	12:17 (WEA VB6)	17:09	134	15:28 (WEA VB5)	18:04	33	15:28 (WEA VB5)	20:02	32	19:27 (WEA VB1)	20:57	40	20:06 (WEA VB2)	21:47	36	20:05 (WEA VB2)	
2	08:45		11:20 (WEA VB6)	08:14		10:55 (WEA VB7)	07:16		14:59 (WEA VB5)	07:02		18:44 (WEA VB3)	05:53		19:25 (WEA VB4)	05:05		19:29 (WEA VB4)	
	16:19	58	12:18 (WEA VB6)	17:11	132	15:38 (WEA VB5)	18:06	26	15:25 (WEA VB5)	20:04	25	19:25 (WEA VB1)	20:59	41	20:06 (WEA VB4)	21:48	36	20:05 (WEA VB4)	
3	08:45		11:20 (WEA VB6)	08:12		10:54 (WEA VB7)	07:14		15:03 (WEA VB5)	06:59		18:47 (WEA VB3)	05:51		19:24 (WEA VB4)	05:04		19:30 (WEA VB4)	
	16:20	58	12:18 (WEA VB6)	17:13	129	15:39 (WEA VB5)	18:08	17	15:20 (WEA VB5)	20:06	11	18:58 (WEA VB3)	21:01	42	20:06 (WEA VB4)	21:49	34	20:04 (WEA VB4)	
4	08:45		11:21 (WEA VB6)	08:10		10:55 (WEA VB7)	07:12			06:57			05:49		19:23 (WEA VB4)	05:04		19:30 (WEA VB4)	
	16:22	58	12:19 (WEA VB6)	17:15	125	15:40 (WEA VB5)	18:10			20:08			21:03	44	20:07 (WEA VB4)	21:50	33	20:03 (WEA VB4)	
5	08:44		11:21 (WEA VB6)	08:09		10:55 (WEA VB7)	07:09			06:54			05:47		19:23 (WEA VB4)	05:03		19:31 (WEA VB4)	
	16:23	58	12:19 (WEA VB6)	17:17	114	15:41 (WEA VB5)	18:12			20:10			21:04	44	20:07 (WEA VB4)	21:51	33	20:04 (WEA VB4)	
6	08:44		11:22 (WEA VB6)	08:07		10:55 (WEA VB7)	07:07			06:52			05:45		19:22 (WEA VB4)	05:02		19:32 (WEA VB4)	
	16:24	58	12:20 (WEA VB6)	17:19	106	15:41 (WEA VB5)	18:14			20:11			21:06	45	20:07 (WEA VB4)	21:52	31	20:05 (WEA VB4)	
7	08:44		11:22 (WEA VB6)	08:05		10:55 (WEA VB7)	07:04			06:49			05:43		19:22 (WEA VB4)	05:01		19:33 (WEA VB4)	
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	16:27	58	12:21 (WEA VB6)	17:23	109	15:42 (WEA VB5)	18:18			20:15			21:10	46	20:08 (WEA VB4)	21:54	29	20:02 (WEA VB4)	
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10	08:42		11:24 (WEA VB6)	07:59		10:55 (WEA VB7)	06:57			06:42			05:38		19:20 (WEA VB4)	05:00		19:34 (WEA VB4)	
	16:30	57	12:21 (WEA VB6)	17:27	109	15:42 (WEA VB5)	18:22			20:19			21:13	48	20:08 (WEA VB4)	21:56	28	20:02 (WEA VB4)	
11	08:41		11:24 (WEA VB6)	07:57		10:54 (WEA VB7)	06:55			06:40			05:36		19:21 (WEA VB4)	04:59		19:35 (WEA VB4)	
	16:31	58	12:22 (WEA VB6)	17:29	110	15:42 (WEA VB5)	18:23			20:21			21:15	48	20:09 (WEA VB4)	21:57	27	20:02 (WEA VB4)	
12	08:40		11:24 (WEA VB6)	07:55		10:55 (WEA VB7)	06:53			06:38			05:34		19:21 (WEA VB4)	04:59		19:36 (WEA VB4)	
	16:33	58	12:22 (WEA VB6)	17:31	108	15:42 (WEA VB5)	18:25			20:22			21:17	48	20:09 (WEA VB4)	21:57	26	20:02 (WEA VB4)	
13	08:40		11:25 (WEA VB6)	07:53		10:55 (WEA VB7)	06:50			06:35			05:32		19:21 (WEA VB4)	04:59		19:37 (WEA VB4)	
	16:35	57	12:22 (WEA VB6)	17:33	107	15:42 (WEA VB5)	18:27			20:24			21:18	48	20:09 (WEA VB4)	21:58	25	20:02 (WEA VB4)	
14	08:39		11:25 (WEA VB6)	07:51		10:56 (WEA VB7)	06:48			06:31			05:31		19:21 (WEA VB4)	04:59		19:38 (WEA VB4)	
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15	08:38		11:26 (WEA VB6)	07:49		10:57 (WEA VB7)	06:45			06:31			05:29		19:20 (WEA VB4)	04:58		19:37 (WEA VB4)	
	16:38	65	15:09 (WEA VB5)	17:37	104	15:42 (WEA VB5)	18:31			20:28			21:22	48	20:08 (WEA VB4)	21:59	24	20:01 (WEA VB4)	
16	08:37		11:27 (WEA VB6)	07:47		10:57 (WEA VB7)	06:43			06:28			05:27		19:21 (WEA VB4)	04:58		19:38 (WEA VB4)	
	16:39	72	15:14 (WEA VB5)	17:39	103	15:42 (WEA VB5)	18:33			20:30			21:23	48	20:09 (WEA VB4)	22:00	23	20:01 (WEA VB4)	
17	08:36		11:27 (WEA VB6)	07:45		10:58 (WEA VB7)	06:40					19:53 (WEA VB2)	05:26		19:22 (WEA VB4)	04:58		19:39 (WEA VB4)	
	16:41	77	15:17 (WEA VB5)	17:41	100	15:42 (WEA VB5)	18:35	12	18:03 (WEA VB3)	20:32	9	20:02 (WEA VB2)	21:25	47	20:09 (WEA VB4)	22:00	22	20:01 (WEA VB4)	
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	16:43	82	15:19 (WEA VB5)	17:43	99	15:41 (WEA VB5)	18:36	18	18:06 (WEA VB3)	20:23	14	20:04 (WEA VB2)	21:27	47	20:08 (WEA VB4)	22:01	22	20:01 (WEA VB4)	
19	08:34		09:10 (WEA VB7)	07:41		10:50 (WEA VB7)	06:36			20:21			20:52		19:48 (WEA VB2)	05:23		19:39 (WEA VB4)	
	16:45	92	15:21 (WEA VB5)	17:45	93	15:40 (WEA VB5)	18:38	21	18:07 (WEA VB3)	20:35	18	20:06 (WEA VB2)	21:28	47	20:09 (WEA VB4)	22:01	22	20:01 (WEA VB4)	
20	08:33		09:07 (WEA VB7)	07:39		10:51 (WEA VB7)	06:33			20:19			20:51		19:46 (WEA VB2)	05:21		19:40 (WEA VB4)	
	16:46	102	15:23 (WEA VB5)	17:47	90	15:40 (WEA VB5)	18:40	23	18:08 (WEA VB3)	20:37	20	20:06 (WEA VB2)	21:30	46	20:08 (WEA VB4)	22:02	22	20:02 (WEA VB4)	
21	08:31		09:04 (WEA VB7)	07:36		10:53 (WEA VB7)	06:31			20:17			20:50		19:45 (WEA VB2)	05:20		19:41 (WEA VB4)	
	16:49	110	15:30 (WEA VB5)	17:49	86	15:40 (WEA VB5)	18:42	25	18:08 (WEA VB3)	20:42	22	20:07 (WEA VB2)	21:31	46	20:08 (WEA VB4)	22:02	21	20:02 (WEA VB4)	
22	08:30		09:03 (WEA VB7)	07:34		10:04 (WEA VB7)	06:28			20:13			20:48		19:44 (WEA VB2)	05:18		19:41 (WEA VB4)	
	16:50	115	15:27 (WEA VB5)	17:51	80	15:38 (WEA VB5)	18:44	27	18:09 (WEA VB3)	20:41	24	20:08 (WEA VB2)	21:33	45	20:08 (WEA VB4)	22:02	21	20:02 (WEA VB4)	
23	08:29		09:01 (WEA VB7)	07:32		10:06 (WEA VB7)	06:26			20:12			20:57		19:24 (WEA VB4)	04:59		19:40 (WEA VB4)	
	16:52	120	15:28 (WEA VB5)	17:53	73	15:37 (WEA VB5)	18:46	30	18:19 (WEA VB1)	20:43	24	20:08 (WEA VB2)	21:34	44	20:08 (WEA VB4)	22:02	22	20:02 (WEA VB4)	
24	08:28		09:01 (WEA VB7)	07:30		10:10 (WEA VB7)	06:23			20:10			20:55		19:23 (WEA VB4)	04:59		19:41 (WEA VB4)	
	16:54	123	15:30 (WEA VB5)	17:55	64	15:37 (WEA VB5)	18:48	33	18:21 (WEA VB1)	20:44	28	20:09 (WEA VB2)	21:36	44	20:07 (WEA VB4)	22:02	22	20:03 (WEA VB4)	
25	08:26		08:59 (WEA VB7)	07:28		14:47 (WEA VB5)	06:21			20:08			20:54		19:24 (WEA VB4)	04:59		19:41 (WEA VB4)	
	16:56	127	15:31 (WEA VB5)	17:57	48	15:35 (WEA VB5)	18:49	38	18:23 (WEA VB1)	20:46	32	20:09 (WEA VB2)	21:37	43	20:07 (WEA VB4)	22:02	22	20:03 (WEA VB4)	
26	08:25		08:59 (WEA VB7)	07:25		14:49 (WEA VB5)	06:19			20:06			20:53		19:24 (WEA VB4)	05:00		19:40 (WEA VB4)	
	16:57	128	15:32 (WEA VB5)	17:59	45	15:34 (WEA VB5)	18:51	40	18:25 (WEA VB1)	20:48	35	20:09 (WEA VB2)	21:39	42	20:06 (WEA VB4)	22:02	23	20:03 (WEA VB4)	
27	08:23		08:58 (WEA VB7)	07:23		14:51 (WEA VB5)	06:16			20:04			20:52		19:25 (WEA VB4)	05:00		19:41 (WEA VB4)	
	16:59	131	15:33 (WEA VB5)	18:00	41	15:32 (WEA VB5)	18:53	42	18:27 (WEA VB1)	20:50	36	20:08 (WEA VB2)	21:40	41	20:06 (WEA VB4)	22:02	23	20:04 (WEA VB4)	
28	08:22		08:57 (WEA VB7)	07:21		14:53 (WEA VB5)	06:14			20:02			20:50		19:26 (WEA VB4)	05:01		19:40 (WEA VB4)	
	17:01	133	15:34 (WEA VB5)	18:02	37	15:30 (WEA VB5)	18:55	43	18:28 (WEA VB1)	20:52	38	20:08 (WEA VB2)	21:41	41	20:06 (WEA VB4)	22:02	24	20:04 (WEA VB4)	
29	08:20		08:57 (WEA VB7)				07:11			20:59			20:59		19:26 (WEA VB4)	05:01		19:40 (WEA VB4)	
	17:03	134	15:35 (WEA VB5)				07:13	45	19:31 (WEA VB1)	20:54	38	20:07 (WEA VB2)	21:42	40	20:06 (WEA VB4)	22:01	25	20:04 (WEA VB4)	
30	08:19		08:57 (WEA VB7)				07:09			20:57			20:57		19:27 (WEA VB4)	05:00		19:41 (WEA VB4)	
	17:05	134	15:36 (WEA VB5)				19:59	43	19:30 (WEA VB1)	20:55	40	20:07 (WEA VB2)	21:44	38	20:05 (WEA VB4)	22:02	25	20:06 (WEA VB4)	
31	08:17		08:56 (WEA VB7)				20:06						20:07		19:27 (WEA VB4)				
	17:07	135	15:37 (WEA VB5)				20:00	40	19:30 (WEA VB1)				21:45	38	20:05 (WEA VB4)				
Sonnenscheinstunden		251		274			367			420			493				509		
astr.max.mögl.Beschattung		2688		2668			556			446			1379				784		

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO1 - Utwarfe 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

		Juli		August		September		Oktober		November		Dezember	
1	05:02	19:40 (WEA VB4)	05:42	19:31 (WEA VB4)	06:36		07:28	07:26	08:24 (WEA VB7)	08:21	11:06 (WEA VB6)		
	22:01	20:06 (WEA VB4)	21:27	20:19 (WEA VB4)	20:20		19:07	16:57	15:11 (WEA VB5)	16:13	58 12:04 (WEA VB6)		
2	05:03	19:40 (WEA VB4)	05:44	19:31 (WEA VB4)	06:37		07:30	07:28	08:24 (WEA VB7)	08:22	11:07 (WEA VB6)		
	22:01	20:07 (WEA VB4)	21:25	20:19 (WEA VB4)	20:18		19:05	16:55	15:11 (WEA VB5)	16:13	57 12:04 (WEA VB6)		
3	05:04	19:40 (WEA VB4)	05:45	19:31 (WEA VB4)	06:39		07:32	07:30	08:24 (WEA VB7)	08:24	11:06 (WEA VB6)		
	22:01	20:08 (WEA VB4)	21:23	20:18 (WEA VB4)	20:16		19:02	16:53	15:12 (WEA VB5)	16:12	58 12:04 (WEA VB6)		
4	05:05	19:39 (WEA VB4)	05:47	19:31 (WEA VB4)	06:41		07:34	07:32	08:24 (WEA VB7)	08:25	11:07 (WEA VB6)		
	22:00	20:08 (WEA VB4)	21:21	20:19 (WEA VB4)	20:13		19:00	16:51	15:11 (WEA VB5)	16:11	58 12:05 (WEA VB6)		
5	05:06	19:38 (WEA VB4)	05:49	19:31 (WEA VB4)	06:43		07:36	07:34	08:25 (WEA VB7)	08:26	11:07 (WEA VB6)		
	22:00	20:08 (WEA VB4)	21:19	20:18 (WEA VB4)	20:11		18:58	16:49	15:11 (WEA VB5)	16:11	58 12:05 (WEA VB6)		
6	05:06	19:38 (WEA VB4)	05:50	19:32 (WEA VB4)	06:44		07:37	07:36	08:25 (WEA VB7)	08:28	11:08 (WEA VB6)		
	21:59	20:09 (WEA VB4)	21:17	20:18 (WEA VB4)	20:08		18:55	16:48	15:10 (WEA VB5)	16:10	58 12:06 (WEA VB6)		
7	05:07	19:38 (WEA VB4)	05:52	19:32 (WEA VB4)	06:46		07:39	07:38	08:25 (WEA VB7)	08:29	11:08 (WEA VB6)		
	21:58	20:10 (WEA VB4)	21:15	20:18 (WEA VB4)	20:06		18:53	16:46	15:10 (WEA VB5)	16:10	58 12:06 (WEA VB6)		
8	05:08	19:38 (WEA VB4)	05:54	19:32 (WEA VB4)	06:48		07:41	07:40	08:25 (WEA VB7)	08:30	11:09 (WEA VB6)		
	21:58	20:11 (WEA VB4)	21:13	20:16 (WEA VB4)	20:04		18:50	16:44	15:09 (WEA VB5)	16:09	58 12:07 (WEA VB6)		
9	05:09	19:37 (WEA VB4)	05:55	19:33 (WEA VB4)	06:50		07:43	07:41	08:26 (WEA VB7)	08:32	11:09 (WEA VB6)		
	21:57	20:11 (WEA VB4)	21:11	20:16 (WEA VB4)	20:01	11	18:51 (WEA VB3)	16:42	15:09 (WEA VB5)	16:09	58 12:07 (WEA VB6)		
10	05:11	19:37 (WEA VB4)	05:57	19:33 (WEA VB4)	06:51		07:45	07:43	08:26 (WEA VB7)	08:33	11:09 (WEA VB6)		
	21:56	20:12 (WEA VB4)	21:09	20:15 (WEA VB4)	19:59	24	19:18 (WEA VB1)	16:40	15:08 (WEA VB5)	16:09	58 12:07 (WEA VB6)		
11	05:12	19:36 (WEA VB4)	05:59	19:34 (WEA VB4)	06:53		07:46	07:45	08:27 (WEA VB7)	08:34	11:10 (WEA VB6)		
	21:55	20:12 (WEA VB4)	21:07	20:14 (WEA VB4)	19:56	34	19:21 (WEA VB1)	16:39	15:08 (WEA VB5)	16:08	57 12:07 (WEA VB6)		
12	05:13	19:36 (WEA VB4)	06:01	19:35 (WEA VB4)	06:55		07:48	07:47	08:27 (WEA VB7)	08:35	11:10 (WEA VB6)		
	21:54	20:13 (WEA VB4)	21:05	20:15 (WEA VB2)	19:54	38	19:21 (WEA VB1)	16:37	15:07 (WEA VB5)	16:08	58 12:08 (WEA VB6)		
13	05:14	19:35 (WEA VB4)	06:02	19:35 (WEA VB4)	06:57		07:50	07:49	08:28 (WEA VB7)	08:36	11:11 (WEA VB6)		
	21:53	20:13 (WEA VB4)	21:03	20:14 (WEA VB2)	19:51	42	19:22 (WEA VB1)	16:35	15:07 (WEA VB5)	16:08	58 12:09 (WEA VB6)		
14	05:15	19:35 (WEA VB4)	06:04	19:37 (WEA VB4)	06:58		07:52	07:51	08:30 (WEA VB7)	08:37	11:12 (WEA VB6)		
	21:52	20:14 (WEA VB4)	21:01	20:15 (WEA VB2)	19:49	43	19:21 (WEA VB1)	16:34	15:07 (WEA VB5)	16:08	57 12:09 (WEA VB6)		
15	05:16	19:35 (WEA VB4)	06:06	19:38 (WEA VB4)	07:00		07:54	07:53	08:31 (WEA VB7)	08:38	11:12 (WEA VB6)		
	21:51	20:15 (WEA VB4)	20:59	20:16 (WEA VB2)	19:47	44	19:18 (WEA VB1)	16:32	15:06 (WEA VB5)	16:08	58 12:10 (WEA VB6)		
16	05:18	19:35 (WEA VB4)	06:08	19:39 (WEA VB4)	07:02		07:56	07:55	08:32 (WEA VB7)	08:39	11:12 (WEA VB6)		
	21:50	20:16 (WEA VB4)	20:57	20:15 (WEA VB2)	19:44	43	19:16 (WEA VB1)	16:31	15:05 (WEA VB5)	16:08	57 12:09 (WEA VB6)		
17	05:19	19:34 (WEA VB4)	06:09	19:41 (WEA VB4)	07:04		07:58	07:57	08:33 (WEA VB7)	08:40	11:13 (WEA VB6)		
	21:49	20:16 (WEA VB4)	20:55	20:15 (WEA VB2)	19:42	41	19:14 (WEA VB1)	16:29	15:05 (WEA VB5)	16:08	57 12:10 (WEA VB6)		
18	05:20	19:34 (WEA VB4)	06:11	19:44 (WEA VB4)	07:05		07:59	07:58	08:35 (WEA VB7)	08:41	11:13 (WEA VB6)		
	21:48	20:16 (WEA VB4)	20:53	20:15 (WEA VB2)	19:39	38	19:12 (WEA VB1)	16:28	15:04 (WEA VB5)	16:09	58 12:11 (WEA VB6)		
19	05:22	19:34 (WEA VB4)	06:13	19:48 (WEA VB4)	07:07		08:01	08:00	08:36 (WEA VB7)	08:41	11:14 (WEA VB6)		
	21:46	20:17 (WEA VB4)	20:50	20:14 (WEA VB2)	19:37	35	19:08 (WEA VB1)	16:26	15:03 (WEA VB5)	16:09	57 12:11 (WEA VB6)		
20	05:23	19:33 (WEA VB4)	06:15	19:49 (WEA VB2)	07:09		08:03	08:02	08:38 (WEA VB7)	08:42	11:14 (WEA VB6)		
	21:45	20:17 (WEA VB4)	20:48	20:14 (WEA VB2)	19:34	31	19:06 (WEA VB1)	16:25	15:02 (WEA VB5)	16:09	57 12:11 (WEA VB6)		
21	05:25	19:33 (WEA VB4)	06:16	19:49 (WEA VB2)	07:11		08:05	08:04	08:40 (WEA VB7)	08:43	11:15 (WEA VB6)		
	21:44	20:17 (WEA VB4)	20:46	20:12 (WEA VB2)	19:32	27	18:55 (WEA VB3)	16:24	15:01 (WEA VB5)	16:10	57 12:12 (WEA VB6)		
22	05:26	19:33 (WEA VB4)	06:18	19:50 (WEA VB2)	07:12		08:07	08:06	08:43 (WEA VB7)	08:43	11:15 (WEA VB6)		
	21:42	20:18 (WEA VB4)	20:44	20:12 (WEA VB2)	19:29	26	18:54 (WEA VB3)	16:22	15:00 (WEA VB5)	16:10	57 12:12 (WEA VB6)		
23	05:28	19:32 (WEA VB4)	06:20	19:51 (WEA VB2)	07:14		08:09	08:07	08:46 (WEA VB7)	08:44	11:16 (WEA VB6)		
	21:41	20:18 (WEA VB4)	20:41	20:11 (WEA VB2)	19:27	24	18:52 (WEA VB3)	16:21	14:58 (WEA VB5)	16:11	57 12:13 (WEA VB6)		
24	05:29	19:32 (WEA VB4)	06:22	19:51 (WEA VB2)	07:16		08:11	08:09	11:05 (WEA VB6)	08:44	11:16 (WEA VB6)		
	21:40	20:18 (WEA VB4)	20:39	20:09 (WEA VB2)	19:24	22	18:51 (WEA VB3)	16:20	14:57 (WEA VB5)	16:11	57 12:13 (WEA VB6)		
25	05:31	19:32 (WEA VB4)	06:23	19:53 (WEA VB2)	07:18		07:13	08:11	11:04 (WEA VB6)	08:44	11:16 (WEA VB6)		
	21:38	20:19 (WEA VB4)	20:37	20:10 (WEA VB2)	19:22	19	18:49 (WEA VB3)	17:12	14:54 (WEA VB5)	16:12	57 12:13 (WEA VB6)		
26	05:32	19:31 (WEA VB4)	06:25	19:56 (WEA VB2)	07:19		07:15	08:13	11:05 (WEA VB6)	08:45	11:18 (WEA VB6)		
	21:37	20:19 (WEA VB4)	20:35	20:04 (WEA VB2)	19:19	14	18:47 (WEA VB3)	17:10	14:52 (WEA VB5)	16:12	57 12:15 (WEA VB6)		
27	05:34	19:32 (WEA VB4)	06:27		07:21		07:16	08:14	11:05 (WEA VB6)	08:45	11:18 (WEA VB6)		
	21:35	20:19 (WEA VB4)	20:32		19:17	5	18:41 (WEA VB3)	17:07	14:49 (WEA VB5)	16:13	57 12:15 (WEA VB6)		
28	05:35	19:31 (WEA VB4)	06:29		07:23		07:18	08:16	11:05 (WEA VB6)	08:45	11:18 (WEA VB6)		
	21:33	20:19 (WEA VB4)	20:30		19:15		17:05	15:12 (WEA VB5)	16:16	58 12:16 (WEA VB6)			
29	05:37	19:32 (WEA VB4)	06:30		07:25		07:20	08:25 (WEA VB7)	16:17	58 12:19 (WEA VB6)			
	21:32	20:20 (WEA VB4)	20:28		19:12		17:03	15:12 (WEA VB5)	16:15	57 12:16 (WEA VB6)			
30	05:39	19:31 (WEA VB4)	06:32		07:27		07:22	08:24 (WEA VB7)	16:19	58 12:19 (WEA VB6)			
	21:30	20:19 (WEA VB4)	20:25		19:10		17:01	15:11 (WEA VB5)	16:14	58 12:17 (WEA VB6)			
31	05:40	19:31 (WEA VB4)	06:34				07:24	08:24 (WEA VB7)		08:45	11:19 (WEA VB6)		
	21:28	20:20 (WEA VB4)	20:23				16:59	15:11 (WEA VB5)		16:17	57 12:16 (WEA VB6)		
Sonnenscheinstunden		511	459	911	382	561	329	1610	260	3231	1782		
astr.max.mögl.Beschattung		1223											

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO10 - Remmelhausen 4
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Jun	Jul	August	September	Oktober	November	Dezember
1	08:45	08:15	07:18	07:04	05:55	05:06	21:02 (WEA VB3) 05:02	21:07 (WEA VB3) 05:42	06:36	07:28	07:26	08:21
2	08:45	08:14	07:16	07:01	05:53	05:05	21:01 (WEA VB3) 05:03	21:07 (WEA VB3) 05:44	06:37	07:30	07:28	08:22
3	08:45	08:12	07:14	06:59	05:51	05:04	21:01 (WEA VB3) 05:04	21:08 (WEA VB3) 05:45	06:39	07:32	07:30	08:24
4	08:45	08:10	07:12	06:57	05:49	05:04	21:02 (WEA VB3) 05:05	21:07 (WEA VB3) 05:47	06:41	07:34	07:32	08:25
5	08:44	08:09	07:09	06:54	05:47	05:03	21:02 (WEA VB3) 05:06	21:07 (WEA VB3) 05:49	06:43	07:36	07:34	08:26
6	08:44	08:07	07:07	06:52	05:45	05:02	21:01 (WEA VB3) 05:07	21:08 (WEA VB3) 05:50	06:44	07:37	07:36	08:28
7	08:44	08:05	07:04	06:49	05:43	05:02	21:02 (WEA VB3) 05:07	21:08 (WEA VB3) 05:52	06:46	07:39	07:38	08:29
8	08:43	08:03	07:02	06:47	05:41	05:01	21:02 (WEA VB3) 05:08	21:08 (WEA VB3) 05:54	06:48	07:41	07:40	08:30
9	08:42	08:01	07:00	06:45	05:40	05:00	21:02 (WEA VB3) 05:09	21:08 (WEA VB3) 05:55	06:50	07:43	07:41	08:32
10	08:42	07:59	06:57	06:42	05:38	05:00	21:03 (WEA VB3) 05:11	21:09 (WEA VB3) 05:57	06:51	07:45	07:43	08:33
11	08:41	07:57	06:55	06:40	05:36	04:59	21:03 (WEA VB3) 05:12	21:09 (WEA VB3) 05:59	06:53	07:46	07:45	08:34
12	08:40	07:55	06:53	06:38	05:34	04:59	21:03 (WEA VB3) 05:13	21:09 (WEA VB3) 06:01	06:55	07:48	07:47	08:35
13	08:40	07:53	06:50	06:35	05:32	04:59	21:04 (WEA VB3) 05:14	21:10 (WEA VB3) 06:02	06:57	07:50	07:49	08:36
14	08:39	07:51	06:48	06:33	05:31	04:58	21:04 (WEA VB3) 05:15	21:10 (WEA VB3) 06:04	06:58	07:52	07:51	08:37
15	08:38	07:49	06:45	06:31	05:29	04:58	21:03 (WEA VB3) 05:17	21:11 (WEA VB3) 06:06	07:00	07:54	07:53	08:38
16	08:37	07:47	06:43	06:28	05:27	04:58	21:04 (WEA VB3) 05:18	21:12 (WEA VB3) 06:08	07:02	07:56	07:55	08:39
17	08:36	07:45	06:40	06:26	05:26	04:58	21:04 (WEA VB3) 05:19	21:12 (WEA VB3) 06:09	07:04	07:58	07:56	08:40
18	08:35	07:43	06:38	06:24	05:24	04:58	21:04 (WEA VB3) 05:20	21:13 (WEA VB3) 06:11	07:05	07:59	07:58	08:41
19	08:34	07:41	06:36	06:21	05:23	04:58	21:04 (WEA VB3) 05:22	21:14 (WEA VB3) 06:13	07:07	08:01	08:00	08:41
20	08:33	07:39	06:33	06:19	05:21	04:58	21:06 (WEA VB3) 05:23	21:16 (WEA VB3) 06:15	07:09	08:03	08:02	08:42
21	08:31	07:36	06:31	06:17	05:20	04:58	21:21 (WEA VB3) 05:25	21:21 (WEA VB3) 06:16	07:11	08:05	08:04	08:43
22	08:30	07:34	06:28	06:15	05:18	04:58	21:06 (WEA VB3) 05:26	21:22 (WEA VB3) 06:18	07:12	08:07	08:06	08:43
23	08:29	07:32	06:26	06:12	05:17	04:59	21:05 (WEA VB3) 05:28	21:23 (WEA VB3) 06:20	07:14	08:09	08:07	08:44
24	08:28	07:30	06:23	06:10	05:15	04:59	21:06 (WEA VB3) 05:29	21:24 (WEA VB3) 06:22	07:16	08:11	08:09	08:44
25	08:26	07:28	06:21	06:08	05:14	04:59	21:06 (WEA VB3) 05:31	21:25 (WEA VB3) 06:23	07:18	08:13	08:11	08:44
26	08:25	07:25	06:19	06:06	05:13	21:03 (WEA VB3) 05:00	21:06 (WEA VB3) 05:32	21:26 (WEA VB3) 06:25	07:19	08:15	08:12	08:45
27	08:23	07:23	06:16	06:04	05:12	21:03 (WEA VB3) 05:00	21:22 (WEA VB3) 05:34	21:27 (WEA VB3) 06:27	07:21	08:17	08:14	08:45
28	08:22	07:21	06:14	06:02	05:10	3 21:06 (WEA VB3) 05:01	21:23 (WEA VB3) 05:35	21:28 (WEA VB3) 06:29	07:23	08:19	08:16	08:45
29	08:20	07:19	06:12	05:59	05:09	5 21:07 (WEA VB3) 05:01	21:24 (WEA VB3) 05:37	21:29 (WEA VB3) 06:30	07:25	08:21	08:17	08:45
30	08:19	07:17	06:10	05:57	05:08	7 21:09 (WEA VB3) 05:02	21:25 (WEA VB3) 05:39	21:30 (WEA VB3) 06:32	07:27	08:23	08:19	08:45
31	08:17	07:15	06:08	05:55	05:07	9 21:10 (WEA VB3) 05:02	21:26 (WEA VB3) 05:40	21:31 (WEA VB3) 06:34	07:29	08:25	08:21	08:45
	17:07	07:13	06:06	05:52	05:05	10 21:11 (WEA VB3) 05:03	21:27 (WEA VB3) 05:41	21:32 (WEA VB3) 06:35	07:30	08:26	08:22	08:45
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	235
astr.max.mögl.Beschattung					36	467	209					

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO11 - Westerhausen 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April		Mai		Juni
1	08:45	08:15	07:19	07:04		19:05 (WEA ZB2)	05:55	05:06
	16:18	17:09	18:04	20:02	25	19:30 (WEA ZB2)	20:57	21:47
2	08:45	08:14	07:16	07:02		19:05 (WEA ZB2)	05:53	05:05
	16:19	17:11	18:06	20:04	24	19:29 (WEA ZB2)	20:59	21:48
3	08:45	08:12	07:14	06:59		19:07 (WEA ZB2)	05:51	05:05
	16:21	17:13	18:08	20:06	22	19:29 (WEA ZB2)	21:01	21:49
4	08:45	08:10	07:12	06:57		19:07 (WEA ZB2)	05:49	05:04
	16:22	17:15	18:10	20:08	19	19:26 (WEA ZB2)	21:03	21:50
5	08:44	08:09	07:09	06:54		19:09 (WEA ZB2)	05:47	05:03
	16:23	17:17	18:12	20:10	16	19:25 (WEA ZB2)	21:04	21:51
6	08:44	08:07	07:07	17:46 (WEA ZB3) 06:52		19:11 (WEA ZB2)	05:45	05:02
	16:24	17:19	18:14	17:47 (WEA ZB3) 20:11	10	19:21 (WEA ZB2)	21:06	21:52
7	08:44	08:05	07:05	17:42 (WEA ZB3) 06:50			05:43	05:02
	16:26	17:21	18:16	17:50 (WEA ZB3) 20:13			21:08	21:53
8	08:43	08:03	07:02	17:39 (WEA ZB3) 06:47			05:41	05:01
	16:27	17:23	18:18	17:51 (WEA ZB3) 20:15			21:10	21:54
9	08:43	08:01	07:00	17:37 (WEA ZB3) 06:45		19:46 (WEA ZB1)	05:40	05:00
	16:28	17:25	18:20	17:53 (WEA ZB3) 20:17	3	19:49 (WEA ZB1)	21:11	21:55
10	08:42	07:59	06:57	17:35 (WEA ZB3) 06:42		19:45 (WEA ZB1)	05:38	05:00
	16:30	17:27	18:22	17:55 (WEA ZB3) 20:19	6	19:51 (WEA ZB1)	21:13	21:56
11	08:41	07:57	06:55	17:34 (WEA ZB3) 06:40		19:44 (WEA ZB1)	05:36	04:59
	16:31	17:29	18:23	17:57 (WEA ZB3) 20:21	10	19:54 (WEA ZB1)	21:15	21:57
12	08:40	07:55	06:53	17:32 (WEA ZB3) 06:38		19:42 (WEA ZB1)	05:34	04:59
	16:33	17:31	18:25	17:58 (WEA ZB3) 20:22	13	19:55 (WEA ZB1)	21:17	21:57
13	08:40	07:53	06:50	17:32 (WEA ZB3) 06:35		19:42 (WEA ZB1)	05:32	04:59
	16:35	17:33	18:27	18:01 (WEA ZB3) 20:24	15	19:57 (WEA ZB1)	21:18	21:58
14	08:39	07:51	06:48	17:31 (WEA ZB3) 06:33		19:41 (WEA ZB1)	05:31	04:58
	16:36	17:35	18:29	18:02 (WEA ZB3) 20:26	18	19:59 (WEA ZB1)	21:20	21:59
15	08:38	07:49	06:45	17:30 (WEA ZB3) 06:31		19:41 (WEA ZB1)	05:29	04:58
	16:38	17:37	18:31	18:05 (WEA ZB3) 20:28	20	20:01 (WEA ZB1)	21:22	21:59
16	08:37	07:47	06:43	17:30 (WEA ZB3) 06:28		19:40 (WEA ZB1)	05:27	04:58
	16:40	17:39	18:33	18:05 (WEA ZB3) 20:30	22	20:02 (WEA ZB1)	21:23	22:00
17	08:36	07:45	06:41	17:30 (WEA ZB3) 06:26		19:41 (WEA ZB1)	05:26	04:58
	16:41	17:41	18:35	18:05 (WEA ZB3) 20:32	23	20:04 (WEA ZB1)	21:25	22:00
18	08:35	07:43	06:38	17:30 (WEA ZB3) 06:24		19:41 (WEA ZB1)	05:24	04:58
	16:43	17:43	18:37	18:05 (WEA ZB3) 20:33	22	20:03 (WEA ZB1)	21:27	22:01
19	08:34	07:41	06:36	17:29 (WEA ZB3) 06:21		19:42 (WEA ZB1)	05:23	04:58
	16:45	17:45	18:38	18:04 (WEA ZB3) 20:35	21	20:03 (WEA ZB1)	21:28	22:01
20	08:33	07:39	06:33	17:30 (WEA ZB3) 06:19		19:43 (WEA ZB1)	05:21	04:58
	16:46	17:47	18:40	18:03 (WEA ZB3) 20:37	19	20:02 (WEA ZB1)	21:30	22:02
21	08:31	07:36	06:31	17:30 (WEA ZB3) 06:17		19:43 (WEA ZB1)	05:20	04:58
	16:48	17:49	18:42	18:02 (WEA ZB3) 20:39	16	19:59 (WEA ZB1)	21:31	22:02
22	08:30	07:34	06:28	17:30 (WEA ZB3) 06:15		19:45 (WEA ZB1)	05:18	04:58
	16:50	17:51	18:44	18:18 (WEA ZB2) 20:41	13	19:58 (WEA ZB1)	21:33	22:02
23	08:29	07:32	06:26	17:31 (WEA ZB3) 06:12		19:47 (WEA ZB1)	05:17	04:59
	16:52	17:53	18:46	18:19 (WEA ZB2) 20:43	8	19:55 (WEA ZB1)	21:34	22:02
24	08:28	07:30	06:23	17:32 (WEA ZB3) 06:10			05:15	04:59
	16:54	17:55	18:48	18:21 (WEA ZB2) 20:44			21:36	22:02
25	08:26	07:28	06:21	17:33 (WEA ZB3) 06:08			05:14	04:59
	16:56	17:57	18:49	18:23 (WEA ZB2) 20:46			21:37	22:02
26	08:25	07:25	06:19	17:35 (WEA ZB3) 06:06			05:13	05:00
	16:58	17:59	18:51	18:25 (WEA ZB2) 20:48			21:39	22:02
27	08:23	07:23	06:16	17:38 (WEA ZB3) 06:04			05:12	05:00
	16:59	18:01	18:53	18:27 (WEA ZB2) 20:50			21:40	22:02
28	08:22	07:21	06:14	18:05 (WEA ZB2) 06:02			05:11	05:01
	17:01	18:02	18:55	18:28 (WEA ZB2) 20:52			21:41	22:02
29	08:20		07:11	19:05 (WEA ZB2) 05:59			05:09	05:01
	17:03		19:57	19:31 (WEA ZB2) 20:54			21:43	22:02
30	08:19		07:09	19:05 (WEA ZB2) 05:57			05:08	05:02
	17:05		19:59	19:32 (WEA ZB2) 20:55			21:44	22:02
31	08:17		07:06	19:05 (WEA ZB2)			05:07	
	17:07		20:00	19:31 (WEA ZB2)			21:45	
Sonnenscheinstunden	251	274	367	419			493	509
astr.max.mögl.Beschattung			732	345			479	823

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO11 - Westerhausen 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	05:02	05:49 (WEA VB6)	05:42	06:12 (WEA VB7)	06:36	19:43 (WEA ZB1)	07:28	18:12 (WEA ZB3)	07:26	08:21	
	22:01	28 06:17 (WEA VB6)	21:27	15 06:27 (WEA VB7)	20:20	9 19:52 (WEA ZB1)	19:07	27 18:39 (WEA ZB3)	16:57	16:13	
2	05:03	05:50 (WEA VB6)	05:44	06:14 (WEA VB7)	06:37	19:44 (WEA ZB1)	07:30	18:12 (WEA ZB3)	07:28	08:22	
	22:01	27 06:17 (WEA VB6)	21:25	13 06:27 (WEA VB7)	20:18	6 19:50 (WEA ZB1)	19:05	24 18:36 (WEA ZB3)	16:55	16:13	
3	05:04	05:51 (WEA VB6)	05:45	06:15 (WEA VB7)	06:39	19:44 (WEA ZB1)	07:32	18:12 (WEA ZB3)	07:30	08:24	
	22:01	26 06:17 (WEA VB6)	21:23	10 06:25 (WEA VB7)	20:16	3 19:47 (WEA ZB1)	19:02	22 18:34 (WEA ZB3)	16:53	16:12	
4	05:05	05:52 (WEA VB6)	05:47	06:17 (WEA VB7)	06:41		07:34	18:13 (WEA ZB3)	07:32	08:25	
	22:00	25 06:17 (WEA VB6)	21:21	7 06:24 (WEA VB7)	20:13		19:00	18 18:31 (WEA ZB3)	16:51	16:11	
5	05:06	05:52 (WEA VB6)	05:49	06:19 (WEA VB7)	06:43		07:36	18:15 (WEA ZB3)	07:34	08:26	
	22:00	24 06:16 (WEA VB6)	21:19	4 06:23 (WEA VB7)	20:11		18:58	14 18:29 (WEA ZB3)	16:50	16:11	
6	05:07	05:53 (WEA VB6)	05:50		06:44	19:07 (WEA ZB2)	07:37	18:17 (WEA ZB3)	07:36	08:28	
	21:59	23 06:16 (WEA VB6)	21:17		20:09	19:17 (WEA ZB2)	18:55	10 18:27 (WEA ZB3)	16:48	16:10	
7	05:08	05:53 (WEA VB6)	05:52		06:46	19:04 (WEA ZB2)	07:39	18:19 (WEA ZB3)	07:38	08:29	
	21:58	22 06:15 (WEA VB6)	21:15		20:06	19:20 (WEA ZB2)	18:53	5 18:24 (WEA ZB3)	16:46	16:10	
8	05:09	05:54 (WEA VB6)	05:54		06:48	19:02 (WEA ZB2)	07:41		07:40	08:30	
	21:58	23 06:17 (WEA VB7)	21:13		20:04	19:21 (WEA ZB2)	18:50		16:44	16:09	
9	05:10	05:55 (WEA VB6)	05:55		06:50	19:00 (WEA ZB2)	07:43		07:41	08:32	
	21:57	24 06:19 (WEA VB7)	21:11		20:01	19:22 (WEA ZB2)	18:48		16:42	16:09	
10	05:11	05:57 (WEA VB6)	05:57		06:51	18:59 (WEA ZB2)	07:45		07:43	08:33	
	21:56	23 06:20 (WEA VB7)	21:09		19:59	19:23 (WEA ZB2)	18:46		16:41	16:09	
11	05:12	05:58 (WEA VB6)	05:59		06:53	18:58 (WEA ZB2)	07:47		07:45	08:34	
	21:55	23 06:21 (WEA VB7)	21:07		19:56	19:23 (WEA ZB2)	18:43		16:39	16:08	
12	05:13	06:00 (WEA VB6)	06:01		06:55	18:56 (WEA ZB2)	07:48		07:47	08:35	
	21:54	22 06:22 (WEA VB7)	21:05		19:54	19:23 (WEA ZB2)	18:41		16:37	16:08	
13	05:14	06:03 (WEA VB6)	06:02		06:57	18:56 (WEA ZB2)	07:50		07:49	08:36	
	21:53	20 06:23 (WEA VB7)	21:03		19:51	19:23 (WEA ZB2)	18:39		16:35	16:08	
14	05:15	06:06 (WEA VB6)	06:04		06:58	18:56 (WEA ZB2)	07:52		07:51	08:37	
	21:52	18 06:24 (WEA VB7)	21:01		19:49	19:21 (WEA ZB2)	18:36		16:34	16:08	
15	05:17	06:06 (WEA VB6)	06:06		07:00	18:56 (WEA ZB2)	07:54		07:53	08:38	
	21:51	20 06:26 (WEA VB7)	20:59		19:47	19:19 (WEA ZB2)	18:34		16:32	16:08	
16	05:18	06:06 (WEA VB6)	06:08		07:02	18:27 (WEA ZB3)	07:56		07:55	08:39	
	21:50	20 06:26 (WEA VB7)	20:57		19:44	19:16 (WEA ZB2)	18:32		16:31	16:08	
17	05:19	06:05 (WEA VB6)	06:09		07:04	18:24 (WEA ZB3)	07:58		07:57	08:40	
	21:49	21 06:26 (WEA VB7)	20:55		19:42	19:14 (WEA ZB2)	18:29		16:29	16:08	
18	05:21	06:05 (WEA VB6)	06:11		07:05	18:22 (WEA ZB3)	07:59		07:58	08:41	
	21:48	22 06:27 (WEA VB7)	20:53		19:39	19:12 (WEA ZB2)	18:27		16:28	16:09	
19	05:22	06:05 (WEA VB6)	06:13		07:07	18:19 (WEA ZB3)	08:01		08:00	08:41	
	21:46	23 06:28 (WEA VB7)	20:50		19:37	19:08 (WEA ZB2)	18:25		16:26	16:09	
20	05:23	06:04 (WEA VB6)	06:15		07:09	18:17 (WEA ZB3)	08:03		08:02	08:42	
	21:45	24 06:28 (WEA VB7)	20:48	9 20:01 (WEA ZB1)	19:34	19:06 (WEA ZB2)	18:23		16:25	16:09	
21	05:25	06:04 (WEA VB6)	06:16		07:11	18:16 (WEA ZB3)	08:05		08:04	08:43	
	21:44	24 06:28 (WEA VB7)	20:46	14 20:04 (WEA ZB1)	19:32	19:04 (WEA ZB2)	18:20		16:24	16:10	
22	05:26	06:04 (WEA VB6)	06:18		07:12	18:15 (WEA ZB3)	08:07		08:06	08:43	
	21:42	25 06:29 (WEA VB7)	20:44	17 20:04 (WEA ZB1)	19:29	19:02 (WEA ZB2)	18:18		16:23	16:10	
23	05:28	06:04 (WEA VB6)	06:20		07:14	18:14 (WEA ZB3)	08:09		08:07	08:44	
	21:41	25 06:29 (WEA VB7)	20:41	20 20:06 (WEA ZB1)	19:27	18:47 (WEA ZB3)	18:16		16:21	16:11	
24	05:29	06:03 (WEA VB6)	06:22		07:16	18:13 (WEA ZB3)	08:11		08:09	08:44	
	21:40	26 06:29 (WEA VB7)	20:39	21 20:06 (WEA ZB1)	19:24	18:47 (WEA ZB3)	18:14		16:20	16:11	
25	05:31	06:04 (WEA VB6)	06:23		07:18	18:13 (WEA ZB3)	07:13		08:11	08:44	
	21:38	25 06:29 (WEA VB7)	20:37	22 20:06 (WEA ZB1)	19:22	18:47 (WEA ZB3)	17:12		16:19	16:12	
26	05:32	06:04 (WEA VB6)	06:25		07:19	18:12 (WEA ZB3)	07:15		08:13	08:45	
	21:37	25 06:29 (WEA VB7)	20:35	23 20:06 (WEA ZB1)	19:19	18:47 (WEA ZB3)	17:10		16:18	16:13	
27	05:34	06:05 (WEA VB6)	06:27		07:21	18:11 (WEA ZB3)	07:16		08:14	08:45	
	21:35	24 06:29 (WEA VB7)	20:32	21 20:04 (WEA ZB1)	19:17	18:46 (WEA ZB3)	17:07		16:17	16:13	
28	05:35	06:06 (WEA VB6)	06:29		07:23	18:11 (WEA ZB3)	07:18		08:16	08:45	
	21:33	23 06:29 (WEA VB7)	20:30	19 20:01 (WEA ZB1)	19:15	18:46 (WEA ZB3)	17:05		16:16	16:14	
29	05:37	06:08 (WEA VB6)	06:30		07:25	18:11 (WEA ZB3)	07:20		08:17	08:45	
	21:32	21 06:29 (WEA VB7)	20:28	17 19:59 (WEA ZB1)	19:12	18:44 (WEA ZB3)	17:03		16:15	16:15	
30	05:39	06:09 (WEA VB6)	06:32		07:27	18:11 (WEA ZB3)	07:22		08:19	08:45	
	21:30	19 06:28 (WEA VB7)	20:25	14 19:57 (WEA ZB1)	19:10	18:42 (WEA ZB3)	17:01		16:14	16:16	
31	05:40	06:11 (WEA VB6)	06:34				07:24			08:45	
	21:28	17 06:28 (WEA VB7)	20:23	12 19:54 (WEA ZB1)			16:59			16:17	
Sonnenscheinstunden		511	459		382		329		260	234	
astr.max.mögl.Beschattung		712		258		763		120			

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:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO12 - Westerhausen 4
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45 16:18	08:16 17:09			07:19 18:04	16:41 (WEA ZB3) 17:10 (WEA ZB3)	07:04 20:02	19:11 (WEA ZB1) 19:35 (WEA ZB1)	05:55 20:57	07:02 (WEA VB6) 07:28 (WEA VB6)	05:06 21:47
2	08:45 16:19	08:14 17:11			07:16 18:06	16:43 (WEA ZB3) 17:09 (WEA ZB3)	07:02 20:04	19:11 (WEA ZB1) 19:37 (WEA ZB1)	05:53 20:59	07:03 (WEA VB6) 07:26 (WEA VB6)	05:05 21:48
3	08:45 16:21	08:12 17:13			07:14 18:08	16:44 (WEA ZB3) 17:41 (WEA ZB2)	06:59 20:06	19:12 (WEA ZB1) 19:37 (WEA ZB1)	05:51 21:01	07:05 (WEA VB6) 07:25 (WEA VB6)	05:05 21:49
4	08:45 16:22	08:10 17:15			07:12 18:10	16:47 (WEA ZB3) 17:43 (WEA ZB2)	06:57 20:08	19:11 (WEA ZB1) 19:36 (WEA ZB1)	05:49 21:03	07:06 (WEA VB6) 07:22 (WEA VB6)	05:04 21:50
5	08:44 16:23	08:09 17:17			07:09 18:12	16:50 (WEA ZB3) 17:45 (WEA ZB2)	06:54 20:10	19:12 (WEA ZB1) 19:35 (WEA ZB1)	05:47 21:04	07:08 (WEA VB6) 07:19 (WEA VB6)	05:03 21:51
6	08:44 16:24	08:07 17:19			07:07 18:14	17:32 (WEA ZB2) 17:47 (WEA ZB2)	06:52 20:11	19:12 (WEA ZB1) 19:33 (WEA ZB1)	05:45 21:06		05:02 21:52
7	08:44 16:26	08:05 17:21			07:05 18:16	17:31 (WEA ZB2) 17:50 (WEA ZB2)	06:50 20:13	19:14 (WEA ZB1) 19:32 (WEA ZB1)	05:43 21:08		05:02 21:53
8	08:43 16:27	08:03 17:23			07:02 18:18	17:30 (WEA ZB2) 17:51 (WEA ZB2)	06:47 20:15	19:16 (WEA ZB1) 19:30 (WEA ZB1)	05:41 21:10		05:01 21:54
9	08:43 16:28	08:01 17:25	1	16:52 (WEA ZB3)	07:00 18:20	16:49 (WEA ZB3) 16:55 (WEA ZB3)	07:00 20:17	19:18 (WEA ZB1) 19:26 (WEA ZB1)	05:40 21:11		05:00 21:55
10	08:42 16:30	07:59 17:27	6	16:58 (WEA ZB3)	06:57 18:22	16:47 (WEA ZB3) 16:58 (WEA ZB3)	06:42 20:19	19:28 (WEA ZB1) 07:06 (WEA VB7)	05:38 21:13		05:00 21:56
11	08:41 16:31	07:57 17:29	11	16:58 (WEA ZB3)	06:55 18:23	16:44 (WEA ZB3) 16:59 (WEA ZB3)	06:40 20:21	07:04 (WEA VB7) 07:24 (WEA VB6)	05:36 21:15		04:59 21:57
12	08:40 16:33	07:55 17:31	18	16:43 (WEA ZB3)	06:53 18:25	16:43 (WEA ZB3) 17:01 (WEA ZB3)	06:38 20:22	07:01 (WEA VB7) 07:27 (WEA VB6)	05:34 21:17		04:59 21:57
13	08:40 16:35	07:53 17:33	21	16:42 (WEA ZB3)	06:50 18:27	16:42 (WEA ZB3) 17:03 (WEA ZB3)	06:35 20:24	06:59 (WEA VB7) 07:29 (WEA VB6)	05:32 21:18		04:59 21:58
14	08:39 16:36	07:51 17:35	25	16:41 (WEA ZB3)	06:48 18:29	16:41 (WEA ZB3) 17:06 (WEA ZB3)	06:33 20:26	06:57 (WEA VB7) 07:31 (WEA VB6)	05:31 21:20		04:58 21:59
15	08:38 16:38	07:49 17:37	28	16:40 (WEA ZB3)	06:45 18:31	16:40 (WEA ZB3) 17:08 (WEA ZB3)	06:31 20:28	06:55 (WEA VB7) 07:32 (WEA VB6)	05:29 21:22		04:58 21:59
16	08:37 16:39	07:47 17:39	30	16:40 (WEA ZB3)	06:43 18:33	16:40 (WEA ZB3) 17:10 (WEA ZB3)	06:28 20:30	06:52 (WEA VB7) 07:32 (WEA VB6)	05:27 21:23		04:58 22:00
17	08:36 16:41	07:45 17:41	34	16:39 (WEA ZB3)	06:41 18:35	16:39 (WEA ZB3) 17:13 (WEA ZB3)	06:26 20:32	06:50 (WEA VB7) 07:33 (WEA VB6)	05:26 21:25		04:58 22:00
18	08:35 16:43	07:43 17:43	36	16:38 (WEA ZB3)	06:38 18:37	16:38 (WEA ZB3) 17:14 (WEA ZB3)	06:24 20:33	06:50 (WEA VB7) 07:34 (WEA VB6)	05:24 21:27		04:58 22:01
19	08:34 16:45	07:41 17:45	37	16:38 (WEA ZB3)	06:36 18:38	16:38 (WEA ZB3) 17:15 (WEA ZB3)	06:21 20:35	06:51 (WEA VB7) 07:34 (WEA VB6)	05:23 21:28		04:58 22:01
20	08:33 16:46	07:39 17:47	37	16:38 (WEA ZB3)	06:33 18:40	16:38 (WEA ZB3) 17:15 (WEA ZB3)	06:19 20:37	06:51 (WEA VB7) 07:34 (WEA VB6)	05:21 21:30		04:58 22:02
21	08:32 16:48	07:36 17:49	38	16:38 (WEA ZB3)	06:31 18:42	16:38 (WEA ZB3) 17:16 (WEA ZB3)	06:17 20:39	06:51 (WEA VB7) 07:33 (WEA VB6)	05:20 21:31		04:58 22:02
22	08:30 16:50	07:34 17:51	38	16:37 (WEA ZB3)	06:28 18:44	16:37 (WEA ZB3) 17:15 (WEA ZB3)	06:15 20:41	06:52 (WEA VB7) 07:34 (WEA VB6)	05:18 21:33		04:58 22:02
23	08:29 16:52	07:32 17:53	37	16:38 (WEA ZB3)	06:26 18:46	16:38 (WEA ZB3) 17:15 (WEA ZB3)	06:12 20:43	06:53 (WEA VB7) 07:33 (WEA VB6)	05:17 21:34		04:59 22:02
24	08:28 16:54	07:30 17:55	37	16:38 (WEA ZB3)	06:23 18:48	16:38 (WEA ZB3) 17:15 (WEA ZB3)	06:10 20:44	06:55 (WEA VB7) 07:33 (WEA VB6)	05:15 21:36		04:59 22:02
25	08:26 16:56	07:28 17:57	35	16:38 (WEA ZB3)	06:21 18:49	16:38 (WEA ZB3) 17:13 (WEA ZB3)	06:08 20:46	06:59 (WEA VB6) 07:33 (WEA VB6)	05:14 21:37		04:59 22:02
26	08:25 16:58	07:25 17:59	34	16:39 (WEA ZB3)	06:19 18:51	16:39 (WEA ZB3) 17:13 (WEA ZB3)	06:06 20:48	07:00 (WEA VB6) 07:32 (WEA VB6)	05:13 21:39		05:00 22:02
27	08:23 16:59	07:23 18:01	32	16:40 (WEA ZB3)	06:16 18:53	16:40 (WEA ZB3) 17:12 (WEA ZB3)	06:04 20:50	07:00 (WEA VB6) 07:32 (WEA VB6)	05:12 21:40		05:00 22:02
28	08:22 17:01	07:21 18:02	31	16:40 (WEA ZB3)	06:14 18:55	16:40 (WEA ZB3) 17:11 (WEA ZB3)	06:02 20:52	07:00 (WEA VB6) 07:31 (WEA VB6)	05:11 21:41		05:01 22:02
29	08:20 17:03				07:11 19:57	18:28 (WEA ZB1) 19:14 (WEA ZB1)	20:52 05:59	07:31 (WEA VB6) 07:01 (WEA VB6)	21:41 05:09		05:01 22:02
30	08:19 17:05				07:09 19:59	19:31 (WEA ZB1) 19:12 (WEA ZB1)	20:54 20:55	07:30 (WEA VB6) 07:02 (WEA VB6)	21:43 05:08		05:02 22:02
31	08:17 17:07				07:06 20:00	19:32 (WEA ZB1) 19:12 (WEA ZB1)	20:55 20:55	07:29 (WEA VB6)	21:44 21:45		05:07 21:45
Sonnenscheinstunden		251		274		367		419		493	
astr.max.mögl.Beschattung			581			564		891		96	575

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) Schattenende (WEA mit letztem Schatten)
	Sonnenuntergang (SS:MM)			

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO12 - Westerhausen 4

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember	
1	05:02	06:07 (WEA VB5)	05:42		06:36	07:03 (WEA VB7)	07:28	18:08 (WEA ZB2)	07:26	16:15 (WEA ZB3)	08:21	
2	22:01	21 06:28 (WEA VB5)	21:27		20:21	16 07:23 (WEA VB6)	19:07	29 18:37 (WEA ZB2)	16:57	11 16:26 (WEA ZB3)	16:13	
3	05:04	06:09 (WEA VB5)	05:44		06:37	07:05 (WEA VB7)	07:30	30 18:06 (WEA ZB2)	07:28	6 16:18 (WEA ZB3)	08:22	
4	22:01	20 06:28 (WEA VB5)	21:25		20:18	4 07:09 (WEA VB7)	19:05	30 18:36 (WEA ZB2)	16:55	6 16:24 (WEA ZB3)	16:13	
5	05:05	06:11 (WEA VB5)	05:47		06:39	19:16 (WEA ZB1)	07:32	30 18:06 (WEA ZB2)	07:30		08:24	
6	22:01	18 06:27 (WEA VB5)	21:23		20:16	8 19:24 (WEA ZB1)	19:02	28 18:34 (WEA ZB2)	16:53		16:12	
7	05:06	06:12 (WEA VB5)	05:49		06:41	19:13 (WEA ZB1)	07:34	28 18:06 (WEA ZB2)	07:32		08:25	
8	22:00	15 06:26 (WEA VB5)	21:21		20:13	14 19:27 (WEA ZB1)	19:00	25 18:31 (WEA ZB2)	16:51		16:11	
9	05:07	06:14 (WEA VB5)	05:50		06:43	19:11 (WEA ZB1)	07:36	25 18:07 (WEA ZB2)	07:34		08:26	
10	22:00	12 06:24 (WEA VB5)	21:19		20:11	18 19:29 (WEA ZB1)	18:58	22 18:29 (WEA ZB2)	16:50		16:11	
11	05:08	06:14 (WEA VB5)	05:52		06:44	19:08 (WEA ZB1)	07:37	22 18:07 (WEA ZB2)	07:36		08:28	
12	22:00	8 06:22 (WEA VB5)	21:17		20:09	21 19:29 (WEA ZB1)	18:55	20 18:27 (WEA ZB2)	16:48		16:10	
13	05:08		05:52	07:22 (WEA VB6)	06:46	19:07 (WEA ZB1)	07:39	19:07 (WEA ZB1)	07:39	18:08 (WEA ZB2)	07:38	
14	22:01		21:15	4 07:26 (WEA VB6)	20:06	23 19:30 (WEA ZB1)	18:53	16 18:24 (WEA ZB2)	16:46		16:10	
15	05:08		05:54	07:17 (WEA VB6)	06:48	19:07 (WEA ZB1)	07:41	16 18:09 (WEA ZB2)	07:40		08:30	
16	22:01		21:13	13 07:30 (WEA VB6)	20:04	24 19:31 (WEA ZB1)	18:50	13 18:22 (WEA ZB2)	16:44		16:09	
17	05:10		05:55	07:15 (WEA VB6)	06:50	19:05 (WEA ZB1)	07:43	13 17:23 (WEA ZB3)	07:42		08:32	
18	22:01		21:11	17 07:32 (WEA VB6)	20:01	26 19:31 (WEA ZB1)	18:48	23 18:19 (WEA ZB2)	16:42		16:09	
19	05:11		05:57	07:14 (WEA VB6)	06:51	19:05 (WEA ZB1)	07:45	23 17:19 (WEA ZB3)	07:43		08:33	
20	22:01		21:09	20 07:34 (WEA VB6)	19:59	26 19:31 (WEA ZB1)	18:46	26 18:16 (WEA ZB2)	16:41		16:09	
21	05:12		05:59	07:11 (WEA VB6)	06:53	19:04 (WEA ZB1)	07:47	26 17:17 (WEA ZB3)	07:45		08:34	
22	22:01		21:07	24 07:35 (WEA VB6)	19:56	25 19:29 (WEA ZB1)	18:43	25 18:14 (WEA ZB2)	16:39		16:08	
23	05:13		06:01	07:11 (WEA VB6)	06:55	19:03 (WEA ZB1)	07:48	25 17:15 (WEA ZB3)	07:47		08:35	
24	22:01		21:05	26 07:37 (WEA VB6)	19:54	23 19:26 (WEA ZB1)	18:41	27 17:42 (WEA ZB3)	16:37		16:08	
25	05:14		06:02	07:09 (WEA VB6)	06:57	19:03 (WEA ZB1)	07:50	27 17:14 (WEA ZB3)	07:49		08:36	
26	22:01		21:03	28 07:37 (WEA VB6)	19:51	20 19:23 (WEA ZB1)	18:39	29 17:43 (WEA ZB3)	16:35		16:08	
27	05:15		06:04	07:08 (WEA VB6)	06:58	19:04 (WEA ZB1)	07:52	29 17:12 (WEA ZB3)	07:51		08:37	
28	22:01		21:01	30 07:38 (WEA VB6)	19:49	17 19:21 (WEA ZB1)	18:36	32 17:44 (WEA ZB3)	16:34		16:08	
29	05:17		06:06	07:08 (WEA VB6)	07:00	19:04 (WEA ZB1)	07:54	32 17:11 (WEA ZB3)	07:53		08:38	
30	22:01		20:59	31 07:39 (WEA VB6)	19:47	15 19:19 (WEA ZB1)	18:34	34 17:45 (WEA ZB3)	16:32		16:08	
31	05:18		06:08	07:06 (WEA VB6)	07:02	19:04 (WEA ZB1)	07:56	34 17:10 (WEA ZB3)	07:55		08:39	
32	22:01		20:57	32 07:38 (WEA VB6)	19:44	12 19:16 (WEA ZB1)	18:32	35 17:45 (WEA ZB3)	16:31		16:08	
33	05:19		06:09	07:06 (WEA VB6)	07:04	9 19:05 (WEA ZB1)	07:58	36 17:10 (WEA ZB3)	07:57		08:40	
34	22:01		20:55	33 07:39 (WEA VB6)	19:42	9 19:14 (WEA ZB1)	18:29	36 17:46 (WEA ZB3)	16:29		16:08	
35	05:21		06:11	07:04 (WEA VB7)	07:05	5 19:07 (WEA ZB1)	07:59	37 17:09 (WEA ZB3)	07:58		08:41	
36	22:01		20:53	35 07:39 (WEA VB6)	19:39	5 19:12 (WEA ZB1)	18:27	37 17:46 (WEA ZB3)	16:28		16:09	
37	05:22		06:13	07:00 (WEA VB7)	07:07		08:01	37 17:09 (WEA ZB3)	08:00		08:41	
38	22:01		20:50	39 07:39 (WEA VB6)	19:37		18:25	37 17:46 (WEA ZB3)	16:26		16:09	
39	05:23		06:15	06:58 (WEA VB7)	07:09		08:03	37 17:08 (WEA ZB3)	08:02		08:42	
40	22:01		20:48	41 07:39 (WEA VB6)	19:34		18:23	38 17:46 (WEA ZB3)	16:25		16:09	
41	05:25		06:16	06:57 (WEA VB7)	07:11		08:05	38 17:08 (WEA ZB3)	08:04		08:43	
42	22:01		20:46	42 07:39 (WEA VB6)	19:32		18:20	38 17:46 (WEA ZB3)	16:24		16:10	
43	05:26		06:18	06:55 (WEA VB7)	07:12		08:07	38 17:08 (WEA ZB3)	08:06		08:43	
44	22:01		20:44	43 07:38 (WEA VB6)	19:29		18:18	38 17:46 (WEA ZB3)	16:23		16:10	
45	05:28		06:20	06:55 (WEA VB7)	07:14		08:09	38 17:08 (WEA ZB3)	08:07		08:44	
46	22:01		20:41	43 07:38 (WEA VB6)	19:27	8 18:29 (WEA ZB2)	18:16	37 17:45 (WEA ZB3)	16:21		16:11	
47	05:29		06:22	06:54 (WEA VB7)	07:16		08:11	37 17:08 (WEA ZB3)	08:09		08:44	
48	22:01		20:39	44 07:38 (WEA VB6)	19:24	15 18:32 (WEA ZB2)	18:14	36 17:44 (WEA ZB3)	16:20		16:11	
49	05:31		06:23	06:53 (WEA VB7)	07:18		07:13	36 16:09 (WEA ZB3)	08:11		08:44	
50	22:01		20:37	43 07:36 (WEA VB6)	19:22	19 18:34 (WEA ZB2)	17:12	33 16:42 (WEA ZB3)	16:19		16:12	
51	05:32		06:25	06:53 (WEA VB7)	07:19		07:15	33 16:09 (WEA ZB3)	08:13		08:45	
52	22:01		20:35	43 07:36 (WEA VB6)	19:20	23 18:36 (WEA ZB2)	17:10	30 16:39 (WEA ZB3)	16:18		16:13	
53	05:34		06:27	06:55 (WEA VB7)	07:21		07:17	30 16:10 (WEA ZB3)	08:14		08:45	
54	22:01		20:32	40 07:35 (WEA VB6)	19:17	25 18:36 (WEA ZB2)	17:07	27 16:37 (WEA ZB3)	16:17		16:13	
55	05:35		06:29	06:56 (WEA VB7)	07:23		07:18	27 16:10 (WEA ZB3)	08:16		08:45	
56	22:01		20:30	37 07:33 (WEA VB6)	19:15	26 18:36 (WEA ZB2)	17:05	25 16:35 (WEA ZB3)	16:16		16:14	
57	05:37		06:30	06:58 (WEA VB7)	07:25		07:20	25 16:11 (WEA ZB3)	08:17		08:45	
58	22:01		20:28	34 07:32 (WEA VB6)	19:12	28 18:37 (WEA ZB2)	17:03	21 16:32 (WEA ZB3)	16:15		16:15	
59	05:39		06:32	07:00 (WEA VB7)	07:27		07:22	21 16:12 (WEA ZB3)	08:19		08:45	
60	22:01		20:25	30 07:30 (WEA VB6)	19:10	29 18:37 (WEA ZB2)	17:01	18 16:30 (WEA ZB3)	16:14		16:16	
61	05:40		06:34	07:01 (WEA VB7)			07:24	18 16:14 (WEA ZB3)			08:45	
62	22:01		20:23	26 07:27 (WEA VB6)			16:59	14 16:28 (WEA ZB3)			16:17	
63	Sonnenscheinstunden	511	459		382		329		260		234	
64	astr.max.mögl.Beschattung	94	798		479		879		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	Zeitpunkt (SS:MM) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO13 - Westerhausen 11
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai			Juni		
1	08:45	14:18 (WEA ZB3)	08:16	14:37 (WEA ZB3)	07:19	16:22 (WEA ZB2)	07:04	07:27 (WEA VB7)	05:55	05:06								
	16:18	55 15:13 (WEA ZB3)	17:09	38 15:15 (WEA ZB3)	18:04	35 16:57 (WEA ZB2)	20:02	63 19:10 (WEA ZB1)	20:57	21:47								
2	08:45	14:18 (WEA ZB3)	08:14	14:39 (WEA ZB3)	07:16	16:24 (WEA ZB2)	07:02	07:25 (WEA VB7)	05:53	05:05								
	16:19	56 15:14 (WEA ZB3)	17:11	37 16:39 (WEA ZB2)	18:06	32 16:56 (WEA ZB2)	20:04	62 19:09 (WEA ZB1)	20:59	21:48								
3	08:45	14:18 (WEA ZB3)	08:12	14:41 (WEA ZB3)	07:14	16:25 (WEA ZB2)	06:59	07:23 (WEA VB7)	05:51	05:05								
	16:21	56 15:14 (WEA ZB3)	17:13	40 16:41 (WEA ZB2)	18:08	29 16:54 (WEA ZB2)	20:06	61 19:08 (WEA ZB1)	21:01	21:49								
4	08:45	14:19 (WEA ZB3)	08:10	14:44 (WEA ZB3)	07:12	16:27 (WEA ZB2)	06:57	07:23 (WEA VB7)	05:49	05:04								
	16:22	56 15:15 (WEA ZB3)	17:15	41 16:44 (WEA ZB2)	18:10	25 16:52 (WEA ZB2)	20:08	52 19:06 (WEA ZB1)	21:03	21:50								
5	08:44	14:20 (WEA ZB3)	08:09	14:47 (WEA ZB3)	07:09	16:29 (WEA ZB2)	06:54	07:25 (WEA VB7)	05:47	05:03								
	16:23	56 15:16 (WEA ZB3)	17:17	41 16:47 (WEA ZB2)	18:12	19 16:48 (WEA ZB2)	20:10	40 19:04 (WEA ZB1)	21:04	21:51								
6	08:44	14:20 (WEA ZB3)	08:07	14:51 (WEA ZB3)	07:07	16:34 (WEA ZB2)	06:52	18:42 (WEA ZB1)	05:45	05:02								
	16:24	56 15:16 (WEA ZB3)	17:19	37 16:49 (WEA ZB2)	18:14	10 16:44 (WEA ZB2)	20:12	20 19:02 (WEA ZB1)	21:06	21:52								
7	08:44	14:20 (WEA ZB3)	08:05	16:25 (WEA ZB2)	07:05		06:50	07:18 (WEA VB5)	05:43	05:02								
	16:26	56 15:16 (WEA ZB3)	17:21	26 16:51 (WEA ZB2)	18:16		20:13	22 18:58 (WEA ZB1)	21:08	21:53								
8	08:43	14:21 (WEA ZB3)	08:03	16:23 (WEA ZB2)	07:02		06:47	07:15 (WEA VB5)	05:42	05:01								
	16:27	56 15:17 (WEA ZB3)	17:23	30 16:53 (WEA ZB2)	18:18		20:15	15 07:30 (WEA VB5)	21:10	21:54								
9	08:43	14:21 (WEA ZB3)	08:01	16:22 (WEA ZB2)	07:00		06:45	07:12 (WEA VB5)	05:40	05:00								
	16:29	57 15:18 (WEA ZB3)	17:25	33 16:55 (WEA ZB2)	18:20		20:17	19 07:31 (WEA VB5)	21:11	21:55								
10	08:42	14:21 (WEA ZB3)	07:59	16:22 (WEA ZB2)	06:57		06:42	07:11 (WEA VB5)	05:38	05:00								
	16:30	57 15:18 (WEA ZB3)	17:27	36 16:58 (WEA ZB2)	18:22		20:19	21 07:32 (WEA VB5)	21:13	21:56								
11	08:41	14:21 (WEA ZB3)	07:57	16:20 (WEA ZB2)	06:55		06:40	07:10 (WEA VB5)	05:36	04:59								
	16:31	57 15:18 (WEA ZB3)	17:29	39 16:59 (WEA ZB2)	18:23		20:21	23 07:33 (WEA VB5)	21:15	21:57								
12	08:41	14:22 (WEA ZB3)	07:55	16:19 (WEA ZB2)	06:53		06:38	07:08 (WEA VB5)	05:34	04:59								
	16:33	56 15:18 (WEA ZB3)	17:31	42 17:01 (WEA ZB2)	18:25		20:23	25 07:33 (WEA VB5)	21:17	21:58								
13	08:40	14:22 (WEA ZB3)	07:53	16:19 (WEA ZB2)	06:50		06:35	07:07 (WEA VB5)	05:32	04:59								
	16:35	57 15:19 (WEA ZB3)	17:33	43 17:02 (WEA ZB2)	18:27	10 17:51 (WEA ZB1)	20:24	26 07:33 (WEA VB5)	21:18	21:58								
14	08:39	14:23 (WEA ZB3)	07:51	16:18 (WEA ZB2)	06:48		06:33	07:07 (WEA VB5)	05:31	04:58								
	16:36	56 15:19 (WEA ZB3)	17:35	44 17:02 (WEA ZB2)	18:29	15 18:03 (WEA ZB1)	20:26	27 07:34 (WEA VB5)	21:20	21:59								
15	08:38	14:23 (WEA ZB3)	07:49	16:18 (WEA ZB2)	06:45		06:31	07:07 (WEA VB5)	05:29	04:58								
	16:38	56 15:19 (WEA ZB3)	17:37	45 17:03 (WEA ZB2)	18:31	20 18:05 (WEA ZB1)	20:28	27 07:34 (WEA VB5)	21:22	21:59								
16	08:37	14:24 (WEA ZB3)	07:47	16:18 (WEA ZB2)	06:43		06:28	07:06 (WEA VB5)	05:27	04:58								
	16:40	56 15:20 (WEA ZB3)	17:39	45 17:03 (WEA ZB2)	18:33	24 18:07 (WEA ZB1)	20:30	27 07:33 (WEA VB5)	21:23	22:00								
17	08:36	14:25 (WEA ZB3)	07:45	16:18 (WEA ZB2)	06:41		06:26	07:06 (WEA VB5)	05:26	04:58								
	16:41	55 15:20 (WEA ZB3)	17:41	46 17:04 (WEA ZB2)	18:35	27 18:08 (WEA ZB1)	20:32	27 07:33 (WEA VB5)	21:25	22:01								
18	08:35	14:24 (WEA ZB3)	07:43	16:17 (WEA ZB2)	06:38		06:24	07:06 (WEA VB5)	05:24	04:58								
	16:43	56 15:20 (WEA ZB3)	17:43	46 17:03 (WEA ZB2)	18:37	31 18:11 (WEA ZB1)	20:34	26 07:32 (WEA VB5)	21:27	22:01								
19	08:34	14:25 (WEA ZB3)	07:41	16:17 (WEA ZB2)	06:36		06:21	07:07 (WEA VB5)	05:23	04:58								
	16:45	55 15:20 (WEA ZB3)	17:45	46 17:03 (WEA ZB2)	18:38	34 18:12 (WEA ZB1)	20:35	25 07:32 (WEA VB5)	21:28	22:01								
20	08:33	14:26 (WEA ZB3)	07:39	16:17 (WEA ZB2)	06:33		06:19	07:07 (WEA VB5)	05:21	04:58								
	16:46	55 15:21 (WEA ZB3)	17:47	47 17:04 (WEA ZB2)	18:40	36 18:14 (WEA ZB1)	20:37	24 07:31 (WEA VB5)	21:30	22:02								
21	08:32	14:26 (WEA ZB3)	07:37	16:18 (WEA ZB2)	06:31		06:17	07:07 (WEA VB5)	05:20	04:58								
	16:48	54 15:20 (WEA ZB3)	17:49	46 17:04 (WEA ZB2)	18:42	39 18:15 (WEA ZB1)	20:39	22 07:29 (WEA VB5)	21:31	22:02								
22	08:30	14:27 (WEA ZB3)	07:34	16:17 (WEA ZB2)	06:28		06:15	07:08 (WEA VB5)	05:18	04:58								
	16:50	53 15:20 (WEA ZB3)	17:51	46 17:03 (WEA ZB2)	18:44	40 18:16 (WEA ZB1)	20:41	20 07:28 (WEA VB5)	21:33	22:02								
23	08:29	14:28 (WEA ZB3)	07:32	16:18 (WEA ZB2)	06:26		06:12	07:09 (WEA VB5)	05:17	04:59								
	16:52	52 15:20 (WEA ZB3)	17:53	45 17:03 (WEA ZB2)	18:46	41 18:16 (WEA ZB1)	20:43	18 07:27 (WEA VB5)	21:34	22:02								
24	08:28	14:29 (WEA ZB3)	07:30	16:18 (WEA ZB2)	06:24		06:10	07:11 (WEA VB5)	05:15	04:59								
	16:54	51 15:20 (WEA ZB3)	17:55	44 17:02 (WEA ZB2)	18:48	45 18:16 (WEA ZB1)	20:44	14 07:25 (WEA VB5)	21:36	22:02								
25	08:26	14:29 (WEA ZB3)	07:28	16:18 (WEA ZB2)	06:21		06:08	07:14 (WEA VB5)	05:14	04:59								
	16:56	51 15:20 (WEA ZB3)	17:57	43 17:01 (WEA ZB2)	18:49	50 18:16 (WEA ZB1)	20:46	7 07:21 (WEA VB5)	21:37	22:02								
26	08:25	14:31 (WEA ZB3)	07:25	16:19 (WEA ZB2)	06:19		06:06		05:13	05:00								
	16:58	49 15:20 (WEA ZB3)	17:59	41 17:00 (WEA ZB2)	18:51	55 18:16 (WEA ZB1)	20:48		21:39	22:02								
27	08:23	14:31 (WEA ZB3)	07:23	16:20 (WEA ZB2)	06:16		06:04		05:12	05:00								
	16:59	48 15:19 (WEA ZB3)	18:01	40 17:00 (WEA ZB2)	18:53	58 18:15 (WEA ZB1)	20:50		21:40	22:02								
28	08:22	14:32 (WEA ZB3)	07:21	16:20 (WEA ZB2)	06:14		06:02		05:11	05:01								
	17:01	46 15:18 (WEA ZB3)	18:02	38 16:58 (WEA ZB2)	18:55	59 18:14 (WEA ZB1)	20:52		21:42	22:02								
29	08:20	14:34 (WEA ZB3)			07:11		06:00		05:09	05:01								
	17:03	44 15:18 (WEA ZB3)			19:57	62 19:14 (WEA ZB1)	20:54		21:43	22:02								
30	08:19	14:35 (WEA ZB3)			07:09		05:57		05:08	05:02								
	17:05	42 15:17 (WEA ZB3)			19:59	63 19:13 (WEA ZB1)	20:55		21:44	22:02								
31	08:17	14:36 (WEA ZB3)			07:06				05:07									
	17:07	40 15:16 (WEA ZB3)			20:01	63 19:12 (WEA ZB1)			21:45									
Sonnenscheinstunden	251		274		367		419		493	509								
astr.max.mögl.Beschattung	1650		1145		922		713											

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO13 - Westerhausen 11
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	05:02 22:01	05:42 21:27	06:36 20:21	07:09 (WEA VB5) 07:28 23 07:32 (WEA VB5) 19:07	18:33 (WEA ZB1) 07:26 6 18:39 (WEA ZB1) 16:57	15:50 (WEA ZB2) 08:21 36 16:26 (WEA ZB2) 16:13
2	05:03 22:01	05:44 21:25	06:37 20:18	07:10 (WEA VB5) 07:30 21 07:31 (WEA VB5) 19:05	17:03 (WEA ZB2) 07:28 33 16:25 (WEA ZB2) 16:13	15:52 (WEA ZB2) 08:22 57 15:01 (WEA ZB3)
3	05:04 22:01	05:45 21:23	06:39 20:16	07:10 (WEA VB5) 07:32 19 07:29 (WEA VB5) 19:02	17:00 (WEA ZB2) 07:30 29 16:22 (WEA ZB2) 16:12	15:53 (WEA ZB2) 08:24 57 15:01 (WEA ZB3)
4	05:05 22:00	05:47 21:21	06:41 20:13	07:12 (WEA VB5) 07:34 15 07:27 (WEA VB5) 19:00	17:00 (WEA ZB2) 07:32 26 16:20 (WEA ZB2) 16:11	15:54 (WEA ZB2) 08:25 56 15:01 (WEA ZB3)
5	05:06 22:00	05:49 21:19	06:43 20:11	07:15 (WEA VB5) 07:36 21 18:54 (WEA ZB1) 18:58	17:00 (WEA ZB2) 07:34 38 16:18 (WEA ZB2) 16:11	14:20 (WEA ZB3) 08:27 56 15:01 (WEA ZB3)
6	05:07 21:59	05:50 21:17	06:44 20:09	18:38 (WEA ZB1) 07:37 19 18:57 (WEA ZB1) 18:55	17:00 (WEA ZB2) 07:36 41 16:16 (WEA ZB2) 16:10	14:16 (WEA ZB3) 08:28 56 15:02 (WEA ZB3)
7	05:08 21:58	05:52 21:15	06:46 20:06	07:21 (WEA VB7) 07:39 39 18:59 (WEA ZB1) 18:53	17:00 (WEA ZB2) 07:38 42 16:14 (WEA ZB2) 16:10	14:13 (WEA ZB3) 08:29 56 15:02 (WEA ZB3)
8	05:09 21:58	05:54 21:13	06:48 20:04	07:18 (WEA VB7) 07:41 52 19:01 (WEA ZB1) 18:50	17:07 (WEA ZB2) 07:40 15 17:22 (WEA ZB2) 16:44	14:11 (WEA ZB3) 08:31 41 16:12 (WEA ZB2) 16:09
9	05:10 21:57	05:55 21:11	06:50 20:01	07:16 (WEA VB7) 07:43 60 19:01 (WEA ZB1) 18:48	17:03 (WEA ZB2) 07:42 22 17:25 (WEA ZB2) 16:42	14:09 (WEA ZB3) 08:32 36 14:45 (WEA ZB3) 16:09
10	05:11 21:56	05:57 21:09	06:51 19:59	07:18 (WEA VB7) 07:45 64 19:03 (WEA ZB1) 18:46	17:00 (WEA ZB2) 07:43 27 17:27 (WEA ZB2) 16:41	14:08 (WEA ZB3) 08:33 38 14:46 (WEA ZB3) 16:09
11	05:12 21:55	05:57 21:07	06:53 19:56	07:20 (WEA VB7) 07:47 64 19:04 (WEA ZB1) 18:43	17:00 (WEA ZB2) 07:45 30 17:28 (WEA ZB2) 16:39	14:07 (WEA ZB3) 08:34 40 14:47 (WEA ZB3) 16:08
12	05:13 21:54	06:01 21:05	06:55 19:54	07:21 (WEA VB7) 07:48 63 19:03 (WEA ZB1) 18:41	17:00 (WEA ZB2) 07:47 34 17:30 (WEA ZB2) 16:37	14:06 (WEA ZB3) 08:35 42 14:48 (WEA ZB3) 16:08
13	05:14 21:53	06:02 21:03	06:57 19:52	07:23 (WEA VB7) 07:50 63 19:04 (WEA ZB1) 18:39	17:00 (WEA ZB2) 07:49 37 17:31 (WEA ZB2) 16:36	14:06 (WEA ZB3) 08:36 44 14:50 (WEA ZB3) 16:08
14	05:15 21:52	06:04 21:01	06:58 19:49	07:25 (WEA VB7) 07:52 61 19:04 (WEA ZB1) 18:36	17:00 (WEA ZB2) 07:51 39 17:32 (WEA ZB2) 16:34	14:05 (WEA ZB3) 08:37 46 14:51 (WEA ZB3) 16:08
15	05:17 21:51	06:06 20:59	07:00 19:47	07:27 (WEA VB7) 07:54 61 19:05 (WEA ZB1) 18:34	17:00 (WEA ZB2) 07:53 40 17:32 (WEA ZB2) 16:32	14:04 (WEA ZB3) 08:38 48 14:52 (WEA ZB3) 16:08
16	05:18 21:50	06:08 20:57	07:02 19:44	07:28 (WEA VB6) 07:56 58 19:04 (WEA ZB1) 18:32	17:00 (WEA ZB2) 07:55 42 17:33 (WEA ZB2) 16:31	14:04 (WEA ZB3) 08:39 49 14:53 (WEA ZB3) 16:08
17	05:19 21:49	06:09 20:55	07:04 19:42	07:30 (WEA VB6) 07:58 56 19:04 (WEA ZB1) 18:29	17:00 (WEA ZB2) 07:57 43 17:33 (WEA ZB2) 16:29	14:03 (WEA ZB3) 08:40 51 14:54 (WEA ZB3) 16:08
18	05:21 21:48	06:11 20:53	07:05 19:39	07:32 (WEA VB6) 08:00 52 19:04 (WEA ZB1) 18:27	17:00 (WEA ZB2) 07:58 45 17:34 (WEA ZB2) 16:28	14:03 (WEA ZB3) 08:41 51 14:54 (WEA ZB3) 16:09
19	05:22 21:47	06:13 20:50	07:07 19:37	07:33 (WEA VB6) 08:01 48 19:03 (WEA ZB1) 18:25	17:00 (WEA ZB2) 08:00 45 17:34 (WEA ZB2) 16:27	14:03 (WEA ZB3) 08:41 52 14:55 (WEA ZB3) 16:09
20	05:23 21:45	06:15 20:48	07:09 19:34	07:15 (WEA VB5) 07:09 41 19:02 (WEA ZB1) 18:23	17:00 (WEA ZB2) 08:02 46 17:34 (WEA ZB2) 16:25	14:02 (WEA ZB3) 08:42 53 14:55 (WEA ZB3) 16:09
21	05:25 21:44	06:16 20:46	07:11 19:32	07:13 (WEA VB5) 07:11 41 19:02 (WEA ZB1) 18:20	17:00 (WEA ZB2) 08:04 46 17:34 (WEA ZB2) 16:24	14:02 (WEA ZB3) 08:43 54 14:56 (WEA ZB3) 16:10
22	05:26 21:42	06:18 20:44	07:12 19:29	07:11 (WEA VB5) 07:12 39 19:01 (WEA ZB1) 18:18	17:00 (WEA ZB2) 08:06 46 17:34 (WEA ZB2) 16:23	14:02 (WEA ZB3) 08:43 55 14:57 (WEA ZB3) 16:10
23	05:28 21:41	06:20 20:41	07:14 19:27	07:11 (WEA VB5) 07:14 37 18:58 (WEA ZB1) 18:16	17:00 (WEA ZB2) 08:07 47 17:34 (WEA ZB2) 16:21	14:02 (WEA ZB3) 08:44 55 14:57 (WEA ZB3) 16:11
24	05:29 21:40	06:22 20:39	07:16 19:24	07:10 (WEA VB5) 07:16 34 18:56 (WEA ZB1) 18:14	17:00 (WEA ZB2) 08:09 47 17:34 (WEA ZB2) 16:20	14:03 (WEA ZB3) 08:44 55 14:58 (WEA ZB3) 16:11
25	05:31 21:38	06:23 20:37	07:18 19:22	07:09 (WEA VB5) 07:18 32 18:54 (WEA ZB1) 17:12	17:00 (WEA ZB2) 08:11 46 16:33 (WEA ZB2) 16:19	14:02 (WEA ZB3) 08:45 55 14:57 (WEA ZB3) 16:12
26	05:32 21:37	06:25 20:35	07:20 19:20	07:09 (WEA VB5) 07:20 29 18:52 (WEA ZB1) 17:10	17:00 (WEA ZB2) 08:13 45 16:33 (WEA ZB2) 16:18	14:02 (WEA ZB3) 08:45 56 14:58 (WEA ZB3) 16:13
27	05:34 21:35	06:27 20:32	07:21 19:17	07:09 (WEA VB5) 07:21 25 18:48 (WEA ZB1) 17:07	17:00 (WEA ZB2) 08:14 44 16:32 (WEA ZB2) 16:17	14:02 (WEA ZB3) 08:45 57 14:59 (WEA ZB3) 16:13
28	05:35 21:33	06:29 20:30	07:23 19:15	07:08 (WEA VB5) 07:23 21 18:46 (WEA ZB1) 17:05	17:00 (WEA ZB2) 08:16 44 16:32 (WEA ZB2) 16:16	14:03 (WEA ZB3) 08:45 56 14:59 (WEA ZB3) 16:14
29	05:37 21:32	06:30 20:28	07:25 19:12	07:08 (WEA VB5) 07:25 17 18:44 (WEA ZB1) 17:03	17:00 (WEA ZB2) 08:18 43 16:31 (WEA ZB2) 16:15	14:03 (WEA ZB3) 08:45 57 15:00 (WEA ZB3) 16:15
30	05:39 21:30	06:32 20:25	07:27 19:10	07:08 (WEA VB5) 07:27 13 18:42 (WEA ZB1) 17:01	17:00 (WEA ZB2) 08:19 41 15:49 (WEA ZB2) 16:14	14:03 (WEA ZB3) 08:45 56 14:59 (WEA ZB3) 16:16
31	05:40 21:28	06:34 20:23	07:28 19:07	07:08 (WEA VB5) 07:28 38 16:28 (WEA ZB2) 16:15	17:00 (WEA ZB2) 08:20 260 16:28 (WEA ZB2) 16:17	14:04 (WEA ZB3) 08:45 234 15:12 (WEA ZB3)
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		321	1188	958	1392	1724

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO14 - Westerhausen 12

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	13:48 (WEA ZB3)	08:16	16:00 (WEA ZB2)	07:19	16:16 (WEA ZB2)	07:04	07:42 (WEA VB6)	05:55	05:06	
	16:18	57	14:45 (WEA ZB3)	17:09	37	16:37 (WEA ZB2)	18:04	10	16:26 (WEA ZB2)	20:02	46
2	08:45	13:49 (WEA ZB3)	08:14	16:00 (WEA ZB2)	07:16		07:02	46	18:59 (WEA ZB1)	20:57	21:47
	16:19	57	14:46 (WEA ZB3)	17:11	39	16:39 (WEA ZB2)	18:06		07:45 (WEA VB6)	05:53	05:05
3	08:45	13:48 (WEA ZB3)	08:12	15:59 (WEA ZB2)	07:14		20:04	36	18:57 (WEA ZB1)	20:59	21:48
	16:21	58	14:46 (WEA ZB3)	17:13	42	16:41 (WEA ZB2)	18:08		07:25 (WEA VB5)	05:51	05:05
4	08:45	13:49 (WEA ZB3)	08:10	15:59 (WEA ZB2)	07:12		06:59	35	18:55 (WEA ZB1)	21:01	21:49
	16:22	58	14:47 (WEA ZB3)	17:15	45	16:44 (WEA ZB2)	18:10		07:21 (WEA VB5)	05:49	05:04
5	08:44	13:51 (WEA ZB3)	08:09	15:59 (WEA ZB2)	07:09		06:54	36	18:52 (WEA ZB1)	21:03	21:50
	16:23	56	14:47 (WEA ZB3)	17:17	45	16:44 (WEA ZB2)	18:12		07:20 (WEA VB5)	05:47	05:03
6	08:44	13:51 (WEA ZB3)	08:07	15:58 (WEA ZB2)	07:07		06:52	31	18:48 (WEA ZB1)	21:04	21:51
	16:24	56	14:47 (WEA ZB3)	17:19	47	16:45 (WEA ZB2)	18:14		07:19 (WEA VB5)	05:45	05:02
7	08:44	13:51 (WEA ZB3)	08:05	15:58 (WEA ZB2)	07:05		06:50	21	07:40 (WEA VB5)	21:06	21:52
	16:26	56	14:47 (WEA ZB3)	17:21	47	16:45 (WEA ZB2)	18:16		07:17 (WEA VB5)	05:43	05:02
8	08:43	13:52 (WEA ZB3)	08:03	15:58 (WEA ZB2)	07:02		20:13	23	07:40 (WEA VB5)	21:08	21:53
	16:27	56	14:48 (WEA ZB3)	17:23	48	16:46 (WEA ZB2)	18:18		07:16 (WEA VB5)	05:42	05:01
9	08:43	13:53 (WEA ZB3)	08:01	15:57 (WEA ZB2)	07:00	7	17:44 (WEA ZB1)	06:47	07:40 (WEA VB5)	21:10	21:54
	16:29	55	14:48 (WEA ZB3)	17:25	49	16:46 (WEA ZB2)	18:20	24	07:40 (WEA VB5)	21:11	21:55
10	08:42	13:53 (WEA ZB3)	07:59	15:57 (WEA ZB2)	06:57	13	17:51 (WEA ZB1)	06:45	07:15 (WEA VB5)	05:40	05:00
	16:30	55	14:48 (WEA ZB3)	17:27	50	16:47 (WEA ZB2)	18:22	25	07:40 (WEA VB5)	21:11	21:55
11	08:41	13:54 (WEA ZB3)	07:57	15:57 (WEA ZB2)	06:55	19	17:36 (WEA ZB1)	06:42	07:40 (WEA VB5)	21:13	21:56
	16:31	54	14:48 (WEA ZB3)	17:29	50	16:47 (WEA ZB2)	18:23	25	07:40 (WEA VB5)	21:13	21:56
12	08:41	13:54 (WEA ZB3)	07:55	15:56 (WEA ZB2)	06:53	23	17:34 (WEA ZB1)	06:40	07:15 (WEA VB5)	05:38	05:00
	16:33	54	14:48 (WEA ZB3)	17:31	50	16:46 (WEA ZB2)	18:25	25	07:40 (WEA VB5)	21:13	21:56
13	08:40	13:55 (WEA ZB3)	07:53	15:57 (WEA ZB2)	06:50	26	17:57 (WEA ZB1)	06:38	07:14 (WEA VB5)	05:34	04:59
	16:35	53	14:48 (WEA ZB3)	17:33	49	16:46 (WEA ZB2)	18:27	25	07:39 (WEA VB5)	21:17	21:58
14	08:39	13:56 (WEA ZB3)	07:51	15:57 (WEA ZB2)	06:48	31	17:32 (WEA ZB1)	06:38	07:14 (WEA VB5)	05:32	04:59
	16:36	53	14:49 (WEA ZB3)	17:35	49	16:46 (WEA ZB2)	18:29	24	07:38 (WEA VB5)	21:18	21:58
15	08:38	13:56 (WEA ZB3)	07:49	15:57 (WEA ZB2)	06:45	34	18:01 (WEA ZB1)	06:33	07:15 (WEA VB5)	05:31	04:59
	16:38	53	14:49 (WEA ZB3)	17:37	49	16:46 (WEA ZB2)	18:31	23	07:38 (WEA VB5)	21:20	21:59
16	08:37	13:57 (WEA ZB3)	07:47	15:58 (WEA ZB2)	06:43	37	18:03 (WEA ZB1)	06:31	07:16 (WEA VB5)	05:29	04:58
	16:40	52	14:49 (WEA ZB3)	17:39	48	16:46 (WEA ZB2)	18:33	21	07:37 (WEA VB5)	21:22	21:59
17	08:36	13:58 (WEA ZB3)	07:45	15:58 (WEA ZB2)	06:41	40	17:27 (WEA ZB1)	06:28	07:16 (WEA VB5)	05:27	04:58
	16:41	51	14:49 (WEA ZB3)	17:41	48	16:46 (WEA ZB2)	18:35	19	07:35 (WEA VB5)	21:23	22:00
18	08:35	13:59 (WEA ZB3)	07:43	15:58 (WEA ZB2)	06:38	43	18:07 (WEA ZB1)	06:26	07:17 (WEA VB5)	05:26	04:58
	16:43	49	14:48 (WEA ZB3)	17:43	47	16:45 (WEA ZB2)	18:37	16	07:33 (WEA VB5)	21:25	22:01
19	08:34	14:00 (WEA ZB3)	07:41	15:58 (WEA ZB2)	06:36	44	17:25 (WEA ZB1)	06:24	07:19 (WEA VB5)	05:24	04:58
	16:45	48	14:48 (WEA ZB3)	17:45	47	16:45 (WEA ZB2)	18:38	12	07:31 (WEA VB5)	21:27	22:01
20	08:33	14:01 (WEA ZB3)	07:39	15:59 (WEA ZB2)	06:33	44	18:08 (WEA ZB1)	06:21	07:23 (WEA VB5)	05:23	04:58
	16:46	47	14:48 (WEA ZB3)	17:47	45	16:44 (WEA ZB2)	18:40	4	07:27 (WEA VB5)	21:28	22:01
21	08:32	14:02 (WEA ZB3)	07:37	16:00 (WEA ZB2)	06:31	45	17:24 (WEA ZB1)	06:19	05:21	04:58	
	16:48	45	14:47 (WEA ZB3)	17:49	44	16:44 (WEA ZB2)	18:42		21:30	22:02	8
22	08:30	14:03 (WEA ZB3)	07:34	16:00 (WEA ZB2)	06:28	45	18:09 (WEA ZB1)	06:17	05:20	04:58	
	16:50	44	14:47 (WEA ZB3)	17:51	42	16:42 (WEA ZB2)	18:44	25	21:31	22:02	8
23	08:29	14:04 (WEA ZB3)	07:32	16:02 (WEA ZB2)	06:26	50	17:23 (WEA ZB1)	06:17	05:20	04:58	
	16:52	43	16:18 (WEA ZB2)	17:53	39	16:41 (WEA ZB2)	18:46	45	21:33	22:02	8
24	08:28	14:06 (WEA ZB3)	07:30	16:03 (WEA ZB2)	06:24	54	18:08 (WEA ZB1)	06:15	05:18	04:58	
	16:54	49	16:21 (WEA ZB2)	17:55	37	16:40 (WEA ZB2)	18:48		05:17	04:59	6
25	08:26	14:07 (WEA ZB3)	07:28	16:04 (WEA ZB2)	06:21	57	18:07 (WEA ZB1)	06:12	21:34	22:02	6
	16:56	50	16:22 (WEA ZB2)	17:57	34	16:38 (WEA ZB2)	18:49	50	05:15	04:59	6
26	08:25	14:09 (WEA ZB3)	07:25	16:06 (WEA ZB2)	06:19	59	18:07 (WEA ZB1)	06:10	21:36	22:02	5
	16:58	52	16:25 (WEA ZB2)	17:59	30	16:36 (WEA ZB2)	18:51		05:14	04:59	5
27	08:23	14:11 (WEA ZB3)	07:23	16:09 (WEA ZB2)	06:16	62	18:06 (WEA ZB1)	06:08	21:37	22:02	3
	16:59	52	16:27 (WEA ZB2)	18:01	25	16:34 (WEA ZB2)	18:53	4	05:13	05:00	
28	08:22	14:13 (WEA ZB3)	07:21	16:11 (WEA ZB2)	06:14	61	18:06 (WEA ZB1)	06:06	21:39	22:02	
	17:01	52	16:29 (WEA ZB2)	18:02	20	16:31 (WEA ZB2)	18:55		05:12	05:00	
29	08:20	14:17 (WEA ZB3)				60	18:04 (WEA ZB1)	06:04	21:40	22:02	
	17:03	49	16:31 (WEA ZB2)			58	18:06 (WEA ZB1)	06:02	21:42	22:02	
30	08:19	14:20 (WEA ZB3)				55	19:04 (WEA ZB1)	06:00	05:09	05:01	
	17:05	46	16:33 (WEA ZB2)				07:41 (WEA VB6)	06:00	21:43	22:02	
31	08:17	16:01 (WEA ZB2)					07:41 (WEA VB6)	05:57	05:08	05:02	
	17:07	34	16:35 (WEA ZB2)				19:02 (WEA ZB1)	20:55	21:44	22:02	
							07:42 (WEA VB6)		05:07		
							19:01 (WEA ZB1)		21:45		
Sonnenscheinstunden	251		274		367		419		493		509
astr.max.mögl.Beschattung	1594		1202		1028		471				64

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:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO14 - Westerhausen 12
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober	November	Dezember
1	05:02 22:01	05:42 21:27	06:36 20:21	07:14 (WEA VB5) 07:28 19:07	18:11 (WEA ZB1) 07:26 16:57	15:26 (WEA ZB2) 08:21 16:13
2	05:03 22:01	05:44 21:25	06:37 20:18	07:14 (WEA VB5) 07:30 19:05	18:11 (WEA ZB1) 07:28 16:55	15:27 (WEA ZB2) 08:22 16:13
3	05:04 22:01	05:45 21:23	06:39 20:16	07:13 (WEA VB5) 07:32 19:02	18:13 (WEA ZB1) 07:30 16:53	15:27 (WEA ZB2) 08:24 16:12
4	05:05 22:00	05:47 21:21	06:41 20:13	07:13 (WEA VB5) 07:34 19:00	18:15 (WEA ZB1) 07:32 16:51	15:28 (WEA ZB2) 08:25 16:11
5	05:06 22:00	05:49 21:19	06:43 20:11	07:14 (WEA VB5) 07:36 18:58	18:19 (WEA ZB1) 07:34 16:50	15:28 (WEA ZB2) 08:27 16:11
6	05:07 21:59	05:50 21:17	06:44 20:09	07:14 (WEA VB5) 07:37 18:55	18:29 (WEA ZB1) 07:36 16:48	15:29 (WEA ZB2) 08:28 16:10
7	05:08 21:58	05:52 21:15	06:46 20:06	07:15 (WEA VB5) 07:39 18:53	18:31 (WEA ZB1) 07:38 16:46	15:29 (WEA ZB2) 08:29 16:10
8	05:09 21:58	05:54 21:13	06:48 20:04	07:16 (WEA VB5) 07:41 18:50	18:34 (WEA ZB1) 07:40 16:44	15:30 (WEA ZB2) 08:31 16:09
9	05:10 21:57	05:55 21:11	06:50 20:01	07:18 (WEA VB5) 07:43 18:48	18:37 (WEA ZB1) 07:42 16:42	15:30 (WEA ZB2) 08:32 16:09
10	05:11 21:56	05:57 21:09	06:51 19:59	07:19 (WEA VB5) 07:45 18:46	18:40 (WEA ZB1) 07:43 16:41	15:31 (WEA ZB2) 08:33 16:09
11	05:12 21:55	05:59 21:07	06:53 19:56	07:20 (WEA VB5) 07:47 18:43	18:43 (WEA ZB1) 07:45 16:39	15:32 (WEA ZB2) 08:34 16:08
12	05:13 21:54	06:01 21:05	06:55 19:54	07:22 (WEA VB5) 07:48 18:41	18:46 (WEA ZB1) 07:47 16:37	15:33 (WEA ZB2) 08:35 16:08
13	05:14 21:53	06:02 21:03	06:57 19:52	07:24 (WEA VB5) 07:50 18:39	18:49 (WEA ZB1) 07:49 16:36	15:34 (WEA ZB2) 08:36 16:08
14	05:15 21:52	06:04 21:01	06:58 19:49	07:26 (WEA VB5) 07:52 18:36	18:52 (WEA ZB1) 07:51 16:34	15:35 (WEA ZB2) 08:37 16:08
15	05:17 21:51	06:06 20:59	07:00 19:47	07:28 (WEA VB5) 07:54 18:34	18:55 (WEA ZB1) 07:53 16:32	15:36 (WEA ZB2) 08:38 16:08
16	05:18 21:50	06:08 20:57	07:02 19:44	07:30 (WEA VB5) 07:56 18:32	18:58 (WEA ZB1) 07:55 16:31	15:37 (WEA ZB2) 08:39 16:08
17	05:19 21:49	06:09 20:55	07:04 19:42	07:32 (WEA VB5) 07:58 18:29	18:59 (WEA ZB1) 07:57 16:29	15:38 (WEA ZB2) 08:40 16:08
18	05:21 21:48	06:11 20:53	07:05 19:39	07:34 (WEA VB5) 08:00 18:27	19:01 (WEA ZB1) 07:58 16:28	15:39 (WEA ZB2) 08:41 16:09
19	05:22 21:47	06:13 20:50	07:07 19:37	07:36 (WEA VB5) 08:01 18:25	19:03 (WEA ZB1) 08:00 16:27	15:40 (WEA ZB2) 08:41 16:09
20	05:23 21:45	06:15 20:48	07:09 19:34	07:38 (WEA VB5) 08:03 18:23	19:05 (WEA ZB1) 08:02 16:25	15:41 (WEA ZB2) 08:42 16:09
21	05:25 21:44	06:16 20:46	07:11 19:32	07:40 (WEA VB5) 08:05 18:20	19:07 (WEA ZB1) 08:04 16:24	15:42 (WEA ZB2) 08:43 16:10
22	05:26 21:42	06:18 20:44	07:12 19:29	07:42 (WEA VB5) 08:07 18:18	19:09 (WEA ZB1) 08:06 16:23	15:43 (WEA ZB2) 08:43 16:10
23	05:28 21:41	06:20 20:41	07:14 19:27	07:44 (WEA VB5) 08:09 18:16	19:11 (WEA ZB1) 08:07 16:21	15:44 (WEA ZB2) 08:44 16:11
24	05:29 21:40	06:22 20:39	07:16 19:24	07:46 (WEA VB5) 08:11 18:14	19:13 (WEA ZB1) 08:09 16:20	15:45 (WEA ZB2) 08:44 16:11
25	05:31 21:38	06:23 20:37	07:18 19:22	07:48 (WEA VB5) 08:13 17:12	19:15 (WEA ZB1) 08:11 16:19	15:46 (WEA ZB2) 08:45 16:12
26	05:32 21:37	06:25 20:35	07:20 19:20	07:50 (WEA VB5) 08:15 17:10	19:17 (WEA ZB1) 08:13 16:18	15:47 (WEA ZB2) 08:45 16:13
27	05:34 21:35	06:27 20:32	07:22 19:17	07:52 (WEA VB5) 08:17 17:07	19:19 (WEA ZB1) 08:14 16:17	15:48 (WEA ZB2) 08:45 16:13
28	05:35 21:33	06:29 20:30	07:24 19:15	07:54 (WEA VB5) 08:19 17:05	19:21 (WEA ZB1) 08:16 16:16	15:49 (WEA ZB2) 08:45 16:14
29	05:37 21:32	06:30 20:28	07:26 19:12	07:56 (WEA VB5) 08:21 17:03	19:23 (WEA ZB1) 08:18 16:15	15:50 (WEA ZB2) 08:45 16:15
30	05:39 21:30	06:32 20:25	07:28 19:10	07:58 (WEA VB5) 08:23 17:01	19:25 (WEA ZB1) 08:19 16:14	15:51 (WEA ZB2) 08:45 16:16
31	05:40 21:28	06:34 20:23	07:30 19:08	07:59 (WEA VB5) 08:25 16:59	19:27 (WEA ZB1) 08:21 16:15	15:52 (WEA ZB2) 08:45 16:17
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		146	1267	879	1421	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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
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0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO15 - Westerhausen 9A
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	10:57 (WEA ZB3)	08:16	14:03 (WEA ZB1)	07:19	14:38 (WEA ZB1)	07:04	05:55	06:28 (WEA VB1)	05:06	06:02 (WEA VB2)
	16:18	15:11 (WEA ZB1)	17:09	15:29 (WEA ZB1)	18:04	15:01 (WEA ZB1)	20:02	20:57	07:09 (WEA VB1)	21:47	07:09 (WEA VB1)
2	08:45	10:59 (WEA ZB3)	08:14	14:03 (WEA ZB1)	07:16		07:02	05:53	06:27 (WEA VB1)	05:05	06:02 (WEA VB2)
	16:19	15:12 (WEA ZB1)	17:11	15:29 (WEA ZB1)	18:06		20:04	20:59	07:39 (WEA VB3)	21:48	07:08 (WEA VB1)
3	08:45	11:00 (WEA ZB3)	08:12	14:04 (WEA ZB1)	07:14		06:59	05:51	07:26 (WEA VB3)	05:05	06:02 (WEA VB2)
	16:21	15:13 (WEA ZB1)	17:13	15:30 (WEA ZB1)	18:08		20:06	21:01	07:42 (WEA VB3)	21:49	07:07 (WEA VB1)
4	08:45	11:01 (WEA ZB3)	08:10	14:04 (WEA ZB1)	07:12		06:57	05:49	07:23 (WEA VB3)	05:04	06:03 (WEA VB2)
	16:22	15:13 (WEA ZB1)	17:15	15:30 (WEA ZB1)	18:10		20:08	21:03	07:42 (WEA VB3)	21:50	07:08 (WEA VB1)
5	08:45	11:04 (WEA ZB3)	08:09	14:04 (WEA ZB1)	07:09		06:54	05:47	07:22 (WEA VB3)	05:03	06:03 (WEA VB2)
	16:23	15:14 (WEA ZB1)	17:17	15:30 (WEA ZB1)	18:12		20:10	21:04	07:44 (WEA VB3)	21:51	07:07 (WEA VB1)
6	08:44	11:06 (WEA ZB3)	08:07	14:05 (WEA ZB1)	07:07		06:52	05:45	07:21 (WEA VB3)	05:02	06:04 (WEA VB2)
	16:24	15:15 (WEA ZB1)	17:19	15:30 (WEA ZB1)	18:14		20:12	21:06	07:45 (WEA VB3)	21:52	07:06 (WEA VB1)
7	08:44	12:27 (WEA ZB2)	08:05	14:05 (WEA ZB1)	07:05		06:50	05:43	07:20 (WEA VB3)	05:02	06:05 (WEA VB2)
	16:26	15:15 (WEA ZB1)	17:21	15:30 (WEA ZB1)	18:16		20:13	21:08	07:44 (WEA VB3)	21:53	07:07 (WEA VB1)
8	08:43	12:29 (WEA ZB2)	08:03	14:05 (WEA ZB1)	07:02		06:47	05:42	07:19 (WEA VB3)	05:01	06:04 (WEA VB2)
	16:27	15:17 (WEA ZB1)	17:23	15:30 (WEA ZB1)	18:18		20:15	21:10	07:45 (WEA VB3)	21:54	07:06 (WEA VB1)
9	08:43	12:30 (WEA ZB2)	08:01	14:06 (WEA ZB1)	07:00	17:52 (WEA VB13)	06:45	05:40	07:18 (WEA VB3)	05:00	06:05 (WEA VB2)
	16:29	15:17 (WEA ZB1)	17:25	15:29 (WEA ZB1)	18:20	17:53 (WEA VB13)	20:17	21:11	07:44 (WEA VB3)	21:55	07:06 (WEA VB1)
10	08:42	12:31 (WEA ZB2)	07:59	14:06 (WEA ZB1)	06:57	17:51 (WEA VB13)	06:42	05:38	07:18 (WEA VB3)	05:00	06:06 (WEA VB2)
	16:30	15:18 (WEA ZB1)	17:27	15:29 (WEA ZB1)	18:22	17:55 (WEA VB13)	20:19	21:13	07:44 (WEA VB3)	21:56	07:06 (WEA VB1)
11	08:41	12:32 (WEA ZB2)	07:57	14:07 (WEA ZB1)	06:55	17:51 (WEA VB13)	06:40	05:36	07:18 (WEA VB3)	05:00	06:06 (WEA VB2)
	16:32	15:18 (WEA ZB1)	17:29	15:29 (WEA ZB1)	18:24	17:57 (WEA VB13)	20:21	21:15	07:44 (WEA VB3)	21:57	07:05 (WEA VB1)
12	08:41	12:33 (WEA ZB2)	07:55	14:07 (WEA ZB1)	06:53	17:50 (WEA VB13)	06:38	05:34	07:19 (WEA VB3)	04:59	06:07 (WEA VB2)
	16:33	15:19 (WEA ZB1)	17:31	15:28 (WEA ZB1)	18:25	17:58 (WEA VB13)	20:23	21:17	07:44 (WEA VB3)	21:58	07:05 (WEA VB1)
13	08:40	12:35 (WEA ZB2)	07:53	14:07 (WEA ZB1)	06:50	17:51 (WEA VB13)	06:35	05:32	07:18 (WEA VB3)	04:59	06:08 (WEA VB2)
	16:35	15:20 (WEA ZB1)	17:33	15:27 (WEA ZB1)	18:27	18:01 (WEA VB13)	20:24	21:18	07:42 (WEA VB3)	21:58	07:05 (WEA VB1)
14	08:39	12:37 (WEA ZB2)	07:51	14:08 (WEA ZB1)	06:48	17:52 (WEA VB13)	06:33	05:31	07:19 (WEA VB3)	04:59	06:08 (WEA VB2)
	16:36	15:20 (WEA ZB1)	17:35	15:27 (WEA ZB1)	18:29	18:02 (WEA VB13)	20:26	21:20	07:42 (WEA VB3)	21:59	07:05 (WEA VB1)
15	08:38	12:39 (WEA ZB2)	07:49	14:09 (WEA ZB1)	06:45	17:53 (WEA VB13)	06:31	05:29	06:55 (WEA VB4)	04:58	06:08 (WEA VB2)
	16:38	15:21 (WEA ZB1)	17:37	15:26 (WEA ZB1)	18:31	17:59 (WEA VB13)	20:28	21:22	07:41 (WEA VB3)	22:00	07:05 (WEA VB1)
16	08:37	12:42 (WEA ZB2)	07:47	14:10 (WEA ZB1)	06:43		06:28	05:27	06:52 (WEA VB4)	04:58	06:08 (WEA VB2)
	16:40	15:22 (WEA ZB1)	17:39	15:26 (WEA ZB1)	18:33		20:30	21:23	07:38 (WEA VB3)	22:01	07:05 (WEA VB1)
17	08:36	12:46 (WEA ZB2)	07:45	14:11 (WEA ZB1)	06:41	07:04 (WEA VB5)	06:26	05:26	06:50 (WEA VB4)	04:58	06:09 (WEA VB2)
	16:41	15:23 (WEA ZB1)	17:41	15:25 (WEA ZB1)	18:35	07:08 (WEA VB5)	20:32	21:25	07:37 (WEA VB3)	22:01	07:05 (WEA VB1)
18	08:35	14:01 (WEA ZB1)	07:43	14:12 (WEA ZB1)	06:38	07:02 (WEA VB5)	06:24	05:24	06:48 (WEA VB4)	04:58	06:09 (WEA VB2)
	16:43	15:23 (WEA ZB1)	17:43	15:24 (WEA ZB1)	18:37	07:10 (WEA VB5)	20:34	21:27	07:34 (WEA VB3)	22:01	07:05 (WEA VB1)
19	08:34	14:02 (WEA ZB1)	07:41	14:13 (WEA ZB1)	06:36	06:59 (WEA VB5)	06:21	05:23	06:46 (WEA VB4)	04:58	06:10 (WEA VB2)
	16:45	15:24 (WEA ZB1)	17:45	15:23 (WEA ZB1)	18:38	07:10 (WEA VB5)	20:35	21:28	07:03 (WEA VB4)	22:01	07:06 (WEA VB1)
20	08:33	14:02 (WEA ZB1)	07:39	14:15 (WEA ZB1)	06:33	06:57 (WEA VB5)	06:19	05:21	06:45 (WEA VB4)	04:58	06:10 (WEA VB2)
	16:47	15:25 (WEA ZB1)	17:47	15:22 (WEA ZB1)	18:40	07:10 (WEA VB5)	20:37	21:30	07:04 (WEA VB4)	22:02	07:06 (WEA VB1)
21	08:32	14:02 (WEA ZB1)	07:37	14:16 (WEA ZB1)	06:31	06:54 (WEA VB5)	06:17	05:20	06:43 (WEA VB4)	04:58	06:10 (WEA VB2)
	16:48	15:25 (WEA ZB1)	17:49	15:21 (WEA ZB1)	18:42	07:10 (WEA VB5)	20:39	21:31	07:03 (WEA VB4)	22:02	07:06 (WEA VB1)
22	08:30	14:02 (WEA ZB1)	07:34	14:17 (WEA ZB1)	06:28	06:54 (WEA VB5)	06:15	05:18	06:43 (WEA VB4)	04:58	06:10 (WEA VB2)
	16:50	15:26 (WEA ZB1)	17:51	15:19 (WEA ZB1)	18:44	18:18 (WEA VB12)	20:41	21:33	07:03 (WEA VB4)	22:02	07:06 (WEA VB1)
23	08:29	14:02 (WEA ZB1)	07:32	14:19 (WEA ZB1)	06:26	06:54 (WEA VB5)	06:13	05:17	06:44 (WEA VB4)	04:59	06:10 (WEA VB2)
	16:52	15:26 (WEA ZB1)	17:53	15:18 (WEA ZB1)	18:46	18:19 (WEA VB12)	20:43	21:34	07:02 (WEA VB4)	22:02	07:06 (WEA VB1)
24	08:28	14:02 (WEA ZB1)	07:30	14:21 (WEA ZB1)	06:24	06:55 (WEA VB5)	06:10	05:16	06:42 (WEA VB4)	04:59	06:11 (WEA VB2)
	16:54	15:27 (WEA ZB1)	17:55	15:16 (WEA ZB1)	18:48	18:21 (WEA VB12)	20:45	21:36	07:02 (WEA VB4)	22:02	07:07 (WEA VB1)
25	08:26	14:02 (WEA ZB1)	07:28	14:23 (WEA ZB1)	06:21	06:56 (WEA VB5)	06:08	05:14	06:38 (WEA VB4)	04:59	06:11 (WEA VB2)
	16:56	15:27 (WEA ZB1)	17:57	15:14 (WEA ZB1)	18:50	18:24 (WEA VB12)	20:46	21:37	07:01 (WEA VB4)	22:02	07:07 (WEA VB1)
26	08:25	14:03 (WEA ZB1)	07:25	14:26 (WEA ZB1)	06:19	07:00 (WEA VB5)	06:06	05:13	06:36 (WEA VB4)	05:00	06:11 (WEA VB2)
	16:58	15:28 (WEA ZB1)	17:59	15:12 (WEA ZB1)	18:51	18:23 (WEA VB12)	20:48	21:39	07:03 (WEA VB4)	22:02	07:08 (WEA VB1)
27	08:23	14:02 (WEA ZB1)	07:23	14:29 (WEA ZB1)	06:16		06:04	05:12	06:34 (WEA VB4)	05:00	06:11 (WEA VB2)
	16:59	15:28 (WEA ZB1)	18:01	15:09 (WEA ZB1)	18:53		20:50	21:40	07:05 (WEA VB4)	22:02	07:08 (WEA VB1)
28	08:22	14:02 (WEA ZB1)	07:21	14:32 (WEA ZB1)	06:14		06:02	05:11	06:32 (WEA VB4)	05:01	06:11 (WEA VB2)
	17:01	15:28 (WEA ZB1)	18:03	15:05 (WEA ZB1)	18:55		20:52	21:42	07:06 (WEA VB4)	22:02	07:08 (WEA VB1)
29	08:20	14:03 (WEA ZB1)			07:11		06:00	05:09	06:31 (WEA VB4)	05:01	06:11 (WEA VB2)
	17:03	15:29 (WEA ZB1)			19:57		20:54	21:43	07:07 (WEA VB4)	22:02	07:08 (WEA VB1)
30	08:19	14:03 (WEA ZB1)			07:09		05:57	05:08	06:29 (WEA VB4)	05:02	06:11 (WEA VB2)
	17:05	15:29 (WEA ZB1)			19:59		20:55	21:44	07:08 (WEA VB4)	22:02	07:09 (WEA VB1)
31	08:17	14:03 (WEA ZB1)			07:06			05:07	06:02 (WEA VB4)		
	17:07	15:29 (WEA ZB1)			20:01			21:45	07:09 (WEA VB4)		
Sonnenscheinstunden			274		367		419		493		509
astr.max.mögl.Beschattung		3155		2020		204		700		1937	1526

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO15 - Westerhausen 9A
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

		Juli		August		September		Oktober		November		Dezember	
1	05:03	06:10 (WEA VB2)	05:42	06:16 (WEA VB2)	06:36	07:17 (WEA VB3)	07:28	18:30 (WEA VB13)	07:26	13:35 (WEA ZB1)	08:21	12:14 (WEA ZB2)	
	22:01	07:09 (WEA VB1)	21:27	07:23 (WEA VB1)	20:21	07:43 (WEA VB3)	19:07	18:39 (WEA VB13)	16:57	14:58 (WEA ZB1)	16:13	15:00 (WEA ZB1)	
2	05:03	06:11 (WEA VB2)	05:44	06:18 (WEA VB2)	06:37	07:17 (WEA VB3)	07:30	18:29 (WEA VB13)	07:28	13:35 (WEA ZB1)	08:22	12:14 (WEA ZB2)	
	22:01	07:10 (WEA VB1)	21:25	07:23 (WEA VB1)	20:18	07:43 (WEA VB3)	19:05	18:37 (WEA VB13)	16:55	14:59 (WEA ZB1)	16:13	15:01 (WEA ZB1)	
3	05:04	06:11 (WEA VB2)	05:45	06:21 (WEA VB2)	06:39	07:16 (WEA VB3)	07:32	18:28 (WEA VB13)	07:30	13:35 (WEA ZB1)	08:24	12:13 (WEA ZB2)	
	22:01	07:11 (WEA VB1)	21:23	07:22 (WEA VB1)	20:16	07:42 (WEA VB3)	19:03	18:34 (WEA VB13)	16:53	14:59 (WEA ZB1)	16:12	15:00 (WEA ZB1)	
4	05:05	06:11 (WEA VB2)	05:47	06:33 (WEA VB1)	06:41	07:16 (WEA VB3)	07:34	18:29 (WEA VB13)	07:32	13:35 (WEA ZB1)	08:25	12:13 (WEA ZB2)	
	22:00	07:12 (WEA VB1)	21:21	07:22 (WEA VB1)	20:13	07:42 (WEA VB3)	19:00	18:31 (WEA VB13)	16:51	14:59 (WEA ZB1)	16:11	15:01 (WEA ZB1)	
5	05:06	06:10 (WEA VB2)	05:49	06:34 (WEA VB1)	06:43	07:17 (WEA VB3)	07:36		07:34	13:34 (WEA ZB1)	08:27	12:12 (WEA ZB2)	
	22:00	07:12 (WEA VB1)	21:19	07:23 (WEA VB1)	20:11	07:41 (WEA VB3)	18:58		16:50	15:00 (WEA ZB1)	16:11	15:00 (WEA ZB1)	
6	05:07	06:10 (WEA VB2)	05:50	06:34 (WEA VB1)	06:44	07:16 (WEA VB3)	07:37		07:36	13:34 (WEA ZB1)	08:28	10:53 (WEA ZB3)	
	21:59	07:13 (WEA VB1)	21:17	07:22 (WEA VB1)	20:09	07:40 (WEA VB3)	18:55		16:48	15:00 (WEA ZB1)	16:10	15:01 (WEA ZB1)	
7	05:08	06:10 (WEA VB2)	05:52	06:34 (WEA VB1)	06:46	07:17 (WEA VB3)	07:39		07:38	13:34 (WEA ZB1)	08:29	10:50 (WEA ZB3)	
	21:58	07:13 (WEA VB1)	21:15	07:21 (WEA VB1)	20:06	07:39 (WEA VB3)	18:53		16:46	15:00 (WEA ZB1)	16:10	15:00 (WEA ZB1)	
8	05:09	06:10 (WEA VB2)	05:54	06:34 (WEA VB1)	06:48	07:18 (WEA VB3)	07:41		07:40	13:34 (WEA ZB1)	08:31	10:50 (WEA ZB3)	
	21:58	07:14 (WEA VB1)	21:14	07:20 (WEA VB1)	20:04	07:38 (WEA VB3)	18:50		16:44	15:00 (WEA ZB1)	16:09	15:01 (WEA ZB1)	
9	05:10	06:10 (WEA VB2)	05:55	06:35 (WEA VB1)	06:50	07:19 (WEA VB3)	07:43		07:42	13:34 (WEA ZB1)	08:32	10:49 (WEA ZB3)	
	21:57	07:15 (WEA VB1)	21:12	07:20 (WEA VB1)	20:01	07:35 (WEA VB3)	18:48		16:42	15:00 (WEA ZB1)	16:09	15:01 (WEA ZB1)	
10	05:11	06:10 (WEA VB2)	05:57	06:36 (WEA VB1)	06:51	07:21 (WEA VB3)	07:45		07:44	13:34 (WEA ZB1)	08:33	10:48 (WEA ZB3)	
	21:56	07:15 (WEA VB1)	21:10	07:20 (WEA VB1)	19:59	07:33 (WEA VB3)	18:46		16:41	15:00 (WEA ZB1)	16:09	15:01 (WEA ZB1)	
11	05:12	06:09 (WEA VB2)	05:59	06:36 (WEA VB1)	06:53		07:47		07:45	13:34 (WEA ZB1)	08:34	10:47 (WEA ZB3)	
	21:55	07:16 (WEA VB1)	21:07	07:18 (WEA VB1)	19:56		18:43		16:39	15:00 (WEA ZB1)	16:08	15:01 (WEA ZB1)	
12	05:13	06:09 (WEA VB2)	06:01	06:37 (WEA VB1)	06:55		07:48		15:15 (WEA ZB1)	13:35 (WEA ZB1)	08:35	10:48 (WEA ZB3)	
	21:54	07:16 (WEA VB1)	21:05	07:17 (WEA VB1)	19:54		18:41	15	15:30 (WEA ZB1)	13:34 (WEA ZB1)	16:08	15:02 (WEA ZB1)	
13	05:14	06:09 (WEA VB2)	06:02	06:37 (WEA VB1)	06:57		07:50		15:08 (WEA ZB1)	13:35 (WEA ZB1)	08:36	10:48 (WEA ZB3)	
	21:53	07:17 (WEA VB1)	21:03	07:16 (WEA VB1)	19:52		18:39	28	15:36 (WEA ZB1)	15:01 (WEA ZB1)	16:08	15:02 (WEA ZB1)	
14	05:15	06:10 (WEA VB2)	06:04	06:39 (WEA VB1)	06:58		07:52		15:04 (WEA ZB1)	13:35 (WEA ZB1)	08:37	10:48 (WEA ZB3)	
	21:52	07:18 (WEA VB1)	21:01	07:15 (WEA VB1)	19:49		18:36	36	15:40 (WEA ZB1)	15:01 (WEA ZB1)	16:08	15:02 (WEA ZB1)	
15	05:17	06:10 (WEA VB2)	06:06	06:40 (WEA VB1)	07:00		07:54		15:00 (WEA ZB1)	13:35 (WEA ZB1)	08:38	10:48 (WEA ZB3)	
	21:51	07:19 (WEA VB1)	20:59	07:14 (WEA VB1)	19:47		18:34	42	15:42 (WEA ZB1)	15:01 (WEA ZB1)	16:08	15:03 (WEA ZB1)	
16	05:18	06:09 (WEA VB2)	06:08	06:41 (WEA VB1)	07:02		07:56		14:57 (WEA ZB1)	13:35 (WEA ZB1)	08:39	10:48 (WEA ZB3)	
	21:50	07:19 (WEA VB1)	20:57	07:11 (WEA VB1)	19:44		18:32	48	15:45 (WEA ZB1)	15:01 (WEA ZB1)	16:08	15:03 (WEA ZB1)	
17	05:19	06:09 (WEA VB2)	06:09	06:43 (WEA VB1)	07:04	19:05 (WEA VB12)	07:58		14:54 (WEA ZB1)	13:36 (WEA ZB1)	08:40	10:47 (WEA ZB3)	
	21:49	07:19 (WEA VB1)	20:55	07:09 (WEA VB1)	19:42	19:11 (WEA VB12)	18:29	52	15:46 (WEA ZB1)	15:01 (WEA ZB1)	16:08	15:03 (WEA ZB1)	
18	05:21	06:09 (WEA VB2)	06:11	06:46 (WEA VB1)	07:05	07:44 (WEA VB5)	08:00		14:52 (WEA ZB1)	13:36 (WEA ZB1)	08:41	10:48 (WEA ZB3)	
	21:48	07:20 (WEA VB1)	20:53	07:08 (WEA VB4)	19:39	19:12 (WEA VB12)	18:27	56	15:48 (WEA ZB1)	15:01 (WEA ZB1)	16:09	15:03 (WEA ZB1)	
19	05:22	06:10 (WEA VB2)	06:13	06:48 (WEA VB1)	07:07	07:42 (WEA VB5)	08:01		14:50 (WEA ZB1)	13:37 (WEA ZB1)	08:41	10:49 (WEA ZB3)	
	21:47	07:21 (WEA VB1)	20:50	07:08 (WEA VB4)	19:37	19:08 (WEA VB12)	18:25	59	15:49 (WEA ZB1)	15:01 (WEA ZB1)	16:09	15:04 (WEA ZB1)	
20	05:23	06:10 (WEA VB2)	06:15	06:49 (WEA VB4)	07:09	07:40 (WEA VB5)	08:03		14:48 (WEA ZB1)	13:37 (WEA ZB1)	08:42	10:48 (WEA ZB3)	
	21:45	07:21 (WEA VB1)	20:48	07:08 (WEA VB4)	19:34	19:06 (WEA VB12)	18:23	63	15:51 (WEA ZB1)	15:01 (WEA ZB1)	16:09	15:04 (WEA ZB1)	
21	05:25	06:09 (WEA VB2)	06:16	06:49 (WEA VB4)	07:11	07:40 (WEA VB5)	08:05		14:46 (WEA ZB1)	13:38 (WEA ZB1)	08:43	10:49 (WEA ZB3)	
	21:44	07:21 (WEA VB1)	20:46	07:08 (WEA VB4)	19:32	19:04 (WEA VB12)	18:20	66	15:52 (WEA ZB1)	15:01 (WEA ZB1)	16:10	15:05 (WEA ZB1)	
22	05:26	06:10 (WEA VB2)	06:18	06:48 (WEA VB4)	07:12	07:39 (WEA VB5)	08:07		14:45 (WEA ZB1)	13:38 (WEA ZB1)	08:43	10:49 (WEA ZB3)	
	21:43	07:22 (WEA VB1)	20:44	07:07 (WEA VB4)	19:29	19:02 (WEA VB12)	18:18	68	15:53 (WEA ZB1)	15:01 (WEA ZB1)	16:10	15:04 (WEA ZB1)	
23	05:28	06:10 (WEA VB2)	06:20	06:49 (WEA VB4)	07:14	07:40 (WEA VB5)	08:09		14:43 (WEA ZB1)	13:39 (WEA ZB1)	08:44	10:50 (WEA ZB3)	
	21:41	07:22 (WEA VB1)	20:42	07:07 (WEA VB4)	19:27	07:54 (WEA VB5)	18:16	71	15:54 (WEA ZB1)	15:01 (WEA ZB1)	16:11	15:06 (WEA ZB1)	
24	05:29	06:10 (WEA VB2)	06:22	06:50 (WEA VB4)	07:16	07:42 (WEA VB5)	08:11		14:42 (WEA ZB1)	13:40 (WEA ZB1)	08:44	10:50 (WEA ZB3)	
	21:40	07:22 (WEA VB1)	20:39	07:07 (WEA VB4)	19:24	07:54 (WEA VB5)	18:14	72	15:54 (WEA ZB1)	15:01 (WEA ZB1)	16:11	15:06 (WEA ZB1)	
25	05:31	06:11 (WEA VB2)	06:23	06:51 (WEA VB4)	07:18	07:44 (WEA VB5)	07:13		13:41 (WEA ZB1)	12:23 (WEA ZB2)	08:45	10:51 (WEA ZB3)	
	21:38	07:23 (WEA VB1)	20:37	07:37 (WEA VB3)	19:22	07:53 (WEA VB5)	17:12	74	14:55 (WEA ZB1)	15:00 (WEA ZB1)	16:12	15:06 (WEA ZB1)	
26	05:32	06:11 (WEA VB2)	06:25	06:53 (WEA VB4)	07:20	07:46 (WEA VB5)	07:15		13:40 (WEA ZB1)	12:20 (WEA ZB2)	08:45	10:52 (WEA ZB3)	
	21:37	07:22 (WEA VB1)	20:35	07:40 (WEA VB3)	19:20	07:51 (WEA VB5)	17:10	76	14:56 (WEA ZB1)	15:00 (WEA ZB1)	16:13	15:07 (WEA ZB1)	
27	05:34	06:12 (WEA VB2)	06:27	06:55 (WEA VB4)	07:21	07:48 (WEA VB5)	07:17		13:39 (WEA ZB1)	12:18 (WEA ZB2)	08:45	10:53 (WEA ZB3)	
	21:35	07:23 (WEA VB1)	20:32	07:41 (WEA VB3)	19:17	07:49 (WEA VB5)	17:08	77	14:56 (WEA ZB1)	15:00 (WEA ZB1)	16:13	15:08 (WEA ZB1)	
28	05:35	06:12 (WEA VB2)	06:29	06:56 (WEA VB4)	07:23	18:36 (WEA VB13)	07:19		13:38 (WEA ZB1)	12:17 (WEA ZB2)	08:45	10:54 (WEA ZB3)	
	21:33	07:23 (WEA VB1)	20:30	07:42 (WEA VB3)	19:15	18:38 (WEA VB13)	17:05	78	14:56 (WEA ZB1)	15:01 (WEA ZB1)	16:14	15:08 (WEA ZB1)	
29	05:37	06:13 (WEA VB2)	06:30	07:20 (WEA VB3)	07:25	18:32 (WEA VB13)	07:20		13:37 (WEA ZB1)	12:16 (WEA ZB2)	08:45	10:54 (WEA ZB3)	
	21:32	07:23 (WEA VB1)	20:28	07:43 (WEA VB3)	19:12	18:41 (WEA VB13)	17:03	80	14:57 (WEA ZB1)	15:01 (WEA ZB1)	16:15	15:09 (WEA ZB1)	
30	05:39	06:14 (WEA VB2)	06:32	07:19 (WEA VB3)	07:27	18:31 (WEA VB13)	07:22		13:36 (WEA ZB1)	12:15 (WEA ZB2)	08:46	10:55 (WEA ZB3)	
	21:30	07:23 (WEA VB1)	20:25	07:43 (WEA VB3)	19:10	18:42 (WEA VB13)	17:01	81	14:57 (WEA ZB1)	15:00 (WEA ZB1)	16:16	15:10 (WEA ZB1)	
31	05:40	06:15 (WEA VB2)	06:34	07:17 (WEA VB3)			07:24		13:35 (WEA ZB1)		08:45	10:56 (WEA ZB3)	
	21:28	07:23 (WEA VB1)	20:23	07:43 (WEA VB3)			16:59	83	14:58 (WEA ZB1)		16:17	15:11 (WEA ZB1)	
Sonnenscheinstunden		511											
astr.max.mögl.Beschattung		2043	459		382		329		260	2651	234	4206	

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO16 - Westerhausen 9
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	12:17 (WEA VB2)	08:16	13:42 (WEA VB1)	07:19	07:04	07:33 (WEA VB3)	05:55	06:47 (WEA VB1)	05:06	
	16:18	110	14:48 (WEA VB1)	17:09	76	14:58 (WEA VB1)	18:04	24	07:57 (WEA VB3)	20:57	47
2	08:45	12:18 (WEA VB2)	08:14	13:42 (WEA VB1)	07:16	07:02	07:32 (WEA VB3)	05:53	06:23 (WEA VB2)	05:05	
	16:19	109	14:49 (WEA VB1)	17:11	76	14:58 (WEA VB1)	18:06	25	07:57 (WEA VB3)	20:59	58
3	08:45	12:19 (WEA VB2)	08:12	13:44 (WEA VB1)	07:14	06:59	07:32 (WEA VB3)	05:51	06:20 (WEA VB2)	05:05	
	16:21	108	14:50 (WEA VB1)	17:13	74	14:58 (WEA VB1)	18:08	25	07:57 (WEA VB3)	21:01	61
4	08:45	12:20 (WEA VB2)	08:10	13:44 (WEA VB1)	07:12	06:57	07:31 (WEA VB3)	05:49	06:19 (WEA VB2)	05:04	
	16:22	106	14:50 (WEA VB1)	17:15	74	14:58 (WEA VB1)	18:10	25	07:56 (WEA VB3)	21:03	63
5	08:45	12:22 (WEA VB2)	08:09	13:45 (WEA VB1)	07:09	06:54	07:31 (WEA VB3)	05:47	06:17 (WEA VB2)	05:03	
	16:23	105	14:51 (WEA VB1)	17:17	72	14:57 (WEA VB1)	18:12	25	07:56 (WEA VB3)	21:04	65
6	08:44	12:23 (WEA VB2)	08:07	13:46 (WEA VB1)	07:07	17:45 (WEA VB13)	06:52	07:31 (WEA VB3)	05:45	06:17 (WEA VB2)	05:02
	16:24	103	14:51 (WEA VB1)	17:19	71	14:57 (WEA VB1)	18:14	25	07:56 (WEA VB3)	21:06	66
7	08:44	12:24 (WEA VB2)	08:05	13:47 (WEA VB1)	07:05	17:45 (WEA VB13)	06:50	07:31 (WEA VB3)	05:43	06:16 (WEA VB2)	05:02
	16:26	101	14:51 (WEA VB1)	17:21	69	14:56 (WEA VB1)	18:16	23	07:54 (WEA VB3)	21:08	66
8	08:43	12:27 (WEA VB2)	08:03	13:48 (WEA VB1)	07:02	17:44 (WEA VB13)	06:47	07:32 (WEA VB3)	05:42	06:15 (WEA VB2)	05:01
	16:27	98	14:53 (WEA VB1)	17:23	67	14:55 (WEA VB1)	18:18	22	07:54 (WEA VB3)	21:10	65
9	08:43	12:29 (WEA VB2)	08:01	13:49 (WEA VB1)	07:00	17:44 (WEA VB13)	06:45	07:32 (WEA VB3)	05:40	06:14 (WEA VB2)	05:00
	16:29	95	14:53 (WEA VB1)	17:25	65	14:54 (WEA VB1)	18:20	19	07:51 (WEA VB3)	21:11	65
10	08:42	12:33 (WEA VB2)	07:59	13:51 (WEA VB1)	06:57	17:44 (WEA VB13)	06:42	07:33 (WEA VB3)	05:38	06:14 (WEA VB2)	05:00
	16:30	87	14:53 (WEA VB1)	17:27	62	14:53 (WEA VB1)	18:22	17	07:50 (WEA VB3)	21:13	64
11	08:41	13:34 (WEA VB1)	07:57	13:52 (WEA VB1)	06:55	17:45 (WEA VB13)	06:40	07:04 (WEA VB4)	05:36	06:14 (WEA VB2)	05:00
	16:32	80	14:54 (WEA VB1)	17:29	60	14:52 (WEA VB1)	18:24	25	07:48 (WEA VB3)	21:15	62
12	08:41	13:34 (WEA VB1)	07:55	13:53 (WEA VB1)	06:53	17:47 (WEA VB13)	06:38	07:02 (WEA VB4)	05:34	06:13 (WEA VB2)	04:59
	16:33	80	14:54 (WEA VB1)	17:31	57	14:50 (WEA VB1)	18:25	27	07:44 (WEA VB3)	21:17	61
13	08:40	13:34 (WEA VB1)	07:53	13:55 (WEA VB1)	06:50	17:52 (WEA VB13)	06:35	06:59 (WEA VB4)	05:32	06:14 (WEA VB2)	04:59
	16:35	81	14:55 (WEA VB1)	17:33	54	14:49 (WEA VB1)	18:27	27	07:26 (WEA VB1)	21:18	59
14	08:39	13:34 (WEA VB1)	07:51	13:57 (WEA VB1)	06:48	07:12 (WEA VB5)	06:33	06:57 (WEA VB4)	05:31	06:13 (WEA VB2)	04:59
	16:36	81	14:55 (WEA VB1)	17:35	51	14:48 (WEA VB1)	18:29	32	07:29 (WEA VB1)	21:20	56
15	08:38	13:35 (WEA VB1)	07:49	13:59 (WEA VB1)	06:45	07:09 (WEA VB5)	06:31	06:55 (WEA VB4)	05:29	06:14 (WEA VB2)	04:58
	16:38	81	14:56 (WEA VB1)	17:37	47	14:46 (WEA VB1)	18:31	35	07:30 (WEA VB1)	21:22	53
16	08:37	13:35 (WEA VB1)	07:47	14:02 (WEA VB1)	06:43	07:07 (WEA VB5)	06:28	06:54 (WEA VB4)	05:27	06:14 (WEA VB2)	04:58
	16:40	81	14:56 (WEA VB1)	17:39	42	14:44 (WEA VB1)	18:33	37	07:31 (WEA VB1)	21:23	49
17	08:36	13:36 (WEA VB1)	07:45	14:05 (WEA VB1)	06:41	07:04 (WEA VB5)	06:26	06:54 (WEA VB4)	05:26	06:14 (WEA VB2)	04:58
	16:41	81	14:57 (WEA VB1)	17:41	36	14:41 (WEA VB1)	18:35	38	07:32 (WEA VB1)	21:25	46
18	08:35	13:35 (WEA VB1)	07:43	14:08 (WEA VB1)	06:38	07:02 (WEA VB5)	06:24	06:54 (WEA VB1)	05:24	06:14 (WEA VB2)	04:58
	16:43	82	14:57 (WEA VB1)	17:43	29	14:37 (WEA VB1)	18:37	39	07:33 (WEA VB1)	21:27	38
19	08:34	13:36 (WEA VB1)	07:41	14:14 (WEA VB1)	06:36	07:01 (WEA VB5)	06:21	06:53 (WEA VB1)	05:23	06:15 (WEA VB2)	04:58
	16:45	81	14:57 (WEA VB1)	17:45	18	14:32 (WEA VB1)	18:38	41	07:34 (WEA VB1)	21:28	25
20	08:33	13:37 (WEA VB1)	07:39		06:33	18:12 (WEA VB12)	20:35	06:52 (WEA VB1)	05:21	06:16 (WEA VB2)	04:58
	16:47	81	14:58 (WEA VB1)	17:47	18:40	07:02 (WEA VB5)	06:19	07:35 (WEA VB1)	21:30	06:40 (WEA VB2)	22:02
21	08:32	13:36 (WEA VB1)	07:37		06:31	18:14 (WEA VB12)	20:37	06:50 (WEA VB1)	05:20	06:15 (WEA VB2)	04:58
	16:48	82	14:58 (WEA VB1)	17:49	18:42	07:02 (WEA VB5)	06:17	07:34 (WEA VB1)	21:31	06:39 (WEA VB2)	22:02
22	08:30	13:37 (WEA VB1)	07:34		06:28	18:15 (WEA VB12)	20:39	06:50 (WEA VB1)	05:18	06:16 (WEA VB2)	04:58
	16:50	81	14:58 (WEA VB1)	17:51	18:44	07:04 (WEA VB5)	06:15	06:50 (WEA VB1)	21:33	06:39 (WEA VB2)	22:02
23	08:29	13:37 (WEA VB1)	07:32		06:26	18:10 (WEA VB12)	20:41	06:49 (WEA VB1)	05:17	06:17 (WEA VB2)	04:59
	16:52	81	14:58 (WEA VB1)	17:53	18:46	18:18 (WEA VB12)	20:43	07:35 (WEA VB1)	21:34	06:38 (WEA VB2)	22:02
24	08:28	13:38 (WEA VB1)	07:30		06:24	18:13 (WEA VB12)	20:40	06:49 (WEA VB1)	05:16	06:18 (WEA VB2)	04:59
	16:54	81	14:59 (WEA VB1)	17:55	18:48	2	18:15 (WEA VB12)	07:35 (WEA VB1)	21:36	06:38 (WEA VB2)	22:02
25	08:26	13:38 (WEA VB1)	07:28		06:21		06:08	06:48 (WEA VB1)	05:14	06:18 (WEA VB2)	04:59
	16:56	80	14:58 (WEA VB1)	17:57	18:50		20:46	07:35 (WEA VB1)	21:37	06:36 (WEA VB2)	22:02
26	08:25	13:39 (WEA VB1)	07:25		06:19		06:06	06:48 (WEA VB1)	05:13	06:20 (WEA VB2)	05:00
	16:58	80	14:59 (WEA VB1)	17:59	18:51		20:48	07:35 (WEA VB1)	21:39	06:35 (WEA VB2)	22:02
27	08:23	13:39 (WEA VB1)	07:23		06:16	06:43 (WEA VB3)	06:04	06:48 (WEA VB1)	05:12	06:21 (WEA VB2)	05:00
	16:59	80	14:59 (WEA VB1)	18:01	18:53	7	06:50 (WEA VB3)	07:35 (WEA VB1)	21:40	06:34 (WEA VB2)	22:02
28	08:22	13:39 (WEA VB1)	07:21		06:14	06:39 (WEA VB3)	06:02	06:48 (WEA VB1)	05:11	06:22 (WEA VB2)	05:01
	17:01	79	14:58 (WEA VB1)	18:03	18:55	14	06:53 (WEA VB3)	07:35 (WEA VB1)	21:42	06:33 (WEA VB2)	22:02
29	08:20	13:40 (WEA VB1)			07:11		06:00	06:48 (WEA VB1)	05:09	06:25 (WEA VB2)	05:01
	17:03	79	14:59 (WEA VB1)		19:57	18	07:55 (WEA VB3)	07:35 (WEA VB1)	21:43	6	06:31 (WEA VB2)
30	08:19	13:41 (WEA VB1)			07:09		05:57	06:47 (WEA VB1)	05:08		05:02
	17:05	78	14:59 (WEA VB1)		19:59	20	07:55 (WEA VB3)	07:35 (WEA VB1)	21:44		22:02
31	08:17	13:41 (WEA VB1)			07:06		05:56 (WEA VB3)		05:07		
	17:07	77	14:58 (WEA VB1)		20:01	22			21:45		
Sonnenscheinstunden		251			367		419		493		509
astr.max.mögl.Beschattung		2709		1100	260		1038		1244		

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

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DE-82152 Planegg / München

0049 89 85 602 0

Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO16 - Westerhausen 9

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember		
1	05:03		05:42	06:24 (WEA VB2)	06:36	07:03 (WEA VB4)	07:28		07:26	13:19 (WEA ZB1)	08:21	13:16 (WEA ZB1)	
	22:01		21:27	61 07:37 (WEA VB1)	20:21	24 07:47 (WEA VB3)	19:07		16:57	63 14:22 (WEA ZB1)	16:13	80 14:36 (WEA ZB1)	
2	05:03		05:44	06:24 (WEA VB2)	06:37	07:32 (WEA VB3)	07:30		07:28	13:19 (WEA ZB1)	08:22	12:17 (WEA ZB2)	
	22:01		21:25	64 07:38 (WEA VB1)	20:18	17 07:49 (WEA VB3)	19:05	8	18:25 (WEA VB13)	65 14:24 (WEA ZB1)	16:13	86 14:36 (WEA ZB1)	
3	05:04		05:45	06:24 (WEA VB2)	06:39	07:30 (WEA VB3)	07:32		07:30	13:18 (WEA ZB1)	08:24	12:13 (WEA ZB2)	
	22:01		21:23	64 07:38 (WEA VB1)	20:16	19 07:49 (WEA VB3)	19:03	11	18:33 (WEA VB13)	67 14:25 (WEA ZB1)	16:12	93 14:36 (WEA ZB1)	
4	05:05		05:47	06:25 (WEA VB2)	06:41	07:29 (WEA VB3)	07:34		07:32	13:17 (WEA ZB1)	08:25	12:11 (WEA ZB2)	
	22:00		21:21	66 07:40 (WEA VB1)	20:13	22 07:51 (WEA VB3)	19:00	10	18:31 (WEA VB13)	69 14:26 (WEA ZB1)	16:11	98 14:37 (WEA ZB1)	
5	05:06		05:49	06:26 (WEA VB2)	06:43	07:28 (WEA VB3)	07:36		07:34	13:16 (WEA ZB1)	08:27	12:10 (WEA ZB2)	
	22:00		21:19	66 07:41 (WEA VB1)	20:11	23 07:51 (WEA VB3)	18:58	8	18:29 (WEA VB13)	70 14:26 (WEA ZB1)	16:11	101 14:37 (WEA ZB1)	
6	05:07		05:50	06:25 (WEA VB2)	06:44	07:27 (WEA VB3)	07:37		07:36	13:15 (WEA ZB1)	08:28	12:09 (WEA ZB2)	
	21:59		21:17	66 07:41 (WEA VB1)	20:09	24 07:51 (WEA VB3)	18:55	6	18:27 (WEA VB13)	72 14:27 (WEA ZB1)	16:10	103 14:37 (WEA ZB1)	
7	05:08		05:52	06:27 (WEA VB2)	06:46	07:26 (WEA VB3)	07:39		07:38	13:14 (WEA ZB1)	08:29	12:08 (WEA ZB2)	
	21:58		21:15	66 07:42 (WEA VB1)	20:06	25 07:51 (WEA VB3)	18:53	3	18:24 (WEA VB13)	73 14:27 (WEA ZB1)	16:10	105 14:37 (WEA ZB1)	
8	05:09		05:54	06:27 (WEA VB2)	06:48	07:26 (WEA VB3)	07:41		07:40	13:13 (WEA ZB1)	08:31	12:08 (WEA ZB2)	
	21:58		21:14	64 07:41 (WEA VB1)	20:04	25 07:51 (WEA VB3)	18:50		16:44	75 14:28 (WEA ZB1)	16:09	106 14:38 (WEA ZB1)	
9	05:10		05:55	06:28 (WEA VB2)	06:50	07:25 (WEA VB3)	07:43		07:42	13:13 (WEA ZB1)	08:32	12:08 (WEA ZB2)	
	21:57		21:12	63 07:42 (WEA VB1)	20:01	25 07:50 (WEA VB3)	18:48		16:42	75 14:28 (WEA ZB1)	16:09	107 14:38 (WEA ZB1)	
10	05:11		05:57	06:30 (WEA VB2)	06:51	07:25 (WEA VB3)	07:45		07:44	13:12 (WEA ZB1)	08:33	12:07 (WEA ZB2)	
	21:56		21:10	61 07:43 (WEA VB1)	19:59	25 07:50 (WEA VB3)	18:46		16:41	77 14:29 (WEA ZB1)	16:09	109 14:38 (WEA ZB1)	
11	05:12		05:59	06:32 (WEA VB2)	06:53	07:26 (WEA VB3)	07:47		07:45	13:12 (WEA ZB1)	08:34	12:07 (WEA ZB2)	
	21:55		21:07	55 07:42 (WEA VB1)	19:56	23 07:49 (WEA VB3)	18:43		16:39	77 14:29 (WEA ZB1)	16:08	110 14:38 (WEA ZB1)	
12	05:13		06:01	06:56 (WEA VB1)	06:55	07:25 (WEA VB3)	07:48		07:47	13:13 (WEA ZB1)	08:35	12:08 (WEA ZB2)	
	21:54		21:05	47 07:43 (WEA VB1)	19:54	23 07:48 (WEA VB3)	18:41		16:37	78 14:31 (WEA ZB1)	16:08	109 14:39 (WEA ZB1)	
13	05:14		06:02	06:55 (WEA VB1)	06:57	07:26 (WEA VB3)	07:50		07:49	13:12 (WEA ZB1)	08:36	10:53 (WEA ZB3)	
	21:53		21:03	47 07:42 (WEA VB1)	19:52	21 07:47 (WEA VB3)	18:39		16:36	79 14:31 (WEA ZB1)	16:08	116 14:40 (WEA ZB1)	
14	05:15		06:36 (WEA VB2)	06:04	06:55 (WEA VB1)	06:58	07:27 (WEA VB3)	07:52	07:51	13:12 (WEA ZB1)	08:37	10:52 (WEA ZB3)	
	21:52	2	06:38 (WEA VB2)	21:01	48 07:43 (WEA VB1)	19:49	18 07:45 (WEA VB3)	18:36	16:34	79 14:31 (WEA ZB1)	16:08	120 14:40 (WEA ZB1)	
15	05:17		06:33 (WEA VB2)	06:06	06:55 (WEA VB1)	07:00	07:29 (WEA VB3)	07:54	07:53	13:12 (WEA ZB1)	08:38	10:51 (WEA ZB3)	
	21:51	9	06:42 (WEA VB2)	20:59	48 07:43 (WEA VB1)	19:47	14 07:43 (WEA VB3)	18:34	16:32	80 14:32 (WEA ZB1)	16:08	123 14:40 (WEA ZB1)	
16	05:18		06:31 (WEA VB2)	06:08	06:54 (WEA VB1)	07:02	07:31 (WEA VB3)	07:56	07:55	13:12 (WEA ZB1)	08:39	10:51 (WEA ZB3)	
	21:50	12	06:43 (WEA VB2)	20:57	48 07:42 (WEA VB1)	19:44	8 07:39 (WEA VB3)	18:32	16:31	80 14:32 (WEA ZB1)	16:08	126 14:41 (WEA ZB1)	
17	05:19		06:30 (WEA VB2)	06:09	06:55 (WEA VB1)	07:04		07:58	07:57	13:12 (WEA ZB1)	08:40	10:50 (WEA ZB3)	
	21:49	14	06:44 (WEA VB2)	20:55	47 07:42 (WEA VB1)	19:42		18:29	16:29	80 14:32 (WEA ZB1)	16:08	128 14:41 (WEA ZB1)	
18	05:21		06:28 (WEA VB2)	06:11	06:55 (WEA VB1)	07:05		08:00	07:59	13:12 (WEA ZB1)	08:41	10:50 (WEA ZB3)	
	21:48	17	06:45 (WEA VB2)	20:53	47 07:42 (WEA VB1)	19:39		18:27	16:28	81 14:33 (WEA ZB1)	16:09	127 14:41 (WEA ZB1)	
19	05:22		06:28 (WEA VB2)	06:13	06:54 (WEA VB1)	07:07		08:01	08:00	13:12 (WEA ZB1)	08:41	10:51 (WEA ZB3)	
	21:47	19	06:47 (WEA VB2)	20:50	47 07:41 (WEA VB1)	19:37		18:25	16:27	81 14:33 (WEA ZB1)	16:09	128 14:42 (WEA ZB1)	
20	05:23		06:27 (WEA VB2)	06:15	06:55 (WEA VB1)	07:09	18:57 (WEA VB12)	08:03	08:02	13:12 (WEA ZB1)	08:42	10:51 (WEA ZB3)	
	21:45	21	06:48 (WEA VB2)	20:48	46 07:41 (WEA VB1)	19:34	7 19:04 (WEA VB12)	18:23	16:25	81 14:33 (WEA ZB1)	16:09	129 14:42 (WEA ZB1)	
21	05:25		06:26 (WEA VB2)	06:16	06:55 (WEA VB1)	07:11	07:50 (WEA VB5)	08:05	08:04	13:12 (WEA ZB1)	08:43	10:51 (WEA ZB3)	
	21:44	22	06:48 (WEA VB2)	20:46	45 07:40 (WEA VB1)	19:32	16 19:04 (WEA VB12)	18:20	16:24	82 14:34 (WEA ZB1)	16:10	130 14:43 (WEA ZB1)	
22	05:26		06:26 (WEA VB2)	06:18	06:55 (WEA VB1)	07:12	07:48 (WEA VB5)	08:07	08:06	13:13 (WEA ZB1)	08:43	10:51 (WEA ZB3)	
	21:43	23	06:49 (WEA VB2)	20:44	44 07:39 (WEA VB1)	19:29	19 19:02 (WEA VB12)	18:18	16:23	81 14:34 (WEA ZB1)	16:10	130 14:43 (WEA ZB1)	
23	05:28		06:26 (WEA VB2)	06:20	06:56 (WEA VB1)	07:14	07:46 (WEA VB5)	08:09	08:07	13:13 (WEA ZB1)	08:44	10:52 (WEA ZB3)	
	21:41	24	06:50 (WEA VB2)	20:42	42 07:38 (WEA VB1)	19:27	18 18:58 (WEA VB12)	18:16	22 15:04 (WEA ZB1)	81 14:34 (WEA ZB1)	16:11	130 14:44 (WEA ZB1)	
24	05:29		06:25 (WEA VB2)	06:22	06:57 (WEA VB1)	07:16	07:45 (WEA VB5)	08:11	08:09	13:13 (WEA ZB1)	08:44	10:53 (WEA ZB3)	
	21:40	25	06:50 (WEA VB2)	20:39	41 07:38 (WEA VB1)	19:24	17 18:56 (WEA VB12)	18:14	32 15:09 (WEA ZB1)	82 14:35 (WEA ZB1)	16:11	128 14:44 (WEA ZB1)	
25	05:31		06:25 (WEA VB2)	06:23	06:57 (WEA VB1)	07:18	07:44 (WEA VB5)	07:13	08:11	13:13 (WEA ZB1)	08:45	10:53 (WEA ZB3)	
	21:38	35	07:24 (WEA VB1)	20:37	39 07:36 (WEA VB1)	19:22	17 18:54 (WEA VB12)	17:12	38 14:11 (WEA ZB1)	81 14:34 (WEA ZB1)	16:12	128 14:44 (WEA ZB1)	
26	05:32		06:24 (WEA VB2)	06:25	06:56 (WEA VB4)	07:20	07:46 (WEA VB5)	07:15	08:13	13:13 (WEA ZB1)	08:45	10:55 (WEA ZB3)	
	21:37	42	07:27 (WEA VB1)	20:35	39 07:35 (WEA VB1)	19:20	14 08:00 (WEA VB5)	17:10	44 14:14 (WEA ZB1)	81 14:34 (WEA ZB1)	16:13	127 14:45 (WEA ZB1)	
27	05:34		06:25 (WEA VB2)	06:27	06:56 (WEA VB4)	07:21	07:48 (WEA VB5)	07:17	08:14	13:14 (WEA ZB1)	08:45	10:56 (WEA ZB3)	
	21:35	47	07:30 (WEA VB1)	20:32	38 07:34 (WEA VB1)	19:17	11 07:59 (WEA VB5)	17:08	48 14:16 (WEA ZB1)	81 14:35 (WEA ZB1)	16:13	126 14:46 (WEA ZB1)	
28	05:35		06:24 (WEA VB2)	06:29	06:56 (WEA VB4)	07:23	07:49 (WEA VB5)	07:19	08:16	13:14 (WEA ZB1)	08:45	10:57 (WEA ZB3)	
	21:33	50	07:31 (WEA VB1)	20:30	35 07:31 (WEA VB1)	19:15	8 07:57 (WEA VB5)	17:05	51 14:17 (WEA ZB1)	81 14:35 (WEA ZB1)	16:14	124 14:46 (WEA ZB1)	
29	05:37		06:24 (WEA VB2)	06:30	06:58 (WEA VB4)	07:25	07:51 (WEA VB5)	07:20	08:18	13:15 (WEA ZB1)	08:45	10:58 (WEA ZB3)	
	21:32	54	07:33 (WEA VB1)	20:28	31 07:29 (WEA VB1)	19:12	5 07:56 (WEA VB5)	17:03	55 14:19 (WEA ZB1)	81 14:36 (WEA ZB1)	16:15	122 14:47 (WEA ZB1)	
30	05:39		06:24 (WEA VB2)	06:32	07:00 (WEA VB4)	07:27	07:53 (WEA VB5)	07:22	08:19	13:15 (WEA ZB1)	08:46	11:00 (WEA ZB3)	
	21:30	57	07:34 (WEA VB1)	20:25	27 07:27 (WEA VB1)	19:10	1 07:54 (WEA VB5)	17:01	58 14:20 (WEA ZB1)	80 14:35 (WEA ZB1)	16:16	118 14:47 (WEA ZB1)	
31	05:40		06:24 (WEA VB2)	06:34	07:01 (WEA VB4)			07:24		13:20 (WEA ZB1)		08:46	12:16 (WEA ZB2)
	21:28	60	07:36 (WEA VB1)	20:23	27 07:43 (WEA VB3)			16:59	61 14:21 (WEA ZB1)		16:17	110 14:48 (WEA ZB1)	
Sonnenscheinstunden		511		459		382		329		260		234	
astr.max.mögl.Beschattung		533		1529		469		455		2313		3577	

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO17 - Rüschenstede 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45 16:18 90	10:17 (WEA VB1) 14:57 (WEA ZB1) 17:09	08:16 11:17 (WEA VB1) 18:04	07:19 18:04 20:02	07:04 08:39 (WEA VB2) 20:55	05:06 21:47
2	08:45 16:19 89	10:18 (WEA VB1) 14:58 (WEA ZB1) 17:11	08:51 (WEA VB3) 11:15 (WEA VB1) 18:06	07:16 18:06 20:04	07:02 08:41 (WEA VB2) 20:53	05:05 21:48
3	08:45 16:21 87	10:19 (WEA VB1) 14:58 (WEA ZB1) 17:13	08:51 (WEA VB3) 11:14 (WEA VB1) 18:08	07:14 18:08 20:06	06:59 20:06 21:01	05:05 21:49
4	08:45 16:22 88	10:18 (WEA VB1) 14:58 (WEA ZB1) 17:15	08:50 (WEA VB3) 11:12 (WEA VB1) 18:10	07:12 07:40 (WEA VB4) 20:08	06:57 06:57 20:08	05:04 21:03
5	08:45 16:23 87	10:19 (WEA VB1) 14:58 (WEA ZB1) 17:17	08:49 (WEA VB3) 11:09 (WEA VB1) 18:12	07:09 18:12 20:10	06:54 20:10 21:04	05:03 21:51
6	08:44 16:24 86	10:19 (WEA VB1) 14:58 (WEA ZB1) 17:19	08:49 (WEA VB3) 11:05 (WEA VB1) 18:14	07:07 18:14 20:12	06:52 20:12 21:06	05:02 21:52
7	08:44 16:26 84	10:19 (WEA VB1) 14:57 (WEA ZB1) 17:21	08:32 (WEA VB5) 09:19 (WEA VB3) 18:16	07:05 18:16 20:13	06:50 20:13 21:08	05:02 21:53
8	08:43 16:27 83	10:21 (WEA VB1) 14:58 (WEA ZB1) 17:23	08:30 (WEA VB5) 09:19 (WEA VB3) 18:18	07:02 18:18 20:15	06:47 20:15 21:10	05:01 21:54
9	08:43 16:28 82	10:21 (WEA VB1) 14:57 (WEA ZB1) 17:25	08:28 (WEA VB5) 09:20 (WEA VB3) 18:20	07:00 18:20 20:17	06:45 20:17 21:11	05:00 21:55
10	08:42 16:30 79	10:21 (WEA VB1) 14:56 (WEA ZB1) 17:27	08:26 (WEA VB5) 09:20 (WEA VB3) 18:22	06:57 18:22 20:19	06:42 20:19 21:13	05:00 21:56
11	08:41 16:31 77	10:21 (WEA VB1) 14:55 (WEA ZB1) 17:29	08:24 (WEA VB5) 09:20 (WEA VB3) 18:23	06:55 18:23 20:21	06:40 20:21 21:15	04:59 21:57
12	08:41 16:33 73	10:22 (WEA VB1) 14:54 (WEA ZB1) 17:31	08:21 (WEA VB5) 09:19 (WEA VB3) 18:25	06:53 18:25 20:23	06:38 20:23 21:17	04:59 21:58
13	08:40 16:35 70	10:22 (WEA VB1) 14:52 (WEA ZB1) 17:33	08:21 (WEA VB5) 09:19 (WEA VB3) 18:27	06:50 18:27 20:24	06:35 20:24 21:18	04:59 21:58
14	08:39 16:36 59	10:23 (WEA VB1) 14:52 (WEA ZB1) 17:35	08:21 (WEA VB5) 09:18 (WEA VB3) 18:29	06:48 18:29 20:26	06:33 20:26 21:20	04:58 21:59
15	08:38 16:38 59	10:23 (WEA VB1) 14:52 (WEA ZB1) 17:37	08:21 (WEA VB5) 09:18 (WEA VB3) 18:31	06:45 18:31 20:28	06:31 20:28 21:22	04:58 22:00
16	08:37 16:40 59	10:24 (WEA VB1) 14:51 (WEA ZB1) 17:39	08:22 (WEA VB5) 09:17 (WEA VB3) 18:33	06:43 18:33 20:30	06:28 20:30 21:23	04:58 22:00
17	08:36 16:41 58	10:25 (WEA VB1) 14:51 (WEA ZB1) 17:41	08:23 (WEA VB5) 09:16 (WEA VB3) 18:35	06:41 18:35 20:32	06:26 20:32 21:25	04:58 22:01
18	08:35 16:43 59	10:24 (WEA VB1) 14:51 (WEA ZB1) 17:43	08:23 (WEA VB5) 09:14 (WEA VB3) 18:37	06:38 18:37 20:34	06:24 20:34 21:27	04:58 22:01
19	08:34 16:45 58	10:25 (WEA VB1) 14:51 (WEA ZB1) 17:45	08:26 (WEA VB5) 09:13 (WEA VB3) 18:38	06:36 18:38 20:35	06:21 20:35 21:28	04:58 22:01
20	08:33 16:46 57	10:26 (WEA VB1) 14:51 (WEA ZB1) 17:47	08:56 (WEA VB3) 09:10 (WEA VB3) 18:40	06:33 18:40 20:37	06:19 20:37 21:30	04:58 22:02
21	08:32 16:48 57	10:26 (WEA VB1) 14:51 (WEA ZB1) 17:49	09:01 (WEA VB3) 09:06 (WEA VB3) 18:42	06:31 18:42 20:39	06:17 20:39 21:31	04:58 22:02
22	08:30 16:50 56	10:27 (WEA VB1) 14:51 (WEA ZB1) 17:51	09:06 (WEA VB3) 18:44 20:41	06:28 18:44 20:41	06:15 20:41 21:33	04:58 22:02
23	08:29 16:52 55	10:27 (WEA VB1) 14:51 (WEA ZB1) 17:53	09:06 (WEA VB3) 18:46 20:43	06:26 18:46 20:43	06:12 20:43 21:34	04:59 22:02
24	08:28 16:54 54	10:29 (WEA VB1) 14:51 (WEA ZB1) 17:55	09:06 (WEA VB3) 18:48 20:45	06:24 18:48 20:45	06:10 20:45 21:36	04:59 22:02
25	08:26 16:56 53	10:29 (WEA VB1) 14:51 (WEA ZB1) 17:57	09:06 (WEA VB3) 18:50 20:46	06:21 18:50 20:46	06:08 20:46 21:37	04:59 22:02
26	08:25 16:58 52	10:30 (WEA VB1) 14:51 (WEA ZB1) 17:59	09:06 (WEA VB3) 18:51 20:48	06:19 18:51 20:48	06:06 20:48 21:39	05:00 22:02
27	08:23 16:59 50	10:31 (WEA VB1) 14:51 (WEA ZB1) 18:01	09:06 (WEA VB3) 18:53 20:50	06:16 18:53 20:50	06:04 20:50 21:40	05:00 22:02
28	08:22 17:01 48	10:32 (WEA VB1) 14:51 (WEA ZB1) 18:02	09:06 (WEA VB3) 18:55 20:52	06:14 18:55 20:52	06:02 20:52 21:42	05:01 22:02
29	08:20 17:03 56	10:32 (WEA VB1) 14:51 (WEA ZB1) 18:04	09:06 (WEA VB3) 19:01 20:54	06:11 19:01 20:54	06:00 20:54 21:43	05:01 22:02
30	08:19 17:05 60	10:33 (WEA VB1) 14:51 (WEA ZB1) 18:06	09:06 (WEA VB3) 19:09 20:56	06:09 19:09 20:56	05:57 20:56 21:44	05:02 22:02
31	08:17 17:07 62	10:33 (WEA VB1) 14:51 (WEA ZB1) 18:08	09:06 (WEA VB3) 19:09 20:56	06:09 19:09 20:56	05:57 20:56 21:44	05:02 22:02
Sonnenscheinstunden	251	274	367	420	493	509
astr.max.mögl.Beschattung	2087	879	1093	38		

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO17 - Rüschenstede 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

		July	August	September		Oktober		November		Dezember			
1	05:02 22:01	05:42 21:27	06:36 20:21		07:28 19:07	48	08:07 (WEA VB4) 08:55 (WEA VB2)	07:26 16:57	42	07:55 (WEA VB5) 08:48 (WEA VB3)	08:21 16:13	77	10:03 (WEA VB1) 14:37 (WEA ZB1)
2	05:03 22:01	05:44 21:25	06:37 20:18		07:30 19:05	47	08:07 (WEA VB4) 08:54 (WEA VB2)	07:28 16:55	39	07:58 (WEA VB5) 08:49 (WEA VB3)	08:22 16:13	79	10:04 (WEA VB1) 14:39 (WEA ZB1)
3	05:04 22:01	05:45 21:23	06:39 20:16		07:32 19:02	45	08:06 (WEA VB4) 08:51 (WEA VB2)	07:30 16:53	36	08:00 (WEA VB5) 08:49 (WEA VB3)	08:24 16:12	81	10:04 (WEA VB1) 14:40 (WEA ZB1)
4	05:05 22:00	05:47 21:21	06:41 20:13		07:34 19:00	43	08:06 (WEA VB4) 08:49 (WEA VB2)	07:32 16:51	31	08:18 (WEA VB3) 08:49 (WEA VB3)	08:25 16:11	84	10:05 (WEA VB1) 14:42 (WEA ZB1)
5	05:06 22:00	05:49 21:19	06:43 20:11		07:36 18:58	41	08:06 (WEA VB4) 08:47 (WEA VB2)	07:34 16:50	47	08:19 (WEA VB3) 10:36 (WEA VB1)	08:27 16:11	83	10:05 (WEA VB1) 14:42 (WEA ZB1)
6	05:07 21:59	05:50 21:17	06:44 20:09		07:37 18:55	38	08:07 (WEA VB4) 08:45 (WEA VB2)	07:36 16:48	52	08:19 (WEA VB3) 10:39 (WEA VB1)	08:28 16:10	86	10:05 (WEA VB1) 14:44 (WEA ZB1)
7	05:08 21:58	05:52 21:15	06:46 20:06		07:39 18:53	31	08:08 (WEA VB4) 08:41 (WEA VB2)	07:38 16:46	57	08:20 (WEA VB3) 10:42 (WEA VB1)	08:29 16:10	86	10:06 (WEA VB1) 14:44 (WEA ZB1)
8	05:08 21:58	05:54 21:14	06:48 20:04		07:41 18:50	15	08:10 (WEA VB4) 08:25 (WEA VB4)	07:40 16:44	59	08:21 (WEA VB3) 10:44 (WEA VB1)	08:31 16:09	87	10:07 (WEA VB1) 14:46 (WEA ZB1)
9	05:10 21:57	05:55 21:12	06:50 20:01		07:43 18:48	10	08:11 (WEA VB4) 08:21 (WEA VB4)	07:42 16:42	60	08:22 (WEA VB3) 10:46 (WEA VB1)	08:32 16:09	87	10:07 (WEA VB1) 14:46 (WEA ZB1)
10	05:11 21:56	05:57 21:10	06:51 19:59	15	07:45 18:46		08:35 (WEA VB2) 08:50 (WEA VB2)	07:44 16:41	62	08:23 (WEA VB3) 10:48 (WEA VB1)	08:33 16:09	89	10:07 (WEA VB1) 14:47 (WEA ZB1)
11	05:12 21:55	05:59 21:07	06:53 19:56	21	07:47 18:43		08:32 (WEA VB2) 08:53 (WEA VB2)	07:45 16:39	61	08:24 (WEA VB3) 10:49 (WEA VB1)	08:34 16:08	90	10:07 (WEA VB1) 14:47 (WEA ZB1)
12	05:13 21:54	06:01 21:05	06:55 19:54	26	07:48 18:41		08:29 (WEA VB2) 08:55 (WEA VB2)	07:47 16:37	59	08:27 (WEA VB3) 10:51 (WEA VB1)	08:35 16:08	89	10:09 (WEA VB1) 14:49 (WEA ZB1)
13	05:14 21:53	06:02 21:03	06:57 19:52	30	07:49 18:39		08:27 (WEA VB2) 08:57 (WEA VB2)	07:50 16:36	56	08:30 (WEA VB3) 10:52 (WEA VB1)	08:36 16:08	89	10:09 (WEA VB1) 14:49 (WEA ZB1)
14	05:15 21:52	06:04 21:01	06:58 19:49	33	07:52 18:36		08:25 (WEA VB2) 08:58 (WEA VB2)	07:51 16:34	49	10:04 (WEA VB1) 10:53 (WEA VB1)	08:37 16:08	91	10:09 (WEA VB1) 14:50 (WEA ZB1)
15	05:17 21:51	06:06 20:59	07:00 19:47	35	07:54 18:34		08:24 (WEA VB2) 08:59 (WEA VB2)	07:53 16:32	50	10:04 (WEA VB1) 10:54 (WEA VB1)	08:38 16:08	91	10:10 (WEA VB1) 14:51 (WEA ZB1)
16	05:18 21:50	06:08 20:57	07:02 19:44	37	07:56 18:32		08:22 (WEA VB2) 08:59 (WEA VB2)	07:55 16:31	52	10:03 (WEA VB1) 10:55 (WEA VB1)	08:39 16:08	90	10:11 (WEA VB1) 14:51 (WEA ZB1)
17	05:19 21:49	06:09 20:55	07:04 19:42	39	07:58 18:29		08:21 (WEA VB2) 09:00 (WEA VB2)	07:57 16:29	53	10:03 (WEA VB1) 10:56 (WEA VB1)	08:40 16:08	91	10:10 (WEA VB1) 14:51 (WEA ZB1)
18	05:21 21:48	06:11 20:53	07:05 19:39	41	08:00 18:27		08:20 (WEA VB2) 09:01 (WEA VB2)	07:59 16:28	54	10:03 (WEA VB1) 10:57 (WEA VB1)	08:41 16:09	91	10:11 (WEA VB1) 14:52 (WEA ZB1)
19	05:22 21:47	06:13 20:50	07:07 19:37	42	08:01 18:25		08:19 (WEA VB2) 09:01 (WEA VB2)	08:00 16:27	55	10:02 (WEA VB1) 10:57 (WEA VB1)	08:41 16:09	92	10:12 (WEA VB1) 14:53 (WEA ZB1)
20	05:23 21:45	06:15 20:48	07:09 19:34	43	08:03 18:23		08:18 (WEA VB2) 09:01 (WEA VB2)	08:02 16:25	56	10:02 (WEA VB1) 10:58 (WEA VB1)	08:42 16:09	92	10:12 (WEA VB1) 14:53 (WEA ZB1)
21	05:25 21:44	06:16 20:46	07:11 19:32	43	08:05 18:20	9	08:18 (WEA VB2) 09:01 (WEA VB2)	08:04 16:24	57	10:02 (WEA VB1) 10:59 (WEA VB1)	08:43 16:10	90	10:13 (WEA VB1) 14:53 (WEA ZB1)
22	05:26 21:43	06:18 20:44	07:12 19:29	44	08:07 18:18	15	08:17 (WEA VB2) 09:01 (WEA VB2)	08:06 16:23	57	10:02 (WEA VB1) 10:59 (WEA VB1)	08:43 16:10	90	10:13 (WEA VB1) 14:53 (WEA ZB1)
23	05:28 21:41	06:20 20:42	07:14 19:27	44	08:09 18:16	29	08:16 (WEA VB2) 09:00 (WEA VB2)	08:07 16:21	58	10:02 (WEA VB1) 11:00 (WEA VB1)	08:44 16:11	90	10:14 (WEA VB1) 14:54 (WEA ZB1)
24	05:29 21:40	06:22 20:39	07:16 19:24	44	08:11 18:14	36	08:16 (WEA VB2) 09:00 (WEA VB2)	08:09 16:20	59	10:02 (WEA VB1) 11:01 (WEA VB1)	08:44 16:11	92	10:14 (WEA VB1) 14:55 (WEA ZB1)
25	05:31 21:38	06:23 20:37	07:18 19:22	46	08:13 17:12	40	08:14 (WEA VB4) 09:00 (WEA VB2)	07:13 16:19	58	10:03 (WEA VB1) 11:01 (WEA VB1)	08:45 16:12	91	10:14 (WEA VB1) 14:55 (WEA ZB1)
26	05:32 21:37	06:25 20:35	07:20 19:20	48	07:15 17:10	44	08:12 (WEA VB4) 09:00 (WEA VB2)	08:13 16:18	59	10:02 (WEA VB1) 11:01 (WEA VB1)	08:45 16:13	91	10:15 (WEA VB1) 14:56 (WEA ZB1)
27	05:34 21:35	06:27 20:32	07:21 19:17	48	07:17 17:07	45	08:11 (WEA VB4) 08:59 (WEA VB2)	08:14 16:17	59	10:02 (WEA VB1) 11:01 (WEA VB1)	08:45 16:13	92	10:15 (WEA VB1) 14:56 (WEA ZB1)
28	05:35 21:33	06:29 20:30	07:23 19:15	49	07:19 17:05	48	08:09 (WEA VB4) 08:58 (WEA VB2)	08:16 16:16	59	10:03 (WEA VB1) 11:02 (WEA VB1)	08:45 16:14	90	10:16 (WEA VB1) 14:56 (WEA ZB1)
29	05:37 21:32	06:30 20:28	07:25 19:12	49	07:20 17:03	48	08:08 (WEA VB4) 08:57 (WEA VB2)	08:18 16:15	69	10:03 (WEA VB1) 14:33 (WEA ZB1)	08:45 16:15	90	10:16 (WEA VB1) 14:57 (WEA ZB1)
30	05:39 21:30	06:32 20:25	07:27 19:10	49	07:22 17:01	48	08:07 (WEA VB4) 08:56 (WEA VB2)	08:19 16:14	73	10:03 (WEA VB1) 14:35 (WEA ZB1)	08:46 16:16	90	10:17 (WEA VB1) 14:57 (WEA ZB1)
31	05:40 21:28	06:34 20:23			07:24 16:59	45	07:53 (WEA VB5) 08:48 (WEA VB3)				08:46 16:17	91	10:17 (WEA VB1) 14:58 (WEA ZB1)
Sonnenscheinstunden		511	459	382		329		260			234		
astr.max.mögl.Beschattung				826		725		1638			2742		

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	--------------------------------	---------------------------	----------------------------

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO18 - Langengroden 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45	09:47 (WEA VB6)	08:16	07:19	07:04	05:55	05:06	05:02	05:42	06:36	07:28	07:26
2	16:18	14:57 (WEA VB1)	17:09	18:04	20:02	20:57	21:47	22:01	21:27	20:21	19:07	16:57
3	08:45	09:49 (WEA VB6)	08:14	07:16	07:02	05:53	05:05	05:03	05:44	06:37	07:30	07:28
4	16:19	14:57 (WEA VB1)	17:11	18:06	20:04	20:59	21:48	22:01	21:25	20:18	19:05	16:55
5	08:45	10:25 (WEA VB4)	08:12	07:14	06:59	05:51	05:04	05:04	05:45	06:39	07:32	07:30
6	16:20	14:57 (WEA VB1)	17:13	18:08	20:06	21:01	21:49	22:01	21:23	20:16	19:02	16:53
7	08:45	10:25 (WEA VB4)	08:10	07:12	06:57	05:49	05:04	05:05	05:47	06:41	07:34	07:32
8	16:22	14:57 (WEA VB1)	17:15	18:10	20:08	21:03	21:50	22:00	21:21	20:13	19:00	16:51
9	08:45	10:26 (WEA VB4)	08:09	07:09	06:54	05:47	05:03	05:06	05:49	06:43	07:36	07:34
10	16:23	14:57 (WEA VB1)	17:17	18:12	20:10	21:04	21:51	22:00	21:19	20:11	18:58	16:49
11	08:44	10:26 (WEA VB4)	08:07	07:07	06:52	05:45	05:02	05:06	05:50	06:44	07:37	07:36
12	16:24	14:55 (WEA VB1)	17:19	18:14	20:12	21:06	21:52	21:59	21:17	20:09	18:55	16:48
13	08:44	10:27 (WEA VB4)	08:05	07:05	06:50	05:43	05:02	05:07	05:52	06:46	07:39	07:38
14	16:26	14:52 (WEA VB1)	17:21	18:16	20:13	21:08	21:53	21:58	21:15	20:06	18:53	16:46
15	08:43	10:28 (WEA VB4)	08:03	07:02	06:47	05:41	05:01	05:08	05:54	06:48	07:41	07:40
16	16:27	13:55 (WEA VB2)	17:23	18:18	20:15	21:10	21:54	21:58	21:13	20:04	18:50	16:44
17	08:43	10:29 (WEA VB4)	08:01	07:00	06:45	05:40	05:00	05:09	05:55	06:50	07:43	07:42
18	16:28	13:54 (WEA VB2)	17:25	18:20	20:17	21:11	21:55	21:57	21:12	20:01	18:48	16:42
19	08:42	10:29 (WEA VB4)	07:59	06:57	06:42	05:38	05:00	05:11	05:57	06:51	07:45	07:43
20	16:30	13:54 (WEA VB2)	17:27	18:22	20:19	21:13	21:56	21:56	21:09	19:59	18:46	16:40
21	08:41	10:30 (WEA VB4)	07:57	06:55	06:40	05:36	04:59	05:12	05:59	06:53	07:47	07:45
22	16:31	13:54 (WEA VB2)	17:29	18:23	20:21	21:15	21:57	21:55	21:07	19:56	18:43	16:39
23	08:41	10:31 (WEA VB4)	07:55	06:53	06:38	05:34	04:59	05:13	06:01	06:55	07:48	07:47
24	16:33	13:54 (WEA VB2)	17:31	18:25	20:23	21:17	21:58	21:54	21:05	19:54	18:41	16:37
25	08:40	10:32 (WEA VB4)	07:53	06:50	06:35	05:32	04:59	05:14	06:02	06:57	07:50	07:49
26	16:35	13:54 (WEA VB2)	17:33	18:27	20:24	21:18	21:58	21:53	21:03	19:51	18:39	16:35
27	08:39	10:33 (WEA VB4)	07:51	06:48	06:33	05:31	04:58	05:15	06:04	06:58	07:52	07:51
28	16:36	13:54 (WEA VB2)	17:35	18:29	20:26	21:20	21:59	21:52	21:01	19:49	18:36	16:34
29	08:38	10:34 (WEA VB4)	07:49	06:45	06:31	05:29	04:58	05:16	06:06	07:00	07:54	07:53
30	16:38	13:54 (WEA VB2)	17:37	18:31	20:28	21:22	22:00	21:51	20:59	19:47	18:34	16:32
31	08:37	10:36 (WEA VB4)	07:47	06:43	06:28	05:27	04:58	05:18	06:08	07:02	07:56	07:55
32	16:39	13:54 (WEA VB2)	17:39	18:33	20:30	21:23	22:00	21:50	20:57	19:44	18:32	16:31
33	08:36	10:37 (WEA VB4)	07:45	06:41	06:26	05:26	04:58	05:19	06:09	07:04	07:58	07:57
34	16:41	13:53 (WEA VB2)	17:41	18:35	20:32	21:25	22:01	21:49	20:55	19:42	18:29	16:29
35	08:35	10:38 (WEA VB4)	07:43	06:38	06:24	05:24	04:58	05:20	06:11	07:05	08:00	07:58
36	16:43	13:52 (WEA VB2)	17:43	18:37	20:34	21:27	22:01	21:48	20:53	19:39	18:27	16:28
37	08:34	10:41 (WEA VB4)	07:41	06:36	06:21	05:23	04:58	05:22	06:13	07:07	08:01	08:00
38	16:45	13:51 (WEA VB2)	17:45	18:38	20:35	21:28	22:01	21:47	20:50	19:37	18:25	16:26
39	08:33	10:44 (WEA VB4)	07:39	06:33	06:19	05:21	04:58	05:23	06:15	07:09	08:03	08:02
40	16:46	13:51 (WEA VB2)	17:47	18:40	20:37	21:30	22:02	21:45	20:48	19:34	18:23	16:25
41	08:32	13:26 (WEA VB2)	07:37	06:31	06:17	05:20	04:58	05:25	06:16	07:11	08:05	08:04
42	16:48	13:49 (WEA VB2)	17:49	18:42	20:39	21:31	22:02	21:44	20:46	19:32	18:20	16:24
43	08:30	13:29 (WEA VB2)	07:34	06:28	06:15	05:18	04:58	05:26	06:18	07:12	08:07	08:06
44	16:50	13:48 (WEA VB2)	17:51	18:44	20:41	21:33	22:02	21:43	20:44	19:29	18:18	16:23
45	08:29	13:32 (WEA VB2)	07:32	06:26	06:12	05:17	04:59	05:28	06:20	07:14	08:09	08:07
46	16:52	13:44 (WEA VB2)	17:53	18:46	20:43	21:34	22:02	21:41	20:41	19:27	18:16	16:21
47	08:28		07:30	06:23	06:10	05:15	04:59	05:29	06:22	07:16	08:11	08:09
48	16:54		17:55	18:48	20:44	21:36	22:02	21:40	20:39	19:24	18:14	16:20
49	08:26		07:28	06:21	06:08	05:14	04:59	05:31	06:23	07:18	08:13	08:11
50	16:56		17:57	18:49	20:46	21:37	22:02	21:38	20:37	19:22	18:12	16:19
51	08:25		07:25	06:19	06:06	05:13	05:00	05:32	06:25	07:20	08:15	08:13
52	16:57		17:59	18:51	20:48	21:39	22:02	21:37	20:35	19:20	18:10	16:18
53	08:23		07:23	06:16	06:04	05:12	05:00	05:34	06:27	07:21	08:17	08:14
54	16:59		18:00	18:53	20:50	21:40	22:02	21:35	20:32	19:17	18:07	16:17
55	08:22		07:21	06:14	06:02	05:10	05:01	05:35	06:29	07:23	08:18	08:16
56	17:01		18:02	18:55	20:52	21:42	22:02	21:33	20:30	19:15	18:05	16:16
57	08:20			07:11	06:59	05:09	05:01	05:37	06:30	07:25	08:20	08:18
58	17:03			19:57	20:54	21:43	22:02	21:32	20:28	19:12	18:03	16:15
59	08:19			07:09	06:57	05:08	05:02	05:39	06:32	07:27	08:22	08:19
60	17:05			19:59	20:55	21:44	22:02	21:30	20:25	19:10	18:01	16:14
61	08:17			07:06		06:57		05:40	06:34		07:24	
62	17:07			20:01		21:45		21:28	20:23		16:59	
63	Sonnenscheinstunden	251				493		511		459		329
64	astr.max.mögl.Beschattung	1485	274	367	420		509		382		260	549
65												3188

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
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0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO19 - WA Sengwarden BP207
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1 08:45	15:25 (WEA VB14)	08:15	07:18	07:04	05:55	05:06	05:02	05:42	06:36	07:28	07:26	08:21
2 16:18	15:40 (WEA VB14)	17:09	18:04	20:02	20:57	21:47	22:01	21:26	20:20	19:07	16:57	16:13
3 08:45	15:26 (WEA VB14)	08:14	07:16	07:02	05:53	05:05	05:03	05:44	06:37	07:30	07:28	08:22
4 16:19	15:41 (WEA VB14)	17:11	18:06	20:04	20:59	21:48	22:01	21:25	20:18	19:05	16:55	16:13
5 08:45	15:26 (WEA VB14)	08:12	07:14	06:59	05:51	05:05	05:04	05:45	06:39	07:32	07:30	08:24
6 16:21	15:40 (WEA VB14)	17:13	18:08	20:06	21:01	21:49	22:00	21:23	20:16	19:02	16:53	16:12
7 08:45	15:27 (WEA VB14)	08:10	07:11	06:57	05:49	05:04	05:05	05:47	06:41	07:34	07:32	08:25
8 16:22	15:41 (WEA VB14)	17:15	18:10	20:08	21:02	21:50	22:00	21:21	20:13	19:00	16:51	16:11
9 08:44	15:27 (WEA VB14)	08:08	07:09	06:54	05:47	05:03	05:06	05:49	06:43	07:36	07:34	08:26
10 16:23	15:40 (WEA VB14)	17:17	18:12	20:10	21:04	21:51	21:59	21:19	20:11	18:58	16:49	16:11
11 08:44	15:29 (WEA VB14)	08:07	07:07	06:52	05:45	05:02	05:07	05:50	06:44	07:37	07:36	08:28
12 16:24	15:41 (WEA VB14)	17:19	18:14	20:11	21:06	21:52	21:59	21:17	20:08	18:55	16:48	16:10
13 08:43	15:29 (WEA VB14)	08:05	07:04	06:49	05:43	05:02	05:07	05:52	06:46	07:39	07:38	08:29
14 16:26	15:40 (WEA VB14)	17:21	18:16	20:13	21:08	21:53	21:58	21:15	20:06	18:53	16:46	16:10
15 08:43	15:30 (WEA VB14)	08:03	07:02	06:47	05:41	05:01	05:08	05:54	06:48	07:41	07:39	08:30
16 16:27	15:40 (WEA VB14)	17:23	18:18	20:15	21:10	21:54	21:57	21:13	20:04	18:50	16:44	16:09
17 08:42	15:35 (WEA VB14)	08:01	07:00	06:45	05:40	05:00	05:10	05:55	06:50	07:43	07:41	08:32
18 16:28	15:40 (WEA VB14)	17:25	18:20	20:17	21:11	21:55	21:57	21:11	20:01	18:48	16:42	16:09
19 08:42	15:38 (WEA VB14)	07:59	06:57	06:42	05:38	05:00	05:11	05:57	06:51	07:45	07:43	08:33
20 16:30	15:38 (WEA VB14)	17:27	18:21	20:19	21:13	21:56	21:56	21:09	19:59	18:46	16:40	16:09
21 08:41		07:57	06:55	06:40	05:36	04:59	05:12	05:59	06:53	07:46	07:45	08:34
22 16:31		17:29	18:23	20:21	21:15	21:57	21:55	21:07	19:56	18:43	16:39	16:08
23 08:40		07:55	06:53	06:38	05:34	04:59	05:13	06:01	06:55	07:48	07:47	08:35
24 16:33		17:31	18:25	20:22	21:16	21:57	21:54	21:05	19:54	18:41	16:37	16:08
25 08:40		07:53	06:50	06:35	05:32	04:59	05:14	06:02	06:57	07:50	07:49	08:36
26 16:35		17:33	18:27	20:24	21:18	21:58	21:53	21:03	19:51	18:39	16:35	16:08
27 08:39		07:51	06:48	06:33	05:31	04:58	05:15	06:04	06:58	07:52	07:51	08:37
28 16:36		17:35	18:29	20:26	21:20	21:59	21:52	21:01	19:49	18:36	16:34	16:08
29 08:38		07:49	06:45	06:31	05:29	04:58	05:17	06:06	07:00	07:54	07:53	08:38
30 16:38		17:37	18:31	20:28	21:22	21:59	21:51	20:59	19:46	18:34	16:32	16:08
31 08:37		07:47	06:43	06:28	05:27	04:58	05:18	06:08	07:02	07:56	07:55	08:39
32 16:39		17:39	18:33	20:30	21:23	22:00	21:50	20:57	19:44	18:32	16:31	16:08
33 08:36		07:45	06:40	06:26	05:26	04:58	05:19	06:09	07:04	07:58	07:56	08:40
34 16:41		17:41	18:35	20:32	21:25	22:00	21:49	20:55	19:42	18:29	16:29	16:08
35 08:35		07:43	06:38	06:24	05:24	04:58	05:20	06:11	07:05	07:59	07:58	08:41
36 16:43		17:43	18:36	20:33	21:26	22:01	21:48	20:52	19:39	18:27	16:28	16:09
37 08:34		07:41	06:36	06:21	05:23	04:58	05:22	06:13	07:07	08:01	08:00	08:41
38 16:45		17:45	18:38	20:35	21:28	22:01	21:46	20:50	19:37	18:25	16:26	16:09
39 08:33		07:39	06:33	06:19	05:21	04:58	05:23	06:15	07:09	08:03	08:02	08:42
40 16:46		17:47	18:40	20:37	21:30	22:01	21:45	20:48	19:34	18:23	16:25	16:09
41 08:31		07:36	06:31	06:17	05:20	04:58	05:25	06:16	07:11	08:05	08:04	08:43
42 16:48		17:49	18:42	20:39	21:31	22:02	21:44	20:46	19:32	18:20	16:24	16:10
43 08:30		07:34	06:28	06:15	05:18	04:58	05:26	06:18	07:12	08:07	08:06	08:43
44 16:50		17:51	18:44	20:41	21:33	22:02	21:42	20:44	19:29	18:18	16:23	16:10
45 08:29		07:32	06:26	06:12	05:17	04:59	05:28	06:20	07:14	08:09	08:07	08:44
46 16:52		17:53	18:46	20:43	21:34	22:02	21:41	20:41	19:27	18:16	16:21	16:11
47 08:28		07:30	06:23	06:10	05:15	04:59	05:29	06:22	07:16	08:11	08:09	08:44
48 16:54		17:55	18:48	20:44	21:36	22:02	21:39	20:39	19:24	18:14	16:20	16:11
49 08:26		07:28	06:21	06:08	05:14	04:59	05:31	06:23	07:18	08:13	08:11	08:44
50 16:56		17:57	18:49	20:46	21:37	22:02	21:38	20:37	19:22	18:12	16:19	16:12
51 08:25		07:25	06:19	06:06	05:13	05:00	05:32	06:25	07:19	08:15	08:12	08:45
52 16:57		17:59	18:51	20:48	21:39	22:02	21:36	20:34	19:19	18:09	16:18	16:13
53 08:23		07:23	06:16	06:04	05:12	05:00	05:34	06:27	07:21	08:16	08:14	08:45
54 16:59		18:00	18:53	20:50	21:40	22:02	21:35	20:32	19:17	18:07	16:17	16:13
55 08:22		07:21	06:14	06:02	05:10	05:01	05:35	06:29	07:23	08:18	08:16	08:45
56 17:01		18:02	18:55	20:52	21:41	22:02	21:33	20:30	19:15	18:05	16:16	16:14
57 08:20			07:11	05:59	05:09	05:01	05:37	06:30	07:25	08:20	08:17	08:45
58 17:03			19:57	20:53	21:43	22:02	21:32	20:28	19:12	18:03	16:15	16:15
59 08:19			07:09	05:57	05:08	05:02	05:39	06:32	07:27	08:22	08:19	08:45
60 17:05			19:59	20:55	21:44	22:02	21:30	20:25	19:10	18:01	16:14	16:16
61 08:17			07:06		05:07		05:40	06:34		07:24		08:45
62 17:07			20:00		21:45		21:28	20:23		16:59		16:17
Sonnenscheinstunden	251	274	367	419	493	509	511	459	382	329	260	235
astr.max.mögl.Beschattung	114											395

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO2 - Utwarfe 2
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai			Juni		
1	08:45		11:30 (WEA VB6)	08:15		09:09 (WEA VB7)	07:18		07:04			05:55		19:04 (WEA VB4)	05:06			
	16:18	61	14:54 (WEA VB5)	17:09	102	15:28 (WEA VB5)	18:04		20:02			20:57	47	19:51 (WEA VB4)	21:47			
2	08:45		11:30 (WEA VB6)	08:14		09:10 (WEA VB7)	07:16		07:02			05:53		19:04 (WEA VB4)	05:05			
	16:19	66	14:57 (WEA VB5)	17:11	101	15:29 (WEA VB5)	18:06		20:04			20:59	47	19:51 (WEA VB4)	21:48			
3	08:45		11:30 (WEA VB6)	08:12		09:10 (WEA VB7)	07:14		06:59			05:51		19:04 (WEA VB4)	05:04			
	16:20	69	14:58 (WEA VB5)	17:13	101	15:29 (WEA VB5)	18:08		20:06			21:01	47	19:51 (WEA VB4)	21:49			
4	08:45		11:31 (WEA VB6)	08:10		09:11 (WEA VB7)	07:12		06:57			05:49		19:04 (WEA VB4)	05:04			
	16:22	70	15:00 (WEA VB5)	17:15	101	15:30 (WEA VB5)	18:10		20:08			21:03	47	19:51 (WEA VB4)	21:50			
5	08:44		11:31 (WEA VB6)	08:09		09:11 (WEA VB7)	07:09		06:54			05:47		19:04 (WEA VB4)	05:03			
	16:23	73	15:02 (WEA VB5)	17:17	101	15:30 (WEA VB5)	18:12		20:10			21:04	46	19:50 (WEA VB4)	21:51			
6	08:44		09:21 (WEA VB7)	08:07		09:12 (WEA VB7)	07:07		06:52			05:45		19:04 (WEA VB4)	05:02			
	16:24	83	15:04 (WEA VB5)	17:19	100	15:30 (WEA VB5)	18:14		20:11			21:06	46	19:50 (WEA VB4)	21:52			
7	08:44		09:18 (WEA VB7)	08:05		09:12 (WEA VB7)	07:04		06:49			05:43		19:05 (WEA VB4)	05:01			
	16:26	89	15:05 (WEA VB5)	17:21	99	15:30 (WEA VB5)	18:16		20:13			21:08	45	19:50 (WEA VB4)	21:53			
8	08:43		09:18 (WEA VB7)	08:03		09:13 (WEA VB7)	07:02		06:47			05:41		19:05 (WEA VB4)	05:01			
	16:27	94	15:07 (WEA VB5)	17:23	96	15:29 (WEA VB5)	18:18		20:15			21:10	44	19:49 (WEA VB4)	21:54			
9	08:43		09:17 (WEA VB7)	08:01		09:14 (WEA VB7)	07:00		06:45			05:40		19:05 (WEA VB4)	05:00			
	16:28	99	15:09 (WEA VB5)	17:25	94	15:29 (WEA VB5)	18:20		20:17			21:11	44	19:49 (WEA VB4)	21:55			
10	08:42		09:15 (WEA VB7)	07:59		09:15 (WEA VB7)	06:57		06:42			05:38		19:05 (WEA VB4)	05:00			
	16:30	103	15:10 (WEA VB5)	17:27	91	15:29 (WEA VB5)	18:22		20:19			21:13	43	19:48 (WEA VB4)	21:56			
11	08:41		09:15 (WEA VB7)	07:57		09:15 (WEA VB7)	06:55		06:40			05:36		19:06 (WEA VB4)	04:59			
	16:31	107	15:11 (WEA VB5)	17:29	88	15:28 (WEA VB5)	18:23		20:21			21:15	42	19:48 (WEA VB4)	21:57			
12	08:40		09:14 (WEA VB7)	07:55		09:16 (WEA VB7)	06:53		06:38		17:42 (WEA VB3)	05:34		19:07 (WEA VB4)	04:59			
	16:33	109	15:12 (WEA VB5)	17:31	85	15:27 (WEA VB5)	18:25	12	17:54 (WEA VB3)	20:22	9	19:53 (WEA VB2)	21:17	40	19:47 (WEA VB4)	21:57		
13	08:40		09:13 (WEA VB7)	07:53		09:17 (WEA VB7)	06:50		17:39 (WEA VB3)	06:35		19:41 (WEA VB2)	05:32		19:08 (WEA VB4)	04:59		
	16:35	114	15:13 (WEA VB5)	17:33	82	15:27 (WEA VB5)	18:27	18	17:57 (WEA VB3)	20:24	15	19:56 (WEA VB2)	21:18	39	19:47 (WEA VB4)	21:58		
14	08:39		09:13 (WEA VB7)	07:51		09:19 (WEA VB7)	06:48		17:37 (WEA VB3)	06:33		19:29 (WEA VB4)	05:31		19:08 (WEA VB4)	04:58		
	16:36	116	15:15 (WEA VB5)	17:35	77	15:26 (WEA VB5)	18:29	21	17:58 (WEA VB3)	20:26	22	19:57 (WEA VB2)	21:20	38	19:46 (WEA VB4)	21:59		
15	08:38		09:12 (WEA VB7)	07:49		09:21 (WEA VB7)	06:45		17:36 (WEA VB3)	06:31		19:22 (WEA VB4)	05:29		19:09 (WEA VB4)	04:58		
	16:38	119	15:16 (WEA VB5)	17:37	71	15:26 (WEA VB5)	18:31	23	17:59 (WEA VB3)	20:28	37	19:59 (WEA VB2)	21:22	35	19:44 (WEA VB4)	21:59		
16	08:37		09:12 (WEA VB7)	07:47		09:24 (WEA VB7)	06:43		17:35 (WEA VB3)	06:28		19:18 (WEA VB4)	05:27		19:10 (WEA VB4)	04:58		
	16:39	121	15:17 (WEA VB5)	17:39	63	15:25 (WEA VB5)	18:33	25	18:00 (WEA VB3)	20:30	41	19:59 (WEA VB2)	21:23	34	19:44 (WEA VB4)	22:00		
17	08:36		09:12 (WEA VB7)	07:45		09:29 (WEA VB7)	06:40		17:33 (WEA VB3)	06:26		19:16 (WEA VB4)	05:26		19:12 (WEA VB4)	04:58		
	16:41	124	15:19 (WEA VB5)	17:41	51	15:24 (WEA VB5)	18:35	27	18:00 (WEA VB3)	20:32	43	19:59 (WEA VB2)	21:25	32	19:44 (WEA VB4)	22:00		
18	08:35		09:11 (WEA VB7)	07:43		14:42 (WEA VB5)	06:38		17:33 (WEA VB3)	06:24		19:14 (WEA VB4)	05:24		19:12 (WEA VB4)	04:58		
	16:43	125	15:19 (WEA VB5)	17:43	40	15:22 (WEA VB5)	18:36	28	18:01 (WEA VB3)	20:33	46	20:00 (WEA VB2)	21:27	30	19:42 (WEA VB4)	22:01		
19	08:34		09:11 (WEA VB7)	07:41		14:44 (WEA VB5)	06:36		17:32 (WEA VB3)	06:21		19:13 (WEA VB4)	05:23		19:14 (WEA VB4)	04:58		
	16:45	126	15:20 (WEA VB5)	17:45	36	15:20 (WEA VB5)	18:38	28	18:00 (WEA VB3)	20:35	47	20:00 (WEA VB2)	21:28	27	19:41 (WEA VB4)	22:01		
20	08:33		09:11 (WEA VB7)	07:39		14:47 (WEA VB5)	06:33		17:32 (WEA VB3)	06:19		19:10 (WEA VB4)	05:21		19:15 (WEA VB4)	04:58		
	16:46	126	15:21 (WEA VB5)	17:47	31	15:18 (WEA VB5)	18:40	32	18:14 (WEA VB1)	20:37	49	19:59 (WEA VB2)	21:30	24	19:39 (WEA VB4)	22:02		
21	08:31		09:10 (WEA VB7)	07:36		14:49 (WEA VB5)	06:31		17:31 (WEA VB3)	06:17		19:09 (WEA VB4)	05:20		19:17 (WEA VB4)	04:58		
	16:48	128	15:22 (WEA VB5)	17:49	27	15:16 (WEA VB5)	18:42	35	18:15 (WEA VB1)	20:39	50	19:59 (WEA VB2)	21:31	21	19:38 (WEA VB4)	22:02		
22	08:30		09:10 (WEA VB7)	07:34		14:52 (WEA VB5)	06:28		17:31 (WEA VB3)	06:15		19:08 (WEA VB4)	05:18		19:19 (WEA VB4)	04:58		
	16:50	128	15:23 (WEA VB5)	17:51	20	15:12 (WEA VB5)	18:44	38	18:18 (WEA VB1)	20:41	51	19:59 (WEA VB2)	21:33	18	19:37 (WEA VB4)	22:02		
23	08:29		09:09 (WEA VB7)	07:32		14:59 (WEA VB5)	06:26		17:31 (WEA VB3)	06:12		19:07 (WEA VB4)	05:17		19:22 (WEA VB4)	04:59		
	16:52	127	15:23 (WEA VB5)	17:53	7	15:06 (WEA VB5)	18:46	38	18:19 (WEA VB1)	20:43	51	19:58 (WEA VB2)	21:34	13	19:35 (WEA VB4)	22:02		
24	08:28		09:10 (WEA VB7)	07:30			06:23		17:32 (WEA VB3)	06:10		19:07 (WEA VB4)	05:15		19:25 (WEA VB4)	04:59		
	16:54	127	15:25 (WEA VB5)	17:55			18:48	39	18:21 (WEA VB1)	20:44	51	19:58 (WEA VB2)	21:36	5	19:30 (WEA VB4)	22:02		
25	08:26		09:09 (WEA VB7)	07:28			06:21		17:32 (WEA VB3)	06:08		19:06 (WEA VB4)	05:14			04:59		
	16:56	127	15:25 (WEA VB5)	17:57			18:49	40	18:23 (WEA VB1)	20:46	51	19:57 (WEA VB2)	21:37			22:02		
26	08:25		09:10 (WEA VB7)	07:25			06:19		17:33 (WEA VB3)	06:06		19:06 (WEA VB4)	05:13			05:00		
	16:57	123	15:26 (WEA VB5)	17:59			18:51	40	18:25 (WEA VB1)	20:48	50	19:56 (WEA VB2)	21:39			22:02		
27	08:23		09:09 (WEA VB7)	07:23			06:16		17:35 (WEA VB3)	06:04		19:05 (WEA VB4)	05:12			05:00		
	16:59	120	15:26 (WEA VB5)	18:00			18:53	36	18:25 (WEA VB1)	20:50	50	19:55 (WEA VB2)	21:40			22:02		
28	08:22		09:09 (WEA VB7)	07:21			06:14		17:36 (WEA VB3)	06:02		19:05 (WEA VB4)	05:10			05:01		
	17:01	116	15:27 (WEA VB5)	18:02			18:55	30	18:23 (WEA VB1)	20:52	48	19:53 (WEA VB2)	21:41			22:02		
29	08:20		09:10 (WEA VB7)				07:11		18:40 (WEA VB3)	05:59		19:04 (WEA VB4)	05:09			05:01		
	17:03	105	15:28 (WEA VB5)				19:57	18	19:21 (WEA VB1)	20:54	48	19:52 (WEA VB4)	21:43			22:02		
30	08:19		09:10 (WEA VB7)				07:09		19:13 (WEA VB1)	05:57		19:04 (WEA VB4)	05:08			05:02		
	17:05	101	15:28 (WEA VB5)				19:59	3	19:16 (WEA VB1)	20:55	48	19:52 (WEA VB4)	21:44			22:02		
31	08:17		09:10 (WEA VB7)				07:06					05:07						
	17:07	101	15:28 (WEA VB5)				20:00					21:45						
Sonnenscheinstunden			251				274				367				420			
astr.max.mögl.Beschattung			3297				1664				531				807			

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO2 - Utwarfe 2
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember							
1	05:02		05:42		19:17 (WEA VB4)	06:36		07:28	18:20 (WEA VB3)	07:26	08:43 (WEA VB7)	08:21	08:57 (WEA VB7)					
	22:01		21:27	41	19:58 (WEA VB4)	20:20		19:07	15	18:35 (WEA VB3)	16:57	93	14:58 (WEA VB5)	16:13	107	14:53 (WEA VB5)		
2	05:03		05:43		19:17 (WEA VB4)	06:37		07:30	18:23 (WEA VB3)	07:28	08:42 (WEA VB7)	08:22	08:58 (WEA VB7)					
	22:01		21:25	41	19:58 (WEA VB4)	20:18		19:05	7	18:30 (WEA VB3)	16:55	95	14:58 (WEA VB5)	16:13	104	14:53 (WEA VB5)		
3	05:04		05:45		19:15 (WEA VB4)	06:39		07:32		07:30	08:43 (WEA VB7)	08:24	09:00 (WEA VB7)					
	22:01		21:23	43	19:58 (WEA VB4)	20:16		19:02		16:53	96	14:59 (WEA VB5)	16:12	99	14:52 (WEA VB5)			
4	05:05		05:47		19:15 (WEA VB4)	06:41		07:34		07:32	08:42 (WEA VB7)	08:25	09:02 (WEA VB7)					
	22:00		21:21	44	19:59 (WEA VB4)	20:13		19:00		16:51	98	14:59 (WEA VB5)	16:11	94	14:51 (WEA VB5)			
5	05:06		05:49		19:14 (WEA VB4)	06:43		07:36		07:34	08:41 (WEA VB7)	08:26	09:03 (WEA VB7)					
	22:00		21:19	45	19:59 (WEA VB4)	20:11		18:58		16:49	99	14:59 (WEA VB5)	16:11	90	14:50 (WEA VB5)			
6	05:06		05:50		19:14 (WEA VB4)	06:44		07:37		07:36	08:41 (WEA VB7)	08:28	09:07 (WEA VB7)					
	21:59		21:17	46	20:00 (WEA VB4)	20:08		18:55		16:48	100	14:59 (WEA VB5)	16:10	83	14:50 (WEA VB5)			
7	05:07		05:52		19:14 (WEA VB4)	06:46		07:39		07:38	08:41 (WEA VB7)	08:29	11:18 (WEA VB6)					
	21:58		21:15	46	20:00 (WEA VB4)	20:06		18:53		16:46	100	14:59 (WEA VB5)	16:10	73	14:49 (WEA VB5)			
8	05:08		05:54		19:13 (WEA VB4)	06:48		07:41		07:40	08:41 (WEA VB7)	08:30	11:19 (WEA VB6)					
	21:58		21:13	47	20:00 (WEA VB4)	20:04		18:50		16:44	101	14:59 (WEA VB5)	16:09	71	14:49 (WEA VB5)			
9	05:09		05:55		19:13 (WEA VB4)	06:50		07:43		07:41	08:40 (WEA VB7)	08:32	11:19 (WEA VB6)					
	21:57		21:11	47	20:00 (WEA VB4)	20:01		18:48		16:42	101	14:59 (WEA VB5)	16:09	69	14:47 (WEA VB5)			
10	05:11		05:57		19:12 (WEA VB4)	06:51		07:45		07:43	08:40 (WEA VB7)	08:33	11:19 (WEA VB6)					
	21:56		21:09	47	19:59 (WEA VB4)	19:59		18:46		16:40	101	14:59 (WEA VB5)	16:09	66	14:46 (WEA VB5)			
11	05:12		05:59		19:12 (WEA VB4)	06:53		07:46		07:45	08:40 (WEA VB7)	08:34	11:20 (WEA VB6)					
	21:55		21:07	48	20:00 (WEA VB4)	19:56		18:43		16:39	101	14:59 (WEA VB5)	16:08	61	14:44 (WEA VB5)			
12	05:13		06:01		19:12 (WEA VB4)	06:55		07:48		07:47	08:40 (WEA VB7)	08:35	11:20 (WEA VB6)					
	21:54		21:05	48	20:00 (WEA VB4)	19:54		18:41		16:37	101	14:59 (WEA VB5)	16:08	56	14:42 (WEA VB5)			
13	05:14		06:02		19:12 (WEA VB4)	06:57		07:50		07:49	08:41 (WEA VB7)	08:36	11:21 (WEA VB6)					
	21:53		21:03	47	19:59 (WEA VB4)	19:51		18:39		16:35	105	14:59 (WEA VB5)	16:08	53	12:14 (WEA VB6)			
14	05:15		06:04		19:12 (WEA VB4)	06:58		07:52		07:51	08:42 (WEA VB7)	08:37	11:22 (WEA VB6)					
	21:52		21:01	47	19:59 (WEA VB2)	19:49	16	19:11 (WEA VB1)		16:34	116	15:00 (WEA VB5)	16:08	52	12:14 (WEA VB6)			
15	05:16		06:06		19:12 (WEA VB4)	07:00		07:54		07:53	08:42 (WEA VB7)	08:38	11:22 (WEA VB6)					
	21:51		20:59	49	20:01 (WEA VB2)	19:47	28	19:12 (WEA VB1)		16:32	121	14:59 (WEA VB5)	16:08	53	12:15 (WEA VB6)			
16	05:18		06:08		19:12 (WEA VB4)	07:02		07:56		07:55	08:43 (WEA VB7)	08:39	11:22 (WEA VB6)					
	21:50		20:57	50	20:02 (WEA VB2)	19:44	34	19:13 (WEA VB1)		16:31	124	14:59 (WEA VB5)	16:08	52	12:14 (WEA VB6)			
17	05:19		06:09		19:12 (WEA VB4)	07:04		07:58		07:57	08:43 (WEA VB7)	08:40	11:22 (WEA VB6)					
	21:49		20:55	51	20:03 (WEA VB2)	19:42	39	19:14 (WEA VB1)		16:29	127	14:59 (WEA VB5)	16:08	53	12:15 (WEA VB6)			
18	05:20		06:11		19:13 (WEA VB4)	07:05		07:59		07:58	08:44 (WEA VB7)	08:41	11:23 (WEA VB6)					
	21:48		20:53	51	20:04 (WEA VB2)	19:39	40	19:12 (WEA VB1)		16:28	127	14:59 (WEA VB5)	16:09	53	12:16 (WEA VB6)			
19	05:22		06:13		19:12 (WEA VB4)	07:07		08:01	15:27 (WEA VB5)	08:00	08:44 (WEA VB7)	08:41	11:24 (WEA VB6)					
	21:46		20:50	52	20:04 (WEA VB2)	19:37	40	19:08 (WEA VB1)		16:26	128	14:58 (WEA VB5)	16:09	53	12:17 (WEA VB6)			
20	05:23		19:33 (WEA VB4)	06:15	19:13 (WEA VB4)	07:09		08:03		15:22 (WEA VB5)	08:02	08:45 (WEA VB7)	08:42	11:24 (WEA VB6)				
	21:45	10	19:43 (WEA VB4)	20:48	51	20:04 (WEA VB2)	19:34	39	19:06 (WEA VB1)	18:23	23	15:45 (WEA VB5)	16:25	128	14:58 (WEA VB5)	16:09	52	12:16 (WEA VB6)
21	05:25		19:30 (WEA VB4)	06:16	19:13 (WEA VB4)	07:11		08:05		15:19 (WEA VB5)	08:04	08:46 (WEA VB7)	08:43	11:24 (WEA VB6)				
	21:44	15	19:45 (WEA VB4)	20:46	51	20:04 (WEA VB2)	19:32	38	19:04 (WEA VB1)	18:20	28	15:47 (WEA VB5)	16:24	128	14:58 (WEA VB5)	16:10	53	12:17 (WEA VB6)
22	05:26		19:29 (WEA VB4)	06:18	19:14 (WEA VB4)	07:12		08:07		15:16 (WEA VB5)	08:06	08:47 (WEA VB7)	08:43	11:24 (WEA VB6)				
	21:42	19	19:48 (WEA VB4)	20:44	50	20:04 (WEA VB2)	19:29	35	19:02 (WEA VB1)	18:18	33	15:49 (WEA VB5)	16:22	127	14:58 (WEA VB5)	16:10	53	12:17 (WEA VB6)
23	05:28		19:26 (WEA VB4)	06:20	19:15 (WEA VB4)	07:14		08:09		15:14 (WEA VB5)	08:07	08:48 (WEA VB7)	08:44	11:25 (WEA VB6)				
	21:41	23	19:49 (WEA VB4)	20:41	49	20:04 (WEA VB2)	19:27	32	18:58 (WEA VB1)	18:16	37	15:51 (WEA VB5)	16:21	127	14:57 (WEA VB5)	16:11	53	12:18 (WEA VB6)
24	05:29		19:25 (WEA VB4)	06:22	19:16 (WEA VB4)	07:16		08:11		15:12 (WEA VB5)	08:09	08:49 (WEA VB7)	08:44	11:26 (WEA VB6)				
	21:40	25	19:50 (WEA VB4)	20:39	47	20:03 (WEA VB2)	19:24	29	18:44 (WEA VB3)	18:14	40	15:52 (WEA VB5)	16:20	125	14:57 (WEA VB5)	16:11	53	12:19 (WEA VB6)
25	05:31		19:24 (WEA VB4)	06:23	19:17 (WEA VB4)	07:18		07:13		08:57 (WEA VB7)	08:11	08:49 (WEA VB7)	08:44	11:26 (WEA VB6)				
	21:38	28	19:52 (WEA VB4)	20:37	46	20:03 (WEA VB2)	19:22	29	18:44 (WEA VB3)	17:12	54	14:53 (WEA VB5)	16:19	124	14:56 (WEA VB5)	16:12	53	12:19 (WEA VB6)
26	05:32		19:22 (WEA VB4)	06:25	19:19 (WEA VB4)	07:19		07:15		08:53 (WEA VB7)	08:13	08:50 (WEA VB7)	08:45	11:27 (WEA VB6)				
	21:37	31	19:53 (WEA VB4)	20:35	43	20:02 (WEA VB2)	19:19	27	18:43 (WEA VB3)	17:10	64	14:54 (WEA VB5)	16:18	122	14:55 (WEA VB5)	16:12	53	12:20 (WEA VB6)
27	05:34		19:22 (WEA VB4)	06:27	19:20 (WEA VB4)	07:21		07:16		08:50 (WEA VB7)	08:14	08:51 (WEA VB7)	08:45	11:27 (WEA VB6)				
	21:35	32	19:54 (WEA VB4)	20:32	40	20:00 (WEA VB2)	19:17	26	18:41 (WEA VB3)	17:07	72	14:55 (WEA VB5)	16:17	119	14:55 (WEA VB5)	16:13	53	12:20 (WEA VB6)
28	05:35		19:20 (WEA VB4)	06:29	19:24 (WEA VB4)	07:23		07:18		08:48 (WEA VB7)	08:16	08:53 (WEA VB7)	08:45	11:28 (WEA VB6)				
	21:33	35	19:55 (WEA VB4)	20:30	35	19:59 (WEA VB2)	19:15	24	18:40 (WEA VB3)	17:05	77	14:56 (WEA VB5)	16:16	116	14:55 (WEA VB5)	16:14	53	12:21 (WEA VB6)
29	05:37		19:20 (WEA VB4)	06:30	19:31 (WEA VB4)	07:25		07:20		08:47 (WEA VB7)	08:17	08:54 (WEA VB7)	08:45	11:28 (WEA VB6)				
	21:32	36	19:56 (WEA VB4)	20:28	20	19:58 (WEA VB2)	19:12	22	18:39 (WEA VB3)	17:03	81	14:56 (WEA VB5)	16:15	115	14:55 (WEA VB5)	16:15	53	12:21 (WEA VB6)
30	05:39		19:18 (WEA VB4)	06:32	19:41 (WEA VB2)	07:27		07:22		08:45 (WEA VB7)	08:19	08:55 (WEA VB7)	08:45	11:29 (WEA VB6)				
	21:30	38	19:56 (WEA VB4)	20:25	14	19:55 (WEA VB2)	19:10	19	18:37 (WEA VB3)	17:01	86	14:57 (WEA VB5)	16:14	109	14:53 (WEA VB5)	16:16	53	12:22 (WEA VB6)
31	05:40		19:18 (WEA VB4)	06:34	19:44 (WEA VB2)			07:24		08:44 (WEA VB7)		08:45			08:45	11:29 (WEA VB6)		
	21:28	39	19:57 (WEA VB4)	20:23	8	19:52 (WEA VB2)		16:59	89	14:57 (WEA VB5)		16:17		52	12:21 (WEA VB6)			
Sonnenscheinstunden		511		459		382		329		260		234		1976				
astr.max.mögl.Beschattung		331		1344		517		719		3374								

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO20 - Langengrodener Weg 17
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 22:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:11 21:56	05:57 21:10	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	08:00 18:27	07:59 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:10	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO21 - Am Sudring 15
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:14	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:09 21:57	05:55 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:10 21:56	05:57 21:10	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:09
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	08:00 18:27	07:59 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
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24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
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26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	04:59 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:10	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:39 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO22 - Georg-Adden-Straße 55

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:12
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:05 22:00	05:48 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:25	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:14	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
9	08:43 16:28	08:01 17:25	07:00 18:20	06:45 20:17	05:39 21:11	05:00 21:55	05:09 21:57	05:55 21:12	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:10 21:56	05:57 21:10	06:51 19:59	07:45 18:46	07:43 16:40	08:33 16:08
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	04:59 21:57	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:58	05:13 21:54	06:00 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
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14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:59 16:28	08:41 16:08
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:19 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:28 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:08 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	04:59 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:38 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO23 - Hooksiel
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:02 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04	05:53 20:59	05:05 21:48	05:03 22:01	05:43 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:12
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:04 21:49	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:45 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:05 22:00	05:48 21:19	06:43 20:11	07:36 18:58	07:34 16:49	08:27 16:10
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11	05:45 21:06	05:02 21:52	05:06 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:25	08:05 17:21	07:05 18:16	06:49 20:13	05:43 21:08	05:01 21:53	05:07 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:09
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:41 21:10	05:01 21:54	05:08 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:31 16:09
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12	08:41 16:33	07:55 17:31	06:53 18:25	06:38 20:22	05:34 21:17	04:59 21:58	05:13 21:54	06:00 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:14 21:53	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:35	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:58 21:59	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 22:00	05:16 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:18 21:50	06:07 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	05:26 21:25	04:58 22:01	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	05:24 21:27	04:58 22:01	05:20 21:48	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:08
19	08:34 16:44	07:41 17:45	06:36 18:38	06:21 20:35	05:22 21:28	04:58 22:01	05:22 21:47	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:26	08:41 16:09
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:23 21:45	06:14 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:36 17:49	06:31 18:42	06:17 20:39	05:19 21:31	04:58 22:02	05:25 21:44	06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:09
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:26 21:43	06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:22	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:58 22:02	05:27 21:41	06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:10
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	05:15 21:36	04:59 22:02	05:29 21:40	06:21 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:55	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:31 21:38	06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:45 16:12
26	08:25 16:57	07:25 17:58	06:19 18:51	06:06 20:48	05:13 21:39	04:59 22:02	05:32 21:37	06:25 20:35	07:19 19:19	07:15 17:09	08:13 16:18	08:45 16:12
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	05:11 21:40	05:00 22:02	05:34 21:35	06:27 20:32	07:21 19:17	07:17 17:07	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	05:10 21:42	05:00 22:02	05:35 21:33	06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	05:59 20:54	05:09 21:43	05:01 22:02	05:37 21:32	06:30 20:28	07:25 19:12	07:20 17:03	08:18 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:38 21:30	06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:46 16:16
31	08:17 17:07		07:06 20:00		05:07 21:46		05:40 21:28	06:34 20:23		07:24 16:59		08:46 16:17
Sonnenscheinstunden	251	274	367	420	493	509	511	459	382	329	260	234
astr.max.mögl.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	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO24 - Depenhausen/Pakens 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45	09:52 (WEA VB3)	08:16		07:19		07:04	07:45 (WEA VB1)	05:55		05:06
	16:18	93	11:48 (WEA ZB1)	17:09		18:04		23	08:08 (WEA VB1)	20:57	21:47
2	08:45		09:53 (WEA ZB3)	08:14		07:16			07:45 (WEA VB1)	05:53	05:05
	16:19	91	11:49 (WEA ZB1)	17:11		18:06		21	08:06 (WEA VB1)	20:59	21:48
3	08:45		09:55 (WEA ZB3)	08:12		07:14			07:47 (WEA VB1)	05:51	05:05
	16:21	90	11:50 (WEA ZB1)	17:13		18:08		17	08:04 (WEA VB1)	21:01	21:49
4	08:45		09:55 (WEA ZB3)	08:10		07:12			07:48 (WEA VB1)	05:49	05:04
	16:22	87	11:49 (WEA ZB1)	17:15		18:10		13	08:01 (WEA VB1)	21:03	21:50
5	08:45		09:56 (WEA ZB3)	08:09		07:09			07:52 (WEA VB1)	05:47	05:03
	16:23	85	11:50 (WEA ZB1)	17:17		18:12		5	07:57 (WEA VB1)	21:04	21:51
6	08:44		09:57 (WEA ZB3)	08:07		07:07				05:45	05:02
	16:24	82	11:50 (WEA ZB1)	17:19		18:14			21:06		21:52
7	08:44		09:58 (WEA ZB3)	08:05		07:05			05:43		05:02
	16:26	80	11:50 (WEA ZB1)	17:21		18:16			21:08		21:53
8	08:43		10:00 (WEA ZB3)	08:03		07:02			07:11 (WEA VB2)	05:42	05:01
	16:27	78	11:51 (WEA ZB1)	17:23		18:18	3	17:48 (WEA VB12)	06:47		21:54
9	08:43		10:01 (WEA ZB3)	08:01		07:00		5	07:16 (WEA VB2)	21:10	05:00
	16:29	75	11:51 (WEA ZB1)	17:25		18:20	6	17:53 (WEA VB12)	06:45		21:55
10	08:42		10:03 (WEA ZB3)	07:59		06:58		10	07:19 (WEA VB2)	21:12	05:00
	16:30	72	11:51 (WEA ZB1)	17:27		18:22	9	17:55 (WEA VB12)	06:42		21:56
11	08:41		10:05 (WEA ZB3)	07:57		06:55		13	07:19 (WEA VB2)	21:13	05:00
	16:32	67	11:51 (WEA ZB1)	17:29		18:24	11	17:57 (WEA VB12)	06:40		21:57
12	08:41		10:51 (WEA ZB3)	07:55		06:53		16	07:20 (WEA VB2)	21:15	04:59
	16:33	60	11:51 (WEA ZB1)	17:31		18:25	13	17:46 (WEA VB12)	06:38		21:58
13	08:40		10:52 (WEA ZB3)	07:53		06:50		19	07:21 (WEA VB2)	21:17	04:59
	16:35	59	11:51 (WEA ZB1)	17:33		18:27	14	17:59 (WEA VB12)	06:35		21:58
14	08:39		10:53 (WEA ZB3)	07:51		06:48		20	07:21 (WEA VB2)	21:18	04:59
	16:36	58	11:51 (WEA ZB1)	17:35		18:29	12	17:47 (WEA VB12)	06:33		21:59
15	08:38		10:53 (WEA ZB3)	07:49		06:45		20	07:21 (WEA VB2)	21:20	04:58
	16:38	58	11:51 (WEA ZB1)	17:37		18:31	9	17:59 (WEA VB12)	06:31		22:00
16	08:37		10:54 (WEA ZB3)	07:47		06:43		20	07:21 (WEA VB2)	21:22	04:58
	16:40	57	11:51 (WEA ZB1)	17:39		18:33	6	17:57 (WEA VB12)	06:28		22:00
17	08:36		10:55 (WEA ZB3)	07:45		06:41		19	07:00 (WEA VB2)	21:23	04:58
	16:41	56	11:51 (WEA ZB1)	17:41		18:35	9	17:53 (WEA VB12)	06:26		22:01
18	08:35		10:56 (WEA ZB3)	07:43		06:38		20	07:13 (WEA VB3)	21:25	04:58
	16:43	54	11:50 (WEA ZB1)	17:43		18:37	12	17:55 (WEA VB12)	06:24		22:01
19	08:34		10:57 (WEA ZB3)	07:41		06:36		17	07:14 (WEA VB3)	21:27	04:58
	16:45	53	11:50 (WEA ZB1)	17:45	2	17:16 (WEA VB13)	15	17:57 (WEA VB12)	06:22		22:01
20	08:33		10:58 (WEA ZB3)	07:39		06:33		15	07:14 (WEA VB3)	21:28	04:58
	16:47	52	11:50 (WEA ZB1)	17:47	6	17:19 (WEA VB13)	18	17:57 (WEA VB12)	06:19		22:02
21	08:32		10:59 (WEA ZB3)	07:37		06:31		13	07:15 (WEA VB3)	21:30	04:58
	16:48	50	11:49 (WEA ZB1)	17:49	9	17:21 (WEA VB13)	20	17:57 (WEA VB12)	06:17		22:02
22	08:30		11:00 (WEA ZB3)	07:34		06:28		7	07:16 (WEA VB3)	21:31	04:58
	16:50	49	11:49 (WEA ZB1)	17:51	11	17:22 (WEA VB13)	23	17:57 (WEA VB12)	06:15		22:02
23	08:29		11:01 (WEA ZB3)	07:32		06:26			07:12 (WEA VB3)	21:33	04:58
	16:52	47	11:48 (WEA ZB1)	17:53	14	17:25 (WEA VB13)	24	17:57 (WEA VB12)	06:13		22:02
24	08:28		11:03 (WEA ZB3)	07:30		06:24			07:13 (WEA VB3)	21:34	04:59
	16:54	44	11:47 (WEA ZB1)	17:55	16	17:27 (WEA VB13)	26	17:57 (WEA VB12)	06:10		22:02
25	08:26		11:04 (WEA ZB3)	07:28		06:21		1	06:45 (WEA VB1)	21:36	04:59
	16:56	42	11:46 (WEA ZB1)	17:57	16	17:27 (WEA VB13)	27	17:57 (WEA VB12)	06:08		22:02
26	08:25		11:06 (WEA ZB3)	07:25		06:19		3	06:44 (WEA VB1)	21:37	05:00
	16:58	39	11:45 (WEA ZB1)	17:59	14	17:26 (WEA VB13)	28	17:57 (WEA VB12)	06:06		22:02
27	08:24		11:07 (WEA ZB3)	07:23		06:16		4	06:44 (WEA VB1)	21:39	05:00
	17:00	37	11:44 (WEA ZB1)	18:01	12	17:25 (WEA VB13)	28	17:57 (WEA VB12)	06:04		22:02
28	08:22		11:09 (WEA ZB3)	07:21		06:14			06:44 (WEA VB1)	21:40	05:01
	17:01	33	11:42 (WEA ZB1)	18:03	9	17:23 (WEA VB13)	28	17:57 (WEA VB12)	06:02		22:02
29	08:20		11:12 (WEA ZB3)			07:11		6	06:43 (WEA VB1)	21:42	05:01
	17:03	28	11:40 (WEA ZB1)			07:09			06:43 (WEA VB1)	21:43	05:01
30	08:19		11:15 (WEA ZB3)			07:07		7	06:43 (WEA VB1)	21:43	05:02
	17:05	22	11:37 (WEA ZB1)			07:05			06:43 (WEA VB1)	21:44	05:02
31	08:17		11:19 (WEA ZB3)			07:07		8	06:43 (WEA VB1)	21:44	22:02
	17:07	14	11:33 (WEA ZB1)			07:01			06:43 (WEA VB1)	21:46	
Sonnenscheinstunden		251				367			493		509
astr.max.mögl.Beschattung		1812		109		420		293		42	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		(WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)			Zeitpunkt (SS:MM) Schattenende		

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO24 - Depenhausen/Pakens 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

		Juli		August		September		Oktober		November		Dezember			
1	05:03 22:01		05:42 21:27		06:36 20:21	16	07:03 (WEA VB2) 07:19 (WEA VB2)	07:29 19:07	14	18:25 (WEA VB12) 18:39 (WEA VB12)	07:26 16:57		08:21 16:13	67	09:47 (WEA ZB3) 11:33 (WEA ZB1)
2	05:03 22:01		05:44 21:25		06:37 20:18	13	07:05 (WEA VB2) 07:18 (WEA VB2)	07:30 19:05	12	18:25 (WEA VB12) 18:37 (WEA VB12)	07:28 16:55		08:22 16:13	72	09:46 (WEA ZB3) 11:34 (WEA ZB1)
3	05:04 22:01		05:45 21:23		06:39 20:16	10	07:06 (WEA VB2) 07:16 (WEA VB2)	07:32 19:03	10	18:24 (WEA VB12) 18:34 (WEA VB12)	07:30 16:53		08:24 16:12	75	09:44 (WEA ZB3) 11:34 (WEA ZB1)
4	05:05 22:00		05:47 21:21		06:41 20:13	5	07:08 (WEA VB2) 07:13 (WEA VB2)	07:34 19:00	7	18:24 (WEA VB12) 18:31 (WEA VB12)	07:32 16:51		08:25 16:11	78	09:44 (WEA ZB3) 11:35 (WEA ZB1)
5	05:06 22:00		05:49 21:19		06:43 20:11			07:36 18:58	4	18:25 (WEA VB12) 18:29 (WEA VB12)	07:34 16:50		08:27 16:11	80	09:43 (WEA ZB3) 11:35 (WEA ZB1)
6	05:07 21:59		05:50 21:17		06:44 20:09			07:38 18:55	1	18:26 (WEA VB12) 18:27 (WEA VB12)	07:36 16:48		08:28 16:10	82	09:43 (WEA ZB3) 11:36 (WEA ZB1)
7	05:08 21:58	4	21:14 (WEA VB8) 21:18 (WEA VB8)	05:52 21:15		20:06 20:06	3	07:48 (WEA VB1) 07:51 (WEA VB1)		18:27 (WEA VB12) 18:53	07:38 16:46		08:29 16:10	83	09:43 (WEA ZB3) 11:36 (WEA ZB1)
8	05:09 21:58		21:13 (WEA VB8) 21:19 (WEA VB8)	05:54 21:14		20:06 20:04		07:43 (WEA VB1) 07:56 (WEA VB1)		07:41 18:51	07:40 16:44		08:31 16:09		09:43 (WEA ZB3) 11:38 (WEA ZB1)
9	05:10 21:57	6	21:12 (WEA VB8) 21:20 (WEA VB8)	05:56 21:12		20:04 20:01	13	07:40 (WEA VB1) 07:57 (WEA VB1)		07:43 18:48	07:42 16:42		08:32 16:09	88	09:43 (WEA ZB3) 11:38 (WEA ZB1)
10	05:11 21:56	8	21:12 (WEA VB8) 21:21 (WEA VB8)	05:57 21:10		20:01 19:59	17	07:38 (WEA VB1) 07:59 (WEA VB1)		07:45 18:46	07:44 16:41		08:33 16:09	89	09:43 (WEA ZB3) 11:38 (WEA ZB1)
11	05:12 21:55	9	21:11 (WEA VB8) 21:21 (WEA VB8)	05:59 21:08		19:59 19:56	21	07:37 (WEA VB1) 08:00 (WEA VB1)		07:47 18:43	07:45 16:39	15	10:49 (WEA ZB1) 11:04 (WEA ZB1)		09:42 (WEA ZB3) 11:38 (WEA ZB1)
12	05:13 21:54	10	21:11 (WEA VB8) 21:20 (WEA VB8)	06:01 21:05		19:56 19:54	23	07:36 (WEA VB1) 08:01 (WEA VB1)		07:48 18:41	07:47 16:37	15	11:04 (WEA ZB1) 11:09 (WEA ZB1)	93	09:43 (WEA ZB3) 11:40 (WEA ZB1)
13	05:14 21:53	9	21:11 (WEA VB8) 21:19 (WEA VB8)	06:02 21:03		19:54 19:52	25	08:01 (WEA VB1) 08:01 (WEA VB1)		18:41 18:39	16:37 16:36	23	11:09 (WEA ZB1) 11:04 (WEA ZB1)	94	09:44 (WEA ZB3) 11:40 (WEA ZB1)
14	05:15 21:52	8	21:19 (WEA VB8) 21:19 (WEA VB8)	06:04 21:01		19:52 19:49	27	08:01 (WEA VB1) 08:01 (WEA VB1)	3	17:53 (WEA VB13) 17:47 (WEA VB13)	16:36 16:34	28	11:12 (WEA ZB1) 11:15 (WEA ZB1)		11:40 (WEA ZB3) 11:41 (WEA ZB1)
15	05:17 21:51	7	21:11 (WEA VB8) 21:18 (WEA VB8)	06:06 20:59		19:49 19:47	27	08:01 (WEA VB1) 08:01 (WEA VB1)		17:47 (WEA VB13) 17:54 (WEA VB13)	16:34 16:32	28	11:15 (WEA ZB1) 11:04 (WEA ZB1)	96	09:44 (WEA ZB3) 11:41 (WEA ZB1)
16	05:18 21:50	5	21:11 (WEA VB8) 21:16 (WEA VB8)	06:08 20:57		19:47 19:44	28	08:01 (WEA VB1) 08:00 (WEA VB1)	13	17:54 (WEA VB13) 17:59 (WEA VB13)	16:32 16:31	37	11:17 (WEA ZB1) 10:39 (WEA ZB1)	96	09:45 (WEA ZB3) 11:42 (WEA ZB1)
17	05:19 21:49	4	21:11 (WEA VB8) 21:15 (WEA VB8)	06:09 20:55		19:44 19:42	28	07:32 (WEA VB1) 08:00 (WEA VB1)	15	17:43 (WEA VB13) 17:59 (WEA VB13)	07:57 16:29	39	10:38 (WEA ZB1) 11:20 (WEA ZB1)		09:44 (WEA ZB3) 11:41 (WEA ZB1)
18	05:21 21:48	3	21:11 (WEA VB8) 21:14 (WEA VB8)	06:11 20:53		19:42 19:39	28	07:32 (WEA VB1) 08:00 (WEA VB1)	16	17:43 (WEA VB13) 17:58 (WEA VB13)	07:59 16:28	42	10:37 (WEA ZB1) 11:21 (WEA ZB1)	97	09:45 (WEA ZB3) 11:42 (WEA ZB1)
19	05:22 21:47	1	21:12 (WEA VB8) 21:13 (WEA VB8)	06:13 20:50		19:39 19:37	28	07:32 (WEA VB1) 08:00 (WEA VB1)	15	17:42 (WEA VB13) 17:55 (WEA VB13)	08:00 16:27	44	10:36 (WEA ZB1) 11:23 (WEA ZB1)	97	09:45 (WEA ZB3) 11:43 (WEA ZB1)
20	05:23 21:45		06:15 20:48		19:37 19:34	26	07:35 (WEA VB1) 08:00 (WEA VB1)		13	17:43 (WEA VB13) 17:53 (WEA VB13)	08:02 16:25	47	11:25 (WEA ZB1) 10:35 (WEA ZB1)	98	09:45 (WEA ZB3) 11:43 (WEA ZB1)
21	05:25 21:44		06:16 20:46		19:34 19:32	25	07:37 (WEA VB1) 08:00 (WEA VB1)		10	17:53 (WEA VB13) 17:44 (WEA VB13)	16:25 16:24	49	11:24 (WEA ZB1) 10:34 (WEA ZB1)		09:46 (WEA ZB3) 11:44 (WEA ZB1)
22	05:26 21:43		06:18 20:44	9	07:13 (WEA VB2) 07:18 (WEA VB2)	23	08:00 (WEA VB1) 08:00 (WEA VB1)	8	17:44 (WEA VB13) 17:48 (WEA VB13)	50	16:24 16:23	50	11:25 (WEA ZB1) 10:34 (WEA ZB1)	98	09:46 (WEA ZB3) 11:44 (WEA ZB1)
23	05:28 21:41		06:20 20:42	9	07:14 (WEA VB2) 07:18 (WEA VB2)	21	08:00 (WEA VB1) 07:40 (WEA VB1)	4	17:48 (WEA VB13) 17:45 (WEA VB13)	52	16:23 16:08	52	11:26 (WEA ZB1) 10:34 (WEA ZB1)	98	09:47 (WEA ZB3) 11:45 (WEA ZB1)
24	05:29 21:40		06:22 20:39	13	07:16 (WEA VB2) 07:21 (WEA VB2)	19	07:42 (WEA VB3) 07:58 (WEA VB3)	1	17:46 (WEA VB13) 17:46 (WEA VB13)	53	16:21 16:20	53	11:27 (WEA ZB1) 10:34 (WEA ZB1)	98	09:47 (WEA ZB3) 11:45 (WEA ZB1)
25	05:31 21:38		06:23 20:37	15	07:18 (WEA VB2) 07:21 (WEA VB2)	16	07:44 (WEA VB3) 07:57 (WEA VB3)			54	16:19 16:18	54	11:28 (WEA ZB1) 10:33 (WEA ZB1)	98	09:48 (WEA ZB3) 11:45 (WEA ZB1)
26	05:32 21:37		06:25 20:35	17	07:23 (WEA VB2) 07:25 (WEA VB2)	13	07:46 (WEA VB3) 07:56 (WEA VB3)			55	16:17 16:16	55	11:29 (WEA ZB1) 10:33 (WEA ZB1)	97	09:49 (WEA ZB3) 11:46 (WEA ZB1)
27	05:34 21:35		06:27 20:32	19	07:22 (WEA VB2) 07:23 (WEA VB2)	10	07:48 (WEA VB3) 07:54 (WEA VB3)			56	16:18 16:17	56	11:29 (WEA ZB1) 11:30 (WEA ZB1)	97	09:49 (WEA ZB3) 11:47 (WEA ZB1)
28	05:35 21:33		06:29 20:30	20	07:24 (WEA VB2) 07:22 (WEA VB2)	6	18:29 (WEA VB12) 18:37 (WEA VB12)			57	16:16 16:16	57	11:30 (WEA ZB1) 10:33 (WEA ZB1)	98	09:50 (WEA ZB3) 11:47 (WEA ZB1)
29	05:37 21:32		06:30 20:28	20	07:26 (WEA VB2) 07:22 (WEA VB2)	8	18:27 (WEA VB12) 18:39 (WEA VB12)			58	16:15 16:15	58	11:31 (WEA ZB1) 10:32 (WEA ZB1)	96	09:51 (WEA ZB3) 11:48 (WEA ZB1)
30	05:39 21:30		06:32 20:25	20	07:28 (WEA VB2) 07:22 (WEA VB2)	12	18:26 (WEA VB12) 18:40 (WEA VB12)			59	16:14 16:14	59	11:32 (WEA ZB1) 10:32 (WEA ZB1)	94	09:51 (WEA ZB3) 11:48 (WEA ZB1)
31	05:40 21:28		06:34 20:23	19	07:01 (WEA VB2) 07:20 (WEA VB2)	14	18:40 (WEA VB12) 18:40 (WEA VB12)			60	16:14 16:14	60	11:32 (WEA ZB1) 10:32 (WEA ZB1)		09:52 (WEA ZB3) 11:48 (WEA ZB1)
Sonnenscheinstunden		511	459		382		329			260		234			
astr.max.mögl.Beschattung		81	172		505		156		911		2825				

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) Schattenende (WEA mit letztem Schatten)
	Sonnenuntergang (SS:MM)			

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO25 - Tain 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:46 16:18	08:16 17:09	08:43 (WEA ZB3) 09:08 (WEA ZB2)	07:19 18:05	27	08:14 (WEA ZB1) 08:41 (WEA ZB1)	07:04 20:02	11	07:28 (WEA VB1) 07:38 (WEA VB1)	05:55 20:57	05:06 21:47
2	08:45 16:20	08:14 17:11	08:41 (WEA ZB3) 16:34 (WEA VB13)	07:16 18:06	24	08:16 (WEA ZB1) 08:40 (WEA ZB1)	07:02 20:04	13	07:25 (WEA VB1) 07:38 (WEA VB1)	05:53 20:59	05:06 21:48
3	08:45 16:21	08:12 17:13	08:40 (WEA ZB3) 16:40 (WEA VB13)	07:14 18:08	20	08:17 (WEA ZB1) 08:37 (WEA ZB1)	06:59 20:06	13	07:24 (WEA VB1) 07:37 (WEA VB1)	05:51 21:01	05:05 21:49
4	08:45 16:22	08:11 17:15	08:38 (WEA ZB3) 16:42 (WEA VB13)	07:12 18:10	13	08:21 (WEA ZB1) 08:34 (WEA ZB1)	06:57 20:08	10	07:25 (WEA VB1) 07:35 (WEA VB1)	05:49 21:03	05:04 21:50
5	08:45 16:23	08:09 17:17	08:36 (WEA ZB3) 16:44 (WEA VB13)	07:09 18:12			06:54 20:10	3	07:28 (WEA VB1) 07:31 (WEA VB1)	05:47 21:04	05:03 21:51
6	08:44 16:24	08:07 17:19	08:36 (WEA ZB3) 16:45 (WEA VB13)	07:07 18:14			06:52 20:12			05:45 21:06	05:02 21:52
7	08:44 16:26	08:05 17:21	08:32 (WEA ZB1) 16:46 (WEA VB13)	07:05 18:16			06:50 20:13			05:44 21:08	05:02 21:53
8	08:43 16:27	08:03 17:23	08:30 (WEA ZB1) 16:47 (WEA VB13)	07:02 18:18	13	17:38 (WEA VB12) 17:51 (WEA VB12)	06:47 20:15			05:42 21:10	05:01 21:54
9	08:43 16:29	08:01 17:25	08:28 (WEA ZB1) 16:48 (WEA VB13)	07:00 18:20	17	17:36 (WEA VB12) 17:53 (WEA VB12)	06:45 20:17	4	19:39 (WEA VB11) 19:43 (WEA VB11)	05:40 21:12	05:01 21:55
10	08:42 16:30	07:59 17:27	08:26 (WEA ZB1) 16:49 (WEA VB13)	06:58 18:22	21	17:33 (WEA VB12) 17:54 (WEA VB12)	06:42 20:19	12	19:34 (WEA VB11) 19:46 (WEA VB11)	05:38 21:13	05:00 21:56
11	08:41 16:32	07:57 17:29	08:24 (WEA ZB1) 16:49 (WEA VB13)	06:55 18:24	24	17:32 (WEA VB12) 17:56 (WEA VB12)	06:40 20:21	15	19:33 (WEA VB11) 19:48 (WEA VB11)	05:36 21:15	05:00 21:57
12	08:41 16:33	07:55 17:31	08:22 (WEA ZB1) 16:50 (WEA VB13)	06:53 18:25	26	17:31 (WEA VB12) 17:57 (WEA VB12)	06:38 20:23	18	19:31 (WEA VB11) 19:49 (WEA VB11)	05:34 21:17	04:59 21:58
13	08:40 16:35	07:53 17:33	08:19 (WEA ZB1) 16:49 (WEA VB13)	06:50 18:27	26	17:30 (WEA VB12) 17:57 (WEA VB12)	06:35 20:24	18	19:30 (WEA VB11) 19:49 (WEA VB11)	05:33 21:18	04:59 21:58
14	08:39 16:36	07:51 17:35	08:17 (WEA ZB1) 16:49 (WEA VB13)	06:48 18:29	27	17:30 (WEA VB12) 17:57 (WEA VB12)	06:33 20:26	19	19:29 (WEA VB11) 19:49 (WEA VB11)	05:31 21:20	04:59 21:59
15	08:38 16:38	07:49 17:37	08:15 (WEA ZB1) 16:50 (WEA VB13)	06:46 18:31	29	17:28 (WEA VB12) 17:57 (WEA VB12)	06:31 20:28	20	19:29 (WEA VB11) 19:49 (WEA VB11)	05:29 21:22	04:58 22:00
16	08:37 16:40	07:47 17:39	08:13 (WEA ZB1) 16:50 (WEA VB13)	06:43 18:33	29	17:28 (WEA VB12) 17:57 (WEA VB12)	06:28 20:30	21	19:28 (WEA VB11) 19:49 (WEA VB11)	05:27 21:23	04:58 22:00
17	08:36 16:41	07:45 17:41	08:11 (WEA ZB1) 16:49 (WEA VB13)	06:41 18:35	28	17:28 (WEA VB12) 17:56 (WEA VB12)	06:26 20:32	20	19:28 (WEA VB11) 19:48 (WEA VB11)	05:26 21:25	04:58 22:01
18	08:35 16:43	07:43 17:43	08:10 (WEA ZB1) 16:48 (WEA VB13)	06:38 18:37	28	17:28 (WEA VB12) 17:56 (WEA VB12)	06:24 20:34	20	19:28 (WEA VB11) 19:48 (WEA VB11)	05:24 21:27	04:58 22:01
19	08:34 16:45	07:41 17:45	08:10 (WEA ZB1) 16:48 (WEA VB13)	06:36 18:39	28	17:28 (WEA VB12) 17:55 (WEA VB12)	06:22 20:35	20	19:29 (WEA VB11) 19:47 (WEA VB11)	05:23 21:28	04:58 22:01
20	08:33 16:47	07:39 17:47	08:10 (WEA ZB1) 16:47 (WEA VB13)	06:33 18:40	27	17:29 (WEA VB12) 17:54 (WEA VB12)	06:19 20:37	18	19:29 (WEA VB11) 19:47 (WEA VB11)	05:21 21:30	04:58 22:02
21	08:32 16:48	07:37 17:49	08:11 (WEA ZB1) 16:46 (WEA VB13)	06:31 18:42	25	17:29 (WEA VB12) 17:53 (WEA VB12)	06:17 20:39	18	19:30 (WEA VB11) 19:44 (WEA VB11)	05:20 21:31	04:58 22:02
22	08:30 16:50	07:34 17:51	08:10 (WEA ZB1) 16:44 (WEA VB13)	06:28 18:44	24	17:30 (WEA VB12) 17:52 (WEA VB12)	06:15 20:41	14	19:31 (WEA VB11) 19:43 (WEA VB11)	05:18 21:33	04:58 22:02
23	08:29 16:52	07:32 17:53	08:10 (WEA ZB1) 16:43 (WEA VB13)	06:26 18:46	22	17:32 (WEA VB12) 17:50 (WEA VB12)	06:13 20:43	12	19:43 (WEA VB11) 19:34 (WEA VB11)	05:17 21:34	04:59 22:02
24	08:28 16:54	07:30 17:55	08:11 (WEA ZB1) 16:40 (WEA VB13)	06:24 18:48	18	17:33 (WEA VB12) 17:47 (WEA VB12)	06:10 20:45	6	19:40 (WEA VB11) 19:47 (WEA VB11)	05:16 21:36	04:59 22:02
25	08:26 16:56	07:28 17:57	08:12 (WEA ZB1) 16:34 (WEA VB13)	06:21 18:50	14	17:38 (WEA VB12) 17:43 (WEA VB12)	06:08 20:46			05:14 21:37	04:59 22:03
26	08:25 16:58	07:26 17:59	08:11 (WEA ZB1) 09:03 (WEA ZB2)	06:19 18:51	5		06:06 20:48			05:13 21:39	05:00 22:02
27	08:24 17:00	07:23 18:01	08:13 (WEA ZB1) 09:05 (WEA ZB2)	06:16 18:53			06:04 20:50			05:12 21:40	05:00 22:02
28	08:22 17:01	07:21 18:03	08:13 (WEA ZB1) 09:06 (WEA ZB2)	06:14 18:55	2	06:37 (WEA VB1) 06:39 (WEA VB1)	06:02 20:52			05:11 21:42	05:01 22:02
29	08:21 17:03	08:49 (WEA ZB3) 09:07 (WEA ZB2)		07:11 19:57	5	07:35 (WEA VB1) 07:40 (WEA VB1)	06:00 20:54			05:10 21:43	05:01 22:02
30	08:19 17:05	08:47 (WEA ZB3) 09:08 (WEA ZB2)		07:09 19:59	7	07:32 (WEA VB1) 07:39 (WEA VB1)	05:58 20:55			05:08 21:44	05:02 22:02
31	08:17 17:07	08:45 (WEA ZB3) 09:08 (WEA ZB2)		07:07 20:01	9	07:30 (WEA VB1) 07:39 (WEA VB1)				05:07 21:46	
Sonnenscheinstunden		251		367		419			493		509
astr.max.mögl.Beschattung		117	1567	511	287	323	3				

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:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO25 - Tain 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember	
1	05:03	05:42	20:42 (WEA VB10)	06:36	19:32 (WEA VB11)	07:29	18:10 (WEA VB12)	07:26	07:56 (WEA ZB1)	08:21	
	22:02	21:27	10 20:52 (WEA VB10)	20:21	14 19:46 (WEA VB11)	19:07	26 18:36 (WEA VB12)	16:57	70 16:18 (WEA VB13)	16:13	
2	05:03	05:44	20:44 (WEA VB10)	06:38	19:33 (WEA VB11)	07:30	18:11 (WEA VB12)	07:28	07:58 (WEA ZB1)	08:22	
	22:01	21:25	7 20:51 (WEA VB10)	20:18	12 19:45 (WEA VB11)	19:05	24 18:35 (WEA VB12)	16:55	69 16:18 (WEA VB13)	16:13	
3	05:04	05:45		06:39	19:36 (WEA VB11)	07:32	18:11 (WEA VB12)	07:30	08:00 (WEA ZB1)	08:24	
	22:01	21:23		20:16	4 19:40 (WEA VB11)	19:03	22 18:33 (WEA VB12)	16:53	65 16:17 (WEA VB13)	16:12	
4	05:05	05:47		06:41		07:34	18:12 (WEA VB12)	07:32	08:02 (WEA ZB1)	08:25	
	22:00	21:21		20:13		19:00	19 18:31 (WEA VB12)	16:52	59 16:16 (WEA VB13)	16:11	
5	05:06	05:49		06:43		07:36	18:14 (WEA VB12)	07:34	08:05 (WEA ZB1)	08:27	
	22:00	21:19		20:11		18:58	15 18:29 (WEA VB12)	16:50	57 16:15 (WEA VB13)	16:11	
6	05:07	05:50		06:45		07:38	18:17 (WEA VB12)	07:36	08:06 (WEA ZB1)	08:28	
	21:59	21:17		20:09		18:55	8 18:25 (WEA VB12)	16:48	53 16:13 (WEA VB13)	16:10	
7	05:08	05:52		06:46		07:39		07:38	08:12 (WEA ZB1)	08:29	
	21:58	21:16		20:06	2 07:26 (WEA VB1)	18:53		16:46	47 16:11 (WEA VB13)	16:10	
8	05:09	05:54		06:48		07:41		07:40	08:10 (WEA ZB1)	08:31	
	21:58	21:14		20:04	10 07:30 (WEA VB1)	18:51		16:44	41 16:09 (WEA VB13)	16:09	
9	05:10	05:56		06:50		07:43		07:42	08:12 (WEA ZB1)	08:32	
	21:57	21:12		20:01	12 07:30 (WEA VB1)	18:48	7 09:06 (WEA ZB1)	16:42	27 08:39 (WEA ZB2)	16:09	
10	05:11	05:57		06:52		07:45		07:44	08:14 (WEA ZB1)	08:33	
	21:56	21:10		19:59	13 07:31 (WEA VB1)	18:46	16 09:09 (WEA ZB1)	16:41	25 08:39 (WEA ZB2)	16:09	
11	05:12	05:59		06:53		07:47		07:45	08:17 (WEA ZB1)	08:34	
	21:55	21:08		19:57	12 07:32 (WEA VB1)	18:43	22 09:12 (WEA ZB1)	16:39	23 08:40 (WEA ZB2)	16:09	
12	05:13	20:43 (WEA VB10)	06:01	06:55		07:48		07:47	08:19 (WEA ZB1)	08:35	
	21:54	6 20:49 (WEA VB10)	21:06	19:54	10 07:32 (WEA VB1)	18:41	26 09:14 (WEA ZB1)	16:37	21 08:40 (WEA ZB2)	16:08	
13	05:14	20:42 (WEA VB10)	06:02	06:57		07:50		07:49	08:21 (WEA ZB1)	08:36	
	21:53	9 20:51 (WEA VB10)	21:03	19:52	8 07:31 (WEA VB1)	18:39	28 09:15 (WEA ZB1)	16:36	18 08:39 (WEA ZB2)	16:08	
14	05:15	20:42 (WEA VB10)	06:04	06:59		07:52		07:51	08:23 (WEA ZB1)	08:37	
	21:52	11 20:53 (WEA VB10)	21:01	19:49	5 07:30 (WEA VB1)	18:36	31 09:16 (WEA ZB1)	16:34	16 08:39 (WEA ZB2)	16:08	
15	05:17	20:41 (WEA VB10)	06:06	07:00		07:54		07:53	08:25 (WEA ZB1)	08:38	
	21:51	12 20:53 (WEA VB10)	20:59	19:47	2 07:29 (WEA VB1)	18:34	33 09:17 (WEA ZB1)	16:32	13 08:38 (WEA ZB2)	16:08	
16	05:18	20:40 (WEA VB10)	06:08	07:02		07:56		07:55	08:27 (WEA ZB1)	08:39	
	21:50	14 20:54 (WEA VB10)	20:57	19:44		18:32	35 09:18 (WEA ZB1)	16:31	11 08:38 (WEA ZB2)	16:08	
17	05:19	20:39 (WEA VB10)	06:09	07:04		07:58		07:57	08:29 (WEA ZB1)	08:40	
	21:49	15 20:54 (WEA VB10)	20:55	19:42		18:30	43 17:09 (WEA VB13)	16:29	8 08:37 (WEA ZB2)	16:08	
18	05:21	20:39 (WEA VB10)	06:11	07:06		08:00		07:59	08:31 (WEA ZB1)	08:41	
	21:48	16 20:55 (WEA VB10)	20:53	19:39		18:27	53 17:13 (WEA VB13)	16:28	5 08:36 (WEA ZB2)	16:09	
19	05:22	20:39 (WEA VB10)	06:13	07:07		08:01		08:00	08:33 (WEA ZB1)	08:42	
	21:47	17 20:56 (WEA VB10)	20:51	19:37	13 18:21 (WEA VB12)	18:25	58 17:15 (WEA VB13)	16:27	2 08:35 (WEA ZB2)	16:09	
20	05:23	20:38 (WEA VB10)	06:15	07:09		18:25		18:02		08:42	
	21:45	18 20:56 (WEA VB10)	20:48	7 19:39 (WEA VB11)	17 18:34 (WEA VB12)	18:23	61 17:16 (WEA VB13)	16:25		16:09	
21	05:25	20:38 (WEA VB10)	06:16	07:11		18:23		18:04		08:43	
	21:44	18 20:56 (WEA VB10)	20:46	12 19:37 (WEA VB11)	21 18:16 (WEA VB12)	18:23	64 17:17 (WEA VB13)	16:24		16:10	
22	05:26	20:38 (WEA VB10)	06:18	07:13		18:21		18:06		08:43	
	21:43	19 20:57 (WEA VB10)	20:44	15 19:34 (WEA VB11)	23 18:15 (WEA VB12)	18:07	66 17:18 (WEA VB13)	16:23		16:10	
23	05:28	20:38 (WEA VB10)	06:20	07:14		18:18		18:08		08:44	
	21:41	19 20:57 (WEA VB10)	20:42	17 19:33 (WEA VB11)	26 18:13 (WEA VB12)	18:09	66 17:18 (WEA VB13)	16:21		16:11	
24	05:29	20:39 (WEA VB10)	06:22	07:16		18:11		18:09		08:44	
	21:40	18 20:57 (WEA VB10)	20:39	19 19:50 (WEA VB11)	26 18:12 (WEA VB12)	18:14	68 17:19 (WEA VB13)	16:20		16:11	
25	05:31	20:38 (WEA VB10)	06:23	07:18		18:13		18:11		08:45	
	21:38	19 20:57 (WEA VB10)	20:37	20 19:31 (WEA VB11)	28 18:11 (WEA VB12)	17:13	68 16:19 (WEA VB13)	16:19		16:12	
26	05:32	20:38 (WEA VB10)	06:25	07:20		17:15		18:13		08:45	
	21:37	19 20:57 (WEA VB10)	20:35	20 19:31 (WEA VB11)	28 18:11 (WEA VB12)	17:17	66 16:19 (WEA VB13)	16:18		16:13	
27	05:34	20:39 (WEA VB10)	06:27	07:21		17:17		18:14		08:45	
	21:35	18 20:57 (WEA VB10)	20:32	20 19:31 (WEA VB11)	29 18:10 (WEA VB12)	17:17	63 16:19 (WEA VB13)	16:17		16:13	
28	05:36	20:39 (WEA VB10)	06:29	07:23		17:19		18:16		08:45	
	21:33	17 20:56 (WEA VB10)	20:30	20 19:30 (WEA VB11)	29 18:09 (WEA VB12)	17:05	69 16:19 (WEA VB13)	16:16		16:14	
29	05:37	20:40 (WEA VB10)	06:31	07:25		17:21		18:18		08:46	
	21:32	16 20:56 (WEA VB10)	20:28	20 19:30 (WEA VB11)	28 18:09 (WEA VB12)	17:03	72 16:19 (WEA VB13)	16:15		16:15	
30	05:39	20:40 (WEA VB10)	06:32	07:27		17:22		18:19		08:46	
	21:30	15 20:55 (WEA VB10)	20:25	18 19:31 (WEA VB11)	28 18:37 (WEA VB12)	17:01	73 16:18 (WEA VB13)	16:14		16:16	
31	05:40	20:41 (WEA VB10)	06:34	07:24		17:24		18:19		08:46	
	21:28	13 20:54 (WEA VB10)	20:23	18 19:48 (WEA VB11)		16:59	73 16:18 (WEA VB13)			16:17	
Sonnenscheinstunden		511	459	382	400	329	260	234			
astr.max.mögl.Beschattung		309	223	400	1275	630					

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO26 - Werpott 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

		Januar	Februar			März			April			Mai			Juni		
1	08:46 16:18	08:16 17:09				07:19 18:05	32	07:45 (WEA B2) 08:17 (WEA B2)	07:04 20:02	73	07:54 (WEA B1) 19:13 (WEA B1)	05:55 20:57	32	19:39 (WEA B12) 20:11 (WEA B12)	05:06 21:47	21	20:40 (WEA B11) 21:01 (WEA B11)
2	08:45 16:20	08:14 17:11				07:16 18:06	31	07:46 (WEA B2) 08:17 (WEA B2)	07:02 20:04	70	07:55 (WEA B1) 19:12 (WEA B1)	05:53 20:59	31	19:39 (WEA B12) 20:10 (WEA B12)	05:06 21:48	21	20:40 (WEA B11) 21:01 (WEA B11)
3	08:45 16:21	08:12 17:13				07:14 18:08	31	07:45 (WEA B2) 08:16 (WEA B2)	06:59 20:06	66	07:56 (WEA B1) 19:12 (WEA B1)	05:51 21:01	30	20:40 (WEA B12) 19:10 (WEA B12)	05:05 21:49	21	20:40 (WEA B11) 21:01 (WEA B11)
4	08:45 16:22	08:11 17:15				07:12 18:10	29	07:46 (WEA B2) 08:15 (WEA B2)	06:57 20:08	62	07:57 (WEA B1) 19:11 (WEA B1)	05:49 21:03	29	20:40 (WEA B12) 19:09 (WEA B12)	05:04 21:50	21	20:41 (WEA B11) 21:02 (WEA B11)
5	08:45 16:23	08:09 17:17				07:09 18:12	28	07:47 (WEA B2) 08:15 (WEA B2)	06:54 20:10	56	08:00 (WEA B1) 19:11 (WEA B1)	05:47 21:04	28	20:40 (WEA B12) 19:08 (WEA B12)	05:03 21:51	20	20:41 (WEA B11) 21:01 (WEA B11)
6	08:44 16:24	08:07 17:19				07:07 18:14	26	07:47 (WEA B2) 08:13 (WEA B2)	06:52 20:12	46	08:05 (WEA B1) 19:11 (WEA B1)	05:45 21:06	26	20:40 (WEA B12) 20:08 (WEA B12)	05:02 21:52	21	20:41 (WEA B11) 21:01 (WEA B11)
7	08:44 16:26	08:05 17:21				07:05 18:16	24	07:48 (WEA B2) 08:12 (WEA B2)	06:50 20:13	37	18:32 (WEA B1) 19:09 (WEA B1)	05:44 21:08	25	20:41 (WEA B12) 20:07 (WEA B12)	05:02 21:53	21	20:41 (WEA B11) 21:02 (WEA B11)
8	08:43 16:27	08:03 17:23				07:02 18:18	21	07:49 (WEA B2) 08:10 (WEA B2)	06:47 20:15	35	18:33 (WEA B1) 19:08 (WEA B1)	05:42 21:10	23	20:41 (WEA B12) 20:06 (WEA B12)	05:01 21:54	20	20:41 (WEA B11) 21:01 (WEA B11)
9	08:43 16:29	08:01 17:25				07:00 18:20	17	07:51 (WEA B2) 08:08 (WEA B2)	06:45 20:17	33	18:34 (WEA B1) 19:07 (WEA B1)	05:40 21:12	20	20:41 (WEA B12) 20:04 (WEA B12)	05:01 21:55	20	20:42 (WEA B11) 21:02 (WEA B11)
10	08:42 16:30	07:59 17:27				06:58 18:22	11	07:53 (WEA B2) 08:04 (WEA B2)	06:43 20:19	31	18:34 (WEA B1) 19:05 (WEA B1)	05:38 21:13	17	20:41 (WEA B12) 20:03 (WEA B12)	05:00 21:56	20	20:42 (WEA B11) 21:02 (WEA B11)
11	08:41 16:32	07:57 17:29				06:55 18:24			06:40 20:21	29	18:35 (WEA B1) 19:04 (WEA B1)	05:36 21:15	14	20:41 (WEA B12) 19:47 (WEA B12)	05:00 21:57	20	20:42 (WEA B11) 21:02 (WEA B11)
12	08:41 16:33	07:55 17:31				06:53 18:25			06:38 20:23	26	18:37 (WEA B1) 19:03 (WEA B1)	05:34 21:17	8	20:41 (WEA B12) 19:50 (WEA B12)	04:59 21:58	20	20:42 (WEA B11) 21:02 (WEA B11)
13	08:40 16:35	07:53 17:33				06:50 18:27	9	07:14 (WEA B3) 07:23 (WEA B1)	06:35 20:24	22	18:38 (WEA B1) 19:00 (WEA B1)	05:33 21:18			04:59 21:58	20	20:43 (WEA B11) 21:03 (WEA B11)
14	08:39 16:36	07:51 17:35				06:48 18:29	14	07:12 (WEA B1) 07:26 (WEA B1)	06:33 20:26	16	18:41 (WEA B1) 18:57 (WEA B1)	05:31 21:20			04:59 21:59	20	20:43 (WEA B11) 21:03 (WEA B11)
15	08:38 16:38	07:49 17:37				06:46 18:31	19	07:09 (WEA B1) 07:28 (WEA B1)	06:31 20:28	4	18:47 (WEA B1) 18:51 (WEA B1)	05:29 21:22			04:58 22:00	19	20:44 (WEA B11) 21:03 (WEA B11)
16	08:37 16:40	07:47 17:39				06:43 18:33	22	07:07 (WEA B1) 07:29 (WEA B1)	06:28 20:30			05:27 21:23			04:58 22:00	19	20:44 (WEA B11) 21:03 (WEA B11)
17	08:36 16:41	07:45 17:41	3	08:11 (WEA B3) 08:14 (WEA B3)	06:41 18:35	26	07:04 (WEA B1) 07:30 (WEA B1)	06:26 20:32				05:26 21:25			04:58 22:01	18	20:44 (WEA B11) 21:02 (WEA B11)
18	08:35 16:43	07:43 17:43	6	08:08 (WEA B3) 08:14 (WEA B3)	06:38 18:37	29	07:02 (WEA B1) 07:31 (WEA B1)	06:24 20:34	9	19:53 (WEA B12) 20:02 (WEA B12)	05:24 21:27			04:58 22:01	19	20:45 (WEA B11) 21:04 (WEA B11)	
19	08:34 16:45	07:41 17:45	9	08:06 (WEA B3) 08:15 (WEA B3)	06:36 18:39	32	06:59 (WEA B1) 07:31 (WEA B1)	06:22 20:35	15	19:50 (WEA B12) 20:05 (WEA B12)	05:23 21:28			04:58 22:01	19	20:45 (WEA B11) 21:04 (WEA B11)	
20	08:33 16:47	07:39 17:47	12	08:04 (WEA B3) 08:16 (WEA B3)	06:33 18:40	47	06:57 (WEA B1) 18:02 (WEA B13)	06:19 20:37	20	19:47 (WEA B12) 20:07 (WEA B12)	05:21 21:30			04:58 22:02	19	20:45 (WEA B11) 21:04 (WEA B11)	
21	08:32 16:48	07:37 17:49	15	08:02 (WEA B3) 08:17 (WEA B3)	06:31 18:42	57	06:54 (WEA B1) 18:05 (WEA B13)	06:17 20:39	23	19:45 (WEA B12) 20:08 (WEA B12)	05:20 21:31	8	20:45 (WEA B11) 20:53 (WEA B11)	04:58 22:02	19	20:45 (WEA B11) 21:04 (WEA B11)	
22	08:30 16:50	07:34 17:51	18	07:59 (WEA B3) 08:17 (WEA B3)	06:29 18:44	62	06:54 (WEA B1) 18:07 (WEA B13)	06:15 20:41	25	19:44 (WEA B12) 20:09 (WEA B12)	05:18 21:33	11	20:44 (WEA B11) 20:55 (WEA B11)	04:58 22:02	19	20:45 (WEA B11) 21:04 (WEA B11)	
23	08:29 16:52	07:32 17:53	20	07:57 (WEA B3) 08:17 (WEA B3)	06:26 18:46	67	06:54 (WEA B1) 18:10 (WEA B13)	06:13 20:43	27	19:43 (WEA B12) 20:10 (WEA B12)	05:17 21:34	13	20:43 (WEA B11) 20:56 (WEA B11)	04:59 22:02	19	20:45 (WEA B11) 21:04 (WEA B11)	
24	08:28 16:54	07:30 17:55	22	07:55 (WEA B3) 08:17 (WEA B3)	06:24 18:48	70	06:53 (WEA B1) 18:10 (WEA B13)	06:10 20:45	28	19:42 (WEA B12) 20:10 (WEA B12)	05:16 21:36	15	20:42 (WEA B11) 20:57 (WEA B11)	04:59 22:02	19	20:46 (WEA B11) 21:05 (WEA B11)	
25	08:26 16:56	07:28 17:57	24	07:53 (WEA B3) 08:17 (WEA B3)	06:21 18:50	73	06:53 (WEA B1) 18:12 (WEA B13)	06:08 20:46	30	19:41 (WEA B12) 20:11 (WEA B12)	05:14 21:37	16	20:42 (WEA B11) 20:58 (WEA B11)	04:59 22:03	19	20:46 (WEA B11) 21:05 (WEA B11)	
26	08:25 16:58	07:26 17:59	26	07:50 (WEA B2) 08:16 (WEA B3)	06:19 18:51	75	06:52 (WEA B1) 18:12 (WEA B13)	06:06 20:48	31	19:40 (WEA B12) 20:11 (WEA B12)	05:13 21:39	17	20:41 (WEA B11) 20:58 (WEA B11)	05:00 22:02	19	20:46 (WEA B11) 21:05 (WEA B11)	
27	08:24 17:00	07:23 18:01	29	07:48 (WEA B2) 08:17 (WEA B2)	06:16 18:53	76	06:52 (WEA B1) 18:13 (WEA B13)	06:04 20:50	31	19:40 (WEA B12) 20:11 (WEA B12)	05:12 21:40	19	20:40 (WEA B11) 20:59 (WEA B11)	05:00 22:02	19	20:46 (WEA B11) 21:05 (WEA B11)	
28	08:22 17:01	07:21 18:03	31	07:45 (WEA B2) 08:16 (WEA B2)	06:14 18:55	77	06:52 (WEA B1) 18:13 (WEA B13)	06:02 20:52	31	19:40 (WEA B12) 20:11 (WEA B12)	05:11 21:42	19	20:40 (WEA B11) 20:59 (WEA B11)	05:01 22:02	19	20:47 (WEA B11) 21:06 (WEA B11)	
29	08:20 17:03				07:11 19:57	75	07:53 (WEA B1) 19:13 (WEA B13)	06:00 20:54	31	19:40 (WEA B12) 20:11 (WEA B12)	05:10 21:43	19	20:40 (WEA B11) 20:59 (WEA B11)	05:01 22:02	20	20:46 (WEA B11) 21:06 (WEA B11)	
30	08:19 17:05				07:09 19:59	77	07:52 (WEA B1) 19:13 (WEA B13)	05:58 20:55	32	19:39 (WEA B12) 20:11 (WEA B12)	05:08 21:44	20	20:41 (WEA B11) 21:01 (WEA B11)	05:02 22:02	19	20:47 (WEA B11) 21:07 (WEA B11)	
31	08:17 17:07				07:07 20:01	75	07:53 (WEA B1) 19:13 (WEA B13)				05:07 21:46	21	20:40 (WEA B11) 21:01 (WEA B11)				
Sonnenscheinstunden		251	274			367			419			493			509		
astr.max.mögl.Beschattung			215			1232			939			461			590		

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)
1			
2			
3			
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31			

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO26 - Watpott 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember			
1	05:03	20:46 (WEA VB11)	05:42	19:59 (WEA VB12)	06:36	18:34 (WEA VB13)	07:29	07:55 (WEA ZB1)	07:26	08:21				
	22:02	20	21:06 (WEA VB11)	21:27	11	20:10 (WEA VB12)	20:21	29	19:03 (WEA VB13)	19:07	5	08:00 (WEA ZB1)	16:57	16:14
2	05:03		20:47 (WEA VB11)	05:44		19:57 (WEA VB12)	06:38		18:33 (WEA VB13)	07:30			07:28	08:22
	22:01	20	21:07 (WEA VB11)	21:25	15	20:12 (WEA VB12)	20:18	31	19:04 (WEA VB13)	19:05			16:55	16:13
3	05:04		20:47 (WEA VB11)	05:45		19:56 (WEA VB12)	06:39		18:31 (WEA VB13)	07:32		08:33 (WEA ZB2)	07:30	08:24
	22:01	20	21:07 (WEA VB11)	21:23	18	20:14 (WEA VB12)	20:16	33	19:04 (WEA VB13)	19:03	7	08:40 (WEA ZB2)	16:53	16:12
4	05:05		20:47 (WEA VB11)	05:47		19:54 (WEA VB12)	06:41		18:30 (WEA VB13)	07:34		08:29 (WEA ZB2)	07:32	08:25
	22:00	21	21:08 (WEA VB11)	21:21	21	20:15 (WEA VB12)	20:13	35	19:05 (WEA VB13)	19:00	15	08:44 (WEA ZB2)	16:52	16:11
5	05:06		20:47 (WEA VB11)	05:49		19:53 (WEA VB12)	06:43		18:29 (WEA VB13)	07:36		08:26 (WEA ZB2)	07:34	08:27
	22:00	20	21:07 (WEA VB11)	21:19	23	20:16 (WEA VB12)	20:11	37	19:06 (WEA VB13)	18:58	20	08:46 (WEA ZB2)	16:50	16:11
6	05:07		20:47 (WEA VB11)	05:50		19:51 (WEA VB12)	06:45		08:01 (WEA ZB1)	07:38		08:25 (WEA ZB2)	07:36	08:28
	21:59	20	21:07 (WEA VB11)	21:17	26	20:17 (WEA VB12)	20:09	44	19:06 (WEA VB13)	18:55	23	08:48 (WEA ZB2)	16:48	16:10
7	05:08		20:47 (WEA VB11)	05:52		19:51 (WEA VB12)	06:46		07:55 (WEA ZB1)	07:39		08:23 (WEA ZB2)	07:38	08:29
	21:58	21	21:08 (WEA VB11)	21:16	27	20:18 (WEA VB12)	20:06	55	19:06 (WEA VB13)	18:53	26	08:49 (WEA ZB2)	16:46	16:10
8	05:09		20:47 (WEA VB11)	05:54		19:49 (WEA VB12)	06:48		07:53 (WEA ZB1)	07:41		08:22 (WEA ZB2)	07:40	08:31
	21:58	21	21:08 (WEA VB11)	21:14	29	20:18 (WEA VB12)	20:04	61	19:06 (WEA VB13)	18:51	27	08:49 (WEA ZB2)	16:44	16:09
9	05:10		20:47 (WEA VB11)	05:56		19:49 (WEA VB12)	06:50		07:50 (WEA ZB1)	07:43		08:21 (WEA ZB2)	07:42	08:32
	21:57	21	21:08 (WEA VB11)	21:12	29	20:18 (WEA VB12)	20:01	65	19:05 (WEA VB13)	18:48	29	08:50 (WEA ZB2)	16:42	16:09
10	05:11		20:48 (WEA VB11)	05:57		19:49 (WEA VB12)	06:52		07:48 (WEA ZB1)	07:45		08:20 (WEA ZB2)	07:44	08:33
	21:56	20	21:08 (WEA VB11)	21:10	30	20:19 (WEA VB12)	19:59	70	19:06 (WEA VB13)	18:46	29	08:49 (WEA ZB2)	16:41	16:09
11	05:12		20:48 (WEA VB11)	05:59		19:48 (WEA VB12)	06:53		07:47 (WEA ZB1)	07:47		08:19 (WEA ZB2)	07:45	08:34
	21:55	20	21:08 (WEA VB11)	21:08	31	20:19 (WEA VB12)	19:57	72	19:05 (WEA VB13)	18:43	31	08:50 (WEA ZB2)	16:39	16:09
12	05:13		20:48 (WEA VB11)	06:01		19:48 (WEA VB12)	06:55		07:46 (WEA ZB1)	07:48		08:19 (WEA ZB2)	07:47	08:35
	21:54	20	21:08 (WEA VB11)	21:05	31	20:19 (WEA VB12)	19:54	74	19:05 (WEA VB13)	18:41	31	08:50 (WEA ZB2)	16:37	16:08
13	05:14		20:48 (WEA VB11)	06:02		19:48 (WEA VB12)	06:57		07:44 (WEA ZB1)	07:50		08:18 (WEA ZB2)	07:49	08:36
	21:53	20	21:08 (WEA VB11)	21:03	31	20:19 (WEA VB12)	19:52	75	19:04 (WEA VB13)	18:39	32	08:50 (WEA ZB2)	16:36	16:08
14	05:15		20:49 (WEA VB11)	06:04		19:47 (WEA VB12)	06:59		07:43 (WEA ZB1)	07:52		08:19 (WEA ZB2)	07:51	08:37
	21:52	20	21:09 (WEA VB11)	21:01	32	20:19 (WEA VB12)	19:49	76	19:04 (WEA VB13)	18:36	30	08:49 (WEA ZB2)	16:34	16:08
15	05:17		20:49 (WEA VB11)	06:06		19:47 (WEA VB12)	07:00		07:42 (WEA ZB1)	07:54		08:21 (WEA ZB2)	07:53	08:38
	21:51	20	21:09 (WEA VB11)	20:59	32	20:19 (WEA VB12)	19:47	77	19:03 (WEA VB13)	18:34	28	08:49 (WEA ZB2)	16:32	16:08
16	05:18		20:50 (WEA VB11)	06:08		19:47 (WEA VB12)	07:02		07:41 (WEA ZB1)	07:56		08:23 (WEA ZB2)	07:55	08:39
	21:50	18	21:08 (WEA VB11)	20:57	31	20:18 (WEA VB12)	19:44	75	19:01 (WEA VB13)	18:32	25	08:48 (WEA ZB3)	16:31	16:08
17	05:19		20:50 (WEA VB11)	06:09		19:47 (WEA VB12)	07:04		07:41 (WEA ZB1)	07:58		08:25 (WEA ZB3)	07:57	08:40
	21:49	18	21:08 (WEA VB11)	20:55	30	20:17 (WEA VB12)	19:42	75	19:00 (WEA VB13)	18:30	23	08:48 (WEA ZB3)	16:29	16:09
18	05:21		20:50 (WEA VB11)	06:11		19:48 (WEA VB12)	07:06		07:40 (WEA ZB1)	08:00		08:27 (WEA ZB3)	07:59	08:41
	21:48	17	21:07 (WEA VB11)	20:53	29	20:17 (WEA VB12)	19:39	74	18:59 (WEA VB13)	18:27	21	08:48 (WEA ZB3)	16:28	16:09
19	05:22		20:52 (WEA VB11)	06:13		19:47 (WEA VB12)	07:07		07:40 (WEA ZB1)	08:01		08:29 (WEA ZB3)	08:00	08:42
	21:47	15	21:07 (WEA VB11)	20:51	29	20:16 (WEA VB12)	19:37	72	18:58 (WEA VB13)	18:25	19	08:48 (WEA ZB3)	16:27	16:09
20	05:23		20:52 (WEA VB11)	06:15		19:48 (WEA VB12)	07:09		07:39 (WEA ZB1)	08:03		08:31 (WEA ZB3)	08:02	08:42
	21:45	14	21:06 (WEA VB11)	20:48	27	20:15 (WEA VB12)	19:34	68	18:56 (WEA VB13)	18:23	17	08:48 (WEA ZB3)	16:25	16:09
21	05:25		20:53 (WEA VB11)	06:16		19:49 (WEA VB12)	07:11		07:39 (WEA ZB1)	08:05		08:33 (WEA ZB3)	08:04	08:43
	21:44	12	21:05 (WEA VB11)	20:46	25	20:14 (WEA VB12)	19:32	65	18:54 (WEA VB13)	18:21	14	08:47 (WEA ZB3)	16:24	16:10
22	05:26		20:55 (WEA VB11)	06:18		19:50 (WEA VB12)	07:13		07:40 (WEA ZB1)	08:07		08:35 (WEA ZB3)	08:06	08:43
	21:43	9	21:04 (WEA VB11)	20:44	22	20:12 (WEA VB12)	19:29	59	18:51 (WEA VB13)	18:18	11	08:46 (WEA ZB3)	16:23	16:10
23	05:28		20:57 (WEA VB11)	06:20		19:51 (WEA VB12)	07:14		07:41 (WEA ZB1)	08:09		08:37 (WEA ZB3)	08:08	08:44
	21:41	5	21:02 (WEA VB11)	20:42	19	20:10 (WEA VB12)	19:27	50	18:48 (WEA VB13)	18:16	9	08:46 (WEA ZB3)	16:21	16:11
24	05:29			06:22		19:54 (WEA VB12)	07:16		07:42 (WEA ZB1)	08:11		08:39 (WEA ZB3)	08:09	08:44
	21:40			20:39	14	20:08 (WEA VB12)	19:25	33	08:15 (WEA ZB1)	18:14	5	08:44 (WEA ZB3)	16:20	16:11
25	05:31			06:23		19:56 (WEA VB12)	07:18		07:44 (WEA ZB1)	07:13		07:41 (WEA ZB3)	08:11	08:45
	21:38			20:37	8	20:04 (WEA VB12)	19:22	30	08:14 (WEA ZB1)	17:12	2	07:43 (WEA ZB3)	16:19	16:12
26	05:32			06:25			07:20		07:46 (WEA ZB1)	07:15			08:13	08:45
	21:37			20:35			19:20	27	08:13 (WEA ZB1)	17:10			16:18	16:13
27	05:34			06:27			07:21		07:48 (WEA ZB1)	07:17			08:14	08:45
	21:35			20:32			19:17	24	08:12 (WEA ZB1)	17:08			16:17	16:13
28	05:36			06:29		18:47 (WEA VB13)	07:23		07:49 (WEA ZB1)	07:19			08:16	08:45
	21:33			20:30	6	18:53 (WEA VB13)	19:15	20	08:09 (WEA ZB1)	17:06			16:16	16:14
29	05:37			06:31		18:42 (WEA VB13)	07:25		07:51 (WEA ZB1)	07:20			08:18	08:45
	21:32			20:28	16	18:58 (WEA VB13)	19:12	16	08:07 (WEA ZB1)	17:03			16:15	16:15
30	05:39			06:32		18:39 (WEA VB13)	07:27		07:53 (WEA ZB1)	07:22			08:19	08:46
	21:30			20:25	22	19:01 (WEA VB13)	19:10	11	08:04 (WEA ZB1)	17:01			16:14	16:16
31	05:40			06:34		18:36 (WEA VB13)				07:24				08:46
	21:28			20:23	26	19:02 (WEA VB13)				16:59				16:17
Sonnenscheinstunden	511			459			382			329			260	234
astr.max.mögl.Beschattung	412			690			1533			479				

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO27 - Klein Depenhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45	08:16	07:19	07:43 (WEA ZB3)	07:04	05:55
	16:18	17:09	18:05	8 07:51 (WEA ZB3)	20:02	06:47 (WEA ZB1)
2	08:45	08:14	07:16	07:41 (WEA ZB3)	07:02	05:53
	16:20	17:11	18:06	11 07:52 (WEA ZB3)	20:04	06:47 (WEA ZB1)
3	08:45	08:12	07:14	07:38 (WEA ZB3)	06:59	05:51
	16:21	17:13	18:08	15 07:53 (WEA ZB3)	20:06	06:48 (WEA ZB1)
4	08:45	08:10	07:12	07:36 (WEA ZB3)	06:57	05:49
	16:22	17:15	18:10	18 07:54 (WEA ZB3)	20:08	06:15 (WEA VB1)
5	08:45	08:09	07:09	07:34 (WEA ZB3)	06:54	05:47
	16:23	17:17	18:12	20 07:54 (WEA ZB3)	20:10	06:13 (WEA VB1)
6	08:44	08:07	07:07	07:31 (WEA ZB3)	06:52	05:45
	16:24	17:19	18:14	23 07:54 (WEA ZB3)	20:12	06:12 (WEA VB1)
7	08:44	08:05	07:05	07:29 (WEA ZB3)	06:50	05:44
	16:26	17:21	18:16	25 07:54 (WEA ZB3)	20:13	06:10 (WEA VB1)
8	08:43	08:03	07:02	07:26 (WEA ZB3)	06:47	05:42
	16:27	17:23	18:18	28 07:54 (WEA ZB3)	20:15	06:08 (WEA VB1)
9	08:43	08:01	07:00	07:24 (WEA ZB3)	06:45	05:40
	16:29	17:25	18:20	30 07:54 (WEA ZB3)	20:17	06:06 (WEA VB1)
10	08:42	07:59	06:58	07:21 (WEA ZB3)	06:43	05:38
	16:30	17:27	18:22	31 07:52 (WEA ZB3)	20:19	06:05 (WEA VB1)
11	08:41	07:57	06:55	07:19 (WEA ZB2)	06:40	05:36
	16:32	17:29	18:24	33 07:52 (WEA ZB3)	20:21	06:03 (WEA VB1)
12	08:41	07:55	06:53	07:17 (WEA ZB2)	06:38	05:34
	16:33	17:31	18:25	34 07:51 (WEA ZB3)	20:23	06:03 (WEA VB1)
13	08:40	07:53	06:50	07:14 (WEA ZB2)	06:35	05:33
	16:35	17:33	18:27	36 07:50 (WEA ZB3)	20:24	06:05 (WEA VB1)
14	08:39	07:51	06:48	07:12 (WEA ZB2)	06:33	05:31
	16:36	17:35	18:29	36 07:48 (WEA ZB3)	20:26	06:06 (WEA VB1)
15	08:38	07:49	06:46	07:09 (WEA ZB2)	06:31	05:29
	16:38	17:37	18:31	37 07:46 (WEA ZB3)	20:28	06:05 (WEA VB1)
16	08:37	07:47	06:43	07:07 (WEA ZB2)	06:28	05:27
	16:40	17:39	18:33	37 07:44 (WEA ZB3)	20:30	06:05 (WEA VB1)
17	08:36	07:45	06:41	07:06 (WEA ZB2)	06:26	05:26
	16:41	17:41	18:35	38 07:44 (WEA ZB3)	20:32	06:05 (WEA VB1)
18	08:35	07:43	06:38	07:06 (WEA ZB2)	06:24	05:24
	16:43	17:43	18:37	38 07:44 (WEA ZB3)	20:34	06:05 (WEA VB1)
19	08:34	07:41	06:36	07:05 (WEA ZB2)	06:22	05:23
	16:45	17:45	18:39	38 07:43 (WEA ZB3)	20:35	06:05 (WEA VB1)
20	08:33	07:39	06:33	07:05 (WEA ZB2)	06:19	05:21
	16:47	17:47	18:40	38 07:43 (WEA ZB3)	20:37	06:05 (WEA VB1)
21	08:32	07:37	06:31	07:05 (WEA ZB2)	06:17	05:20
	16:48	17:49	18:42	37 07:42 (WEA ZB3)	20:39	06:05 (WEA VB1)
22	08:30	07:34	06:28	07:05 (WEA ZB2)	06:15	05:18
	16:50	17:51	18:44	37 07:42 (WEA ZB3)	20:41	06:05 (WEA VB1)
23	08:29	07:32	06:26	07:06 (WEA ZB2)	06:13	05:17
	16:52	17:53	18:46	36 07:42 (WEA ZB3)	20:43	06:05 (WEA VB1)
24	08:28	07:30	06:24	07:06 (WEA ZB2)	06:10	05:16
	16:54	17:55	18:48	34 07:40 (WEA ZB3)	20:45	06:05 (WEA VB1)
25	08:26	07:28	06:21	07:07 (WEA ZB2)	06:08	05:14
	16:56	17:57	18:50	32 07:39 (WEA ZB3)	20:46	06:05 (WEA VB1)
26	08:25	07:26	06:19	07:07 (WEA ZB2)	06:06	05:13
	16:58	17:59	18:51	30 07:37 (WEA ZB3)	20:48	06:05 (WEA VB1)
27	08:24	07:23	06:16	07:08 (WEA ZB2)	06:04	05:12
	17:00	18:01	18:53	28 07:36 (WEA ZB3)	20:50	06:05 (WEA VB1)
28	08:22	07:21	06:14	07:09 (WEA ZB2)	06:02	05:11
	17:01	18:03	18:55	24 07:33 (WEA ZB3)	20:52	06:05 (WEA VB1)
29	08:20		07:11	08:11 (WEA ZB2)	06:00	05:10
	17:03		19:57	20 08:31 (WEA ZB2)	20:54	06:05 (WEA VB1)
30	08:19		07:09	08:14 (WEA ZB2)	05:58	05:08
	17:05		19:59	13 08:27 (WEA ZB2)	20:55	06:05 (WEA VB1)
31	08:17		07:07			05:07
	17:07		20:01			06:05 (WEA VB1)
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung		3	865	1190	1394	292

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)

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO27 - Klein Depenhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember
1	05:03 22:01	21:17 (WEA VB11) 21:26 (WEA VB11)	05:42 21:27	06:13 (WEA VB1) 20:55 (WEA VB12)	06:36 20:21	07:03 (WEA ZB1) 07:28 (WEA ZB1)	07:29 19:07	07:55 (WEA ZB2) 08:30 (WEA ZB3)	07:26 16:57	08:21 16:14
2	05:03 22:01	21:18 (WEA VB11) 21:26 (WEA VB11)	05:44 21:25	06:14 (WEA VB1) 20:54 (WEA VB12)	06:38 20:18	07:05 (WEA ZB1) 07:26 (WEA ZB1)	07:30 19:05	07:57 (WEA ZB2) 08:31 (WEA ZB3)	07:28 16:55	08:22 16:13
3	05:04 22:01	21:19 (WEA VB11) 21:25 (WEA VB11)	05:45 21:23	06:16 (WEA VB1) 20:52 (WEA VB12)	06:39 20:16	07:06 (WEA ZB1) 07:22 (WEA ZB1)	07:32 19:03	07:58 (WEA ZB2) 08:30 (WEA ZB3)	07:30 16:53	08:24 16:12
4	05:05 22:00	21:20 (WEA VB11) 21:25 (WEA VB11)	05:47 21:21	06:17 (WEA VB1) 20:50 (WEA VB12)	06:41 20:13	07:08 (WEA ZB1) 07:18 (WEA ZB1)	07:34 19:00	08:00 (WEA ZB2) 08:30 (WEA ZB3)	07:32 16:52	08:25 16:11
5	05:06 22:00	21:20 (WEA VB11) 21:24 (WEA VB11)	05:49 21:19	06:19 (WEA VB1) 20:49 (WEA VB12)	06:43 20:11		07:36 18:58	08:02 (WEA ZB3) 08:30 (WEA ZB3)	07:34 16:50	08:27 16:11
6	05:07 21:59		05:50 21:17	06:20 (WEA VB1) 20:22 (WEA VB13)	06:45 20:09		07:38 18:55	08:04 (WEA ZB3) 08:30 (WEA ZB3)	07:36 16:48	08:28 16:10
7	05:08 21:58	20:44 (WEA VB12) 20:49 (WEA VB12)	05:52 21:16	06:22 (WEA VB1) 20:23 (WEA VB13)	06:46 20:06		07:39 18:53	08:06 (WEA ZB3) 08:30 (WEA ZB3)	07:38 16:46	08:29 16:10
8	05:09 21:58	20:43 (WEA VB12) 20:51 (WEA VB12)	05:54 21:14	06:23 (WEA VB1) 20:22 (WEA VB13)	06:48 20:04		07:41 18:51	08:08 (WEA ZB3) 08:30 (WEA ZB3)	07:40 16:44	08:31 16:09
9	05:10 21:57	20:42 (WEA VB12) 20:52 (WEA VB12)	05:56 21:12	06:25 (WEA VB1) 20:23 (WEA VB13)	06:50 20:01		07:43 18:48	08:10 (WEA ZB3) 08:29 (WEA ZB3)	07:42 16:42	08:32 16:09
10	05:11 21:56	20:41 (WEA VB12) 20:53 (WEA VB12)	05:57 21:10	06:57 (WEA ZB1) 20:23 (WEA VB13)	06:52 19:59		07:45 18:46	08:11 (WEA ZB3) 08:27 (WEA ZB3)	07:44 16:41	08:33 16:09
11	05:12 21:55	20:40 (WEA VB12) 20:54 (WEA VB12)	05:59 21:08	06:56 (WEA ZB1) 20:23 (WEA VB13)	06:53 19:56		07:47 18:43	08:13 (WEA ZB3) 08:26 (WEA ZB3)	07:45 16:39	08:34 16:09
12	05:13 21:54	20:39 (WEA VB12) 20:55 (WEA VB12)	06:01 21:05	06:55 (WEA ZB1) 20:23 (WEA VB13)	06:55 19:54		07:48 18:41	08:15 (WEA ZB3) 08:25 (WEA ZB3)	07:47 16:37	08:35 16:08
13	05:14 21:53	20:39 (WEA VB12) 20:56 (WEA VB12)	06:02 21:03	06:55 (WEA ZB1) 20:23 (WEA VB13)	06:57 19:52	08:05 (WEA ZB2) 08:18 (WEA ZB2)	07:50 18:39	08:17 (WEA ZB3) 08:29 (WEA ZB3)	07:49 16:36	08:36 16:08
14	05:15 21:52	20:39 (WEA VB12) 20:57 (WEA VB12)	06:04 21:01	06:54 (WEA ZB1) 20:22 (WEA VB13)	06:59 19:49	08:02 (WEA ZB2) 08:21 (WEA ZB2)	07:52 18:36	08:23 (WEA ZB3) 08:19 (WEA ZB3)	07:51 16:34	08:37 16:08
15	05:17 21:51	20:38 (WEA VB12) 20:58 (WEA VB12)	06:06 20:59	06:54 (WEA ZB1) 20:22 (WEA VB13)	07:00 19:47	08:00 (WEA ZB2) 08:23 (WEA ZB2)	07:54 18:34	08:21 (WEA ZB3)	07:53 16:32	08:38 16:08
16	05:18 21:50	20:38 (WEA VB12) 20:58 (WEA VB12)	06:08 20:57	06:53 (WEA ZB1) 20:21 (WEA VB13)	07:02 19:44	07:57 (WEA ZB2) 08:24 (WEA ZB2)	07:56 18:32		07:55 16:31	08:39 16:08
17	05:19 21:49	20:37 (WEA VB12) 20:59 (WEA VB12)	06:09 20:55	06:53 (WEA ZB1) 20:20 (WEA VB13)	07:04 19:42	07:56 (WEA ZB2) 08:25 (WEA ZB2)	07:58 18:30		07:57 16:29	08:40 16:09
18	05:21 21:48	20:37 (WEA VB12) 20:59 (WEA VB12)	06:11 20:53	06:53 (WEA ZB1) 20:20 (WEA VB13)	07:06 19:39	07:54 (WEA ZB2) 08:27 (WEA ZB2)	08:00 18:27		07:59 16:28	08:41 16:09
19	05:22 21:47	20:37 (WEA VB12) 21:00 (WEA VB12)	06:13 20:51	06:52 (WEA ZB1) 20:18 (WEA VB13)	07:07 19:37	07:53 (WEA ZB2) 08:27 (WEA ZB2)	08:01 18:25		08:00 16:27	08:41 16:09
20	05:23 21:45	20:37 (WEA VB12) 21:00 (WEA VB12)	06:15 20:48	06:52 (WEA ZB1) 20:17 (WEA VB13)	07:09 19:34	07:52 (WEA ZB2) 08:27 (WEA ZB2)	08:03 18:23		08:02 16:25	08:42 16:09
21	05:25 21:44	20:36 (WEA VB12) 21:00 (WEA VB12)	06:16 20:46	06:53 (WEA ZB1) 20:16 (WEA VB13)	07:11 19:32	07:51 (WEA ZB2) 08:28 (WEA ZB2)	08:05 18:21		08:04 16:24	08:43 16:10
22	05:26 21:43	20:37 (WEA VB12) 21:01 (WEA VB12)	06:18 20:44	06:52 (WEA ZB1) 20:13 (WEA VB13)	07:13 19:29	07:50 (WEA ZB2) 08:28 (WEA ZB2)	08:07 18:18		08:06 16:23	08:43 16:10
23	05:28 21:41	20:36 (WEA VB12) 21:01 (WEA VB12)	06:20 20:42	06:52 (WEA ZB1) 20:10 (WEA VB13)	07:14 19:27	07:50 (WEA ZB2) 08:28 (WEA ZB2)	08:09 18:16		08:08 16:21	08:44 16:11
24	05:29 21:40	20:37 (WEA VB12) 21:01 (WEA VB12)	06:22 20:39	06:53 (WEA ZB1) 07:39 (WEA ZB1)	07:16 19:25	07:49 (WEA ZB2) 08:27 (WEA ZB2)	08:11 18:14		08:09 16:20	08:44 16:11
25	05:31 21:38	20:36 (WEA VB12) 21:01 (WEA VB12)	06:23 20:37	06:53 (WEA ZB1) 07:38 (WEA ZB1)	07:18 19:22	07:49 (WEA ZB2) 08:27 (WEA ZB2)	07:13 17:12		08:11 16:19	08:45 16:12
26	05:32 21:37	20:36 (WEA VB12) 21:00 (WEA VB12)	06:25 20:35	06:53 (WEA ZB1) 07:37 (WEA ZB1)	07:20 19:20	07:49 (WEA ZB2) 08:27 (WEA ZB2)	07:15 17:10		08:13 16:18	08:45 16:13
27	05:34 21:35	20:37 (WEA VB12) 21:01 (WEA VB12)	06:27 20:32	06:55 (WEA ZB1) 07:36 (WEA ZB1)	07:21 19:17	07:49 (WEA ZB2) 08:26 (WEA ZB2)	07:17 17:08		08:14 16:17	08:45 16:13
28	05:36 21:33	20:37 (WEA VB12) 21:00 (WEA VB12)	06:29 20:30	06:56 (WEA ZB1) 07:34 (WEA ZB1)	07:23 19:15	07:49 (WEA ZB2) 08:25 (WEA ZB3)	07:19 17:05		08:16 16:16	08:45 16:14
29	05:37 21:32	06:18 (WEA VB1) 21:00 (WEA VB12)	06:31 20:28	06:58 (WEA ZB1) 07:33 (WEA ZB1)	07:25 19:12	07:51 (WEA ZB2) 08:28 (WEA ZB3)	07:20 17:03		08:18 16:15	08:45 16:15
30	05:39 21:30	06:15 (WEA VB1) 20:58 (WEA VB12)	06:32 20:25	07:00 (WEA ZB1) 07:32 (WEA ZB1)	07:27 19:10	07:53 (WEA ZB2) 08:29 (WEA ZB3)	07:22 17:01		08:19 16:14	08:46 16:16
31	05:40 21:28	06:15 (WEA VB1) 20:57 (WEA VB12)	06:34 20:23	07:01 (WEA ZB1) 07:30 (WEA ZB1)			07:24 16:59			08:46 16:17
Sonnenscheinstunden		511	459		382		329		260	234
astr.max.mögl.Beschattung		622	2020		658		297			

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:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO28 - Klein Westerhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

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Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai		Juni	
1	08:45 16:18	08:16 17:09	07:19 18:04		07:43 (WEA ZB3) 07:45 (WEA ZB3)	07:04 20:02	07:41 (WEA ZB2) 08:47 (WEA ZB2)	05:55 20:57	07:51 (WEA ZB2) 20:14 (WEA VB13)	05:06 21:47
2	08:45 16:20	08:14 17:11	07:16 18:06		07:41 (WEA ZB3) 07:51 (WEA ZB3)	07:02 20:04	07:40 (WEA ZB2) 08:47 (WEA ZB2)	20:53 20:59	07:54 (WEA ZB2) 20:29 (WEA VB12)	05:06 21:48
3	08:45 16:21	08:12 17:13	07:14 18:08		07:38 (WEA ZB3) 07:54 (WEA ZB3)	06:59 20:06	07:39 (WEA ZB2) 08:47 (WEA ZB2)	05:51 21:01	07:58 (WEA ZB2) 20:31 (WEA VB12)	05:05 21:49
4	08:45 16:22	08:10 17:15	07:12 18:10		07:36 (WEA ZB3) 07:56 (WEA ZB3)	06:57 20:08	07:38 (WEA ZB2) 08:47 (WEA ZB2)	05:49 21:03	20:25 (WEA VB12) 20:32 (WEA VB12)	05:04 21:50
5	08:45 16:23	08:09 17:17	07:09 18:12		07:34 (WEA ZB3) 07:58 (WEA ZB3)	06:54 20:10	07:38 (WEA ZB2) 08:47 (WEA ZB2)	05:47 21:04	20:25 (WEA VB12) 20:34 (WEA VB12)	05:03 21:51
6	08:44 16:24	08:07 17:19	07:07 18:14		07:31 (WEA ZB3) 07:58 (WEA ZB3)	06:52 20:12	07:38 (WEA ZB2) 08:47 (WEA ZB2)	05:45 21:06	20:25 (WEA VB12) 20:36 (WEA VB12)	05:02 21:52
7	08:44 16:26	08:05 17:21	07:05 18:16		07:29 (WEA ZB3) 08:00 (WEA ZB3)	06:50 20:13	07:37 (WEA ZB2) 08:46 (WEA ZB2)	05:43 21:08	20:25 (WEA VB12) 20:38 (WEA VB12)	05:02 21:53
8	08:43 16:27	08:03 17:23	07:02 18:18		07:26 (WEA ZB3) 08:00 (WEA ZB3)	06:47 20:15	07:37 (WEA ZB2) 08:46 (WEA ZB2)	05:42 21:10	20:24 (WEA VB12) 20:39 (WEA VB12)	05:01 21:54
9	08:43 16:29	08:01 17:25	07:00 18:20		07:24 (WEA ZB3) 08:01 (WEA ZB3)	06:45 20:17	07:37 (WEA ZB2) 08:46 (WEA ZB2)	05:40 21:11	20:24 (WEA VB12) 20:40 (WEA VB12)	05:01 21:55
10	08:42 16:30	07:59 17:27	06:58 18:22		07:21 (WEA ZB3) 08:01 (WEA ZB3)	06:42 20:19	07:36 (WEA ZB2) 08:45 (WEA ZB2)	05:38 21:13	20:25 (WEA VB12) 20:41 (WEA VB12)	05:00 21:56
11	08:41 16:32	07:57 17:29	06:55 18:24		07:21 (WEA ZB3) 08:01 (WEA ZB3)	06:40 20:21	07:36 (WEA ZB2) 08:45 (WEA ZB2)	05:36 21:15	20:25 (WEA VB12) 20:40 (WEA VB12)	05:00 21:57
12	08:41 16:33	07:55 17:31	06:53 18:25		07:20 (WEA ZB3) 08:02 (WEA ZB3)	06:38 20:23	07:36 (WEA ZB2) 08:45 (WEA ZB2)	05:34 21:17	20:26 (WEA VB12) 20:39 (WEA VB12)	04:59 21:58
13	08:40 16:35	07:53 17:33	06:50 18:27		07:19 (WEA ZB3) 08:01 (WEA ZB3)	06:35 20:24	07:35 (WEA ZB2) 08:43 (WEA ZB2)	05:33 21:18	20:27 (WEA VB12) 20:38 (WEA VB12)	04:59 21:58
14	08:39 16:36	07:51 17:35	06:48 18:29		07:19 (WEA ZB3) 08:02 (WEA ZB3)	06:33 20:26	07:36 (WEA ZB2) 08:43 (WEA ZB2)	05:31 21:20	20:28 (WEA VB12) 20:36 (WEA VB12)	04:59 21:59
15	08:38 16:38	07:49 17:37	06:45 18:31		07:19 (WEA ZB3) 08:01 (WEA ZB3)	06:31 20:28	07:36 (WEA ZB2) 08:42 (WEA ZB2)	05:29 21:22	20:32 (WEA VB12) 20:34 (WEA VB12)	04:58 22:00
16	08:37 16:40	07:47 17:39	06:43 18:33		07:19 (WEA ZB3) 08:01 (WEA ZB3)	06:28 20:30	07:36 (WEA ZB2) 08:41 (WEA ZB2)	05:27 21:23		04:58 22:00
17	08:36 16:41	07:45 17:41	06:41 18:35		07:18 (WEA ZB3) 08:00 (WEA ZB3)	06:26 20:32	07:36 (WEA ZB2) 08:40 (WEA ZB2)	05:26 21:25		04:58 22:01
18	08:35 16:43	07:43 17:43	06:38 18:37		07:08 (WEA ZB2) 07:59 (WEA ZB3)	06:24 20:34	07:37 (WEA ZB2) 08:39 (WEA ZB2)	05:24 21:27		04:58 22:01
19	08:34 16:45	07:41 17:45	06:36 18:38		07:03 (WEA ZB2) 07:58 (WEA ZB3)	06:22 20:35	07:37 (WEA ZB2) 20:07 (WEA VB13)	05:23 21:28		04:58 22:01
20	08:33 16:47	07:39 17:47	06:33 18:40		07:00 (WEA ZB2) 07:57 (WEA ZB3)	06:19 20:37	07:38 (WEA ZB2) 20:09 (WEA VB13)	05:21 21:30		04:58 22:02
21	08:32 16:48	07:37 17:49	06:31 18:42		06:57 (WEA ZB2) 07:56 (WEA ZB3)	06:17 20:39	07:38 (WEA ZB2) 20:10 (WEA VB13)	05:20 21:31		04:58 22:02
22	08:30 16:50	07:34 17:51	06:28 18:44		06:55 (WEA ZB2) 07:55 (WEA ZB3)	06:15 20:41	07:38 (WEA ZB2) 20:12 (WEA VB13)	05:18 21:33		04:58 22:02
23	08:29 16:52	07:32 17:53	06:26 18:46		06:53 (WEA ZB2) 07:54 (WEA ZB3)	06:13 20:43	07:39 (WEA ZB2) 20:14 (WEA VB13)	05:17 21:34		04:59 22:02
24	08:28 16:54	07:30 17:55	06:24 18:48		06:51 (WEA ZB2) 07:51 (WEA ZB3)	06:10 20:45	07:40 (WEA ZB2) 20:16 (WEA VB13)	05:16 21:36		04:59 22:02
25	08:26 16:56	07:28 17:57	06:21 18:50		06:50 (WEA ZB2) 07:49 (WEA ZB3)	06:08 20:46	07:41 (WEA ZB2) 20:17 (WEA VB13)	05:14 21:37		04:59 22:02
26	08:25 16:58	07:25 17:59	06:19 18:51		06:47 (WEA ZB2) 07:46 (WEA ZB3)	06:06 20:48	07:42 (WEA ZB2) 20:18 (WEA VB13)	05:13 21:39		05:00 22:02
27	08:23 17:00	07:23 18:01	06:16 18:53		06:47 (WEA ZB2) 07:45 (WEA ZB2)	06:04 20:50	07:44 (WEA ZB2) 20:18 (WEA VB13)	05:12 21:40		05:00 22:02
28	08:22 17:01	07:21 18:03	06:14 18:55		06:45 (WEA ZB2) 07:45 (WEA ZB2)	06:02 20:52	07:45 (WEA ZB2) 20:17 (WEA VB13)	05:11 21:42		05:01 22:02
29	08:20 17:03		07:11 19:57		07:44 (WEA ZB2) 08:46 (WEA ZB2)	06:00 20:54	07:47 (WEA ZB2) 20:16 (WEA VB13)	05:10 21:43		05:01 22:02
30	08:19 17:05		07:09 19:59		07:42 (WEA ZB2) 08:46 (WEA ZB2)	05:57 20:55	07:48 (WEA ZB2) 20:15 (WEA VB13)	05:08 21:44		05:02 22:02
31	08:17 17:07		07:07 20:01		07:42 (WEA ZB2) 08:47 (WEA ZB2)			05:07 21:45		
Sonnenscheinstunden	251	274	367			419		493		509
astr.max.mögl.Beschattung				1364		1977		228		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	(WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	---------------------------	--------------------------------	----------------------------

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO28 - Klein Westerhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli		August		September		Oktober		November		Dezember
1	05:03	05:35 (WEA VB1)	05:42	20:36 (WEA VB12)	06:36	07:35 (WEA ZB2)	07:29	07:59 (WEA ZB3)	07:26	08:21
	22:01	6 05:41 (WEA VB1)	21:27	13 20:49 (WEA VB12)	20:21	69 08:44 (WEA ZB2)	19:07	42 08:41 (WEA ZB3)	16:57	16:13
2	05:03	05:36 (WEA VB1)	05:44	20:36 (WEA VB12)	06:38	07:35 (WEA ZB2)	07:30	07:59 (WEA ZB3)	07:28	08:22
	22:01	5 05:41 (WEA VB1)	21:25	15 20:51 (WEA VB12)	20:18	69 08:44 (WEA ZB2)	19:05	41 08:40 (WEA ZB3)	16:55	16:13
3	05:04	05:37 (WEA VB1)	05:45	20:34 (WEA VB12)	06:39	07:34 (WEA ZB2)	07:32	07:59 (WEA ZB3)	07:30	08:24
	22:01	4 05:41 (WEA VB1)	21:23	16 20:50 (WEA VB12)	20:16	69 08:43 (WEA ZB2)	19:03	40 08:39 (WEA ZB3)	16:53	16:12
4	05:05	05:38 (WEA VB1)	05:47	20:35 (WEA VB12)	06:41	07:34 (WEA ZB2)	07:34	08:00 (WEA ZB3)	07:32	08:25
	22:00	3 05:41 (WEA VB1)	21:21	15 20:50 (WEA VB12)	20:13	69 08:43 (WEA ZB2)	19:00	38 08:38 (WEA ZB3)	16:52	16:11
5	05:06	05:38 (WEA VB1)	05:49	20:35 (WEA VB12)	06:43	07:34 (WEA ZB2)	07:36	08:02 (WEA ZB3)	07:34	08:27
	22:00	2 05:40 (WEA VB1)	21:19	14 20:49 (WEA VB12)	20:11	69 08:43 (WEA ZB2)	18:58	35 08:37 (WEA ZB3)	16:50	16:11
6	05:07	05:39 (WEA VB1)	05:50	20:34 (WEA VB12)	06:45	07:33 (WEA ZB2)	07:38	08:04 (WEA ZB3)	07:36	08:28
	21:59	1 05:40 (WEA VB1)	21:17	12 20:46 (WEA VB12)	20:09	69 08:42 (WEA ZB2)	18:55	32 08:36 (WEA ZB3)	16:48	16:10
7	05:08		05:52	20:35 (WEA VB12)	06:46	07:33 (WEA ZB2)	07:39	08:06 (WEA ZB3)	07:38	08:29
	21:58		21:15	10 20:45 (WEA VB12)	20:06	69 08:42 (WEA ZB2)	18:53	29 08:35 (WEA ZB3)	16:46	16:10
8	05:09		05:54	20:34 (WEA VB12)	06:48	07:33 (WEA ZB2)	07:41	08:08 (WEA ZB3)	07:40	08:31
	21:58		21:14	9 20:43 (WEA VB12)	20:04	69 08:42 (WEA ZB2)	18:51	26 08:34 (WEA ZB3)	16:44	16:09
9	05:10		05:56	20:35 (WEA VB12)	06:50	07:33 (WEA ZB2)	07:43	08:10 (WEA ZB3)	07:42	08:32
	21:57		21:12	6 20:41 (WEA VB12)	20:01	67 08:40 (WEA ZB2)	18:48	22 08:32 (WEA ZB3)	16:42	16:09
10	05:11		05:57	08:06 (WEA ZB2)	06:52	07:33 (WEA ZB2)	07:45	08:11 (WEA ZB3)	07:44	08:33
	21:56		21:10	25 20:40 (WEA VB12)	19:59	67 08:40 (WEA ZB2)	18:46	18 08:29 (WEA ZB3)	16:41	16:09
11	05:12		05:59	08:01 (WEA ZB2)	06:53	07:33 (WEA ZB2)	07:47	08:13 (WEA ZB3)	07:45	08:34
	21:55		21:08	34 20:21 (WEA VB13)	19:56	67 08:40 (WEA ZB2)	18:43	13 08:26 (WEA ZB3)	16:39	16:09
12	05:13		06:01	07:58 (WEA ZB2)	06:55	07:34 (WEA ZB2)	07:48	08:15 (WEA ZB3)	07:47	08:35
	21:54		21:05	43 20:23 (WEA VB13)	19:54	65 08:39 (WEA ZB2)	18:41	8 08:23 (WEA ZB3)	16:37	16:08
13	05:14		06:02	07:55 (WEA ZB2)	06:57	07:33 (WEA ZB2)	07:50		07:49	08:36
	21:53		21:03	50 20:23 (WEA VB13)	19:52	64 08:37 (WEA ZB2)	18:39		16:36	16:08
14	05:15		06:04	07:54 (WEA ZB2)	06:59	07:34 (WEA ZB2)	07:52		07:51	08:37
	21:52		21:01	55 20:24 (WEA VB13)	19:49	62 08:36 (WEA ZB2)	18:36		16:34	16:08
15	05:17		06:06	07:52 (WEA ZB2)	07:00	07:35 (WEA ZB2)	07:54		07:53	08:38
	21:51		20:59	60 20:25 (WEA VB13)	19:47	60 08:35 (WEA ZB2)	18:34		16:32	16:08
16	05:18		06:08	07:50 (WEA ZB2)	07:02	07:35 (WEA ZB2)	07:56		07:55	08:39
	21:50		20:57	63 20:24 (WEA VB13)	19:44	58 08:33 (WEA ZB2)	18:32		16:31	16:08
17	05:19		06:09	07:49 (WEA ZB2)	07:04	07:36 (WEA ZB2)	07:58		07:57	08:40
	21:49		20:55	67 20:25 (WEA VB13)	19:42	58 08:34 (WEA ZB3)	18:30		16:29	16:08
18	05:21		06:11	07:48 (WEA ZB2)	07:06	07:37 (WEA ZB2)	08:00		07:59	08:41
	21:48		20:53	68 20:24 (WEA VB13)	19:39	59 08:36 (WEA ZB3)	18:27		16:28	16:09
19	05:22		06:13	07:46 (WEA ZB2)	07:07	07:38 (WEA ZB2)	08:01		08:00	08:41
	21:47		20:50	69 20:21 (WEA VB13)	19:37	60 08:38 (WEA ZB3)	18:25		16:27	16:09
20	05:23		06:15	07:45 (WEA ZB2)	07:09	07:38 (WEA ZB2)	08:03		08:02	08:42
	21:45		20:48	68 20:19 (WEA VB13)	19:34	61 08:39 (WEA ZB3)	18:23		16:25	16:09
21	05:25		06:16	07:44 (WEA ZB2)	07:11	07:40 (WEA ZB2)	08:05		08:04	08:43
	21:44		20:46	68 20:17 (WEA VB13)	19:32	60 08:40 (WEA ZB3)	18:21		16:24	16:10
22	05:26		06:18	07:42 (WEA ZB2)	07:13	07:42 (WEA ZB2)	08:07		08:06	08:43
	21:43		20:44	68 20:15 (WEA VB13)	19:29	59 08:41 (WEA ZB3)	18:18		16:23	16:10
23	05:28		06:20	07:41 (WEA ZB2)	07:14	07:43 (WEA ZB2)	08:09		08:08	08:44
	21:41		20:42	67 20:13 (WEA VB13)	19:27	58 08:41 (WEA ZB3)	18:16		16:21	16:11
24	05:29		06:22	07:41 (WEA ZB2)	07:16	07:46 (WEA ZB2)	08:11		08:09	08:44
	21:40		20:39	64 20:11 (WEA VB13)	19:25	55 08:41 (WEA ZB3)	18:14		16:20	16:11
25	05:31		06:23	07:39 (WEA ZB2)	07:18	07:49 (WEA ZB2)	07:13		08:11	08:45
	21:38		20:37	63 08:42 (WEA ZB2)	19:22	53 08:42 (WEA ZB3)	17:12		16:19	16:12
26	05:32		06:25	07:39 (WEA ZB2)	07:20	07:55 (WEA ZB2)	07:15		08:13	08:45
	21:37		20:35	64 08:43 (WEA ZB2)	19:20	47 08:42 (WEA ZB3)	17:10		16:18	16:13
27	05:34		06:27	07:38 (WEA ZB2)	07:21	08:01 (WEA ZB3)	07:17		08:14	08:45
	21:35		20:32	66 08:44 (WEA ZB2)	19:17	41 08:42 (WEA ZB3)	17:08		16:17	16:13
28	05:36		06:29	07:37 (WEA ZB2)	07:23	07:59 (WEA ZB3)	07:19		08:16	08:45
	21:33		20:30	66 08:43 (WEA ZB2)	19:15	42 08:41 (WEA ZB3)	17:05		16:16	16:14
29	05:37	20:41 (WEA VB12)	06:30	07:37 (WEA ZB2)	07:25	07:59 (WEA ZB3)	07:20		08:18	08:45
	21:32	5 20:46 (WEA VB12)	20:28	67 08:44 (WEA ZB2)	19:12	42 08:41 (WEA ZB3)	17:03		16:15	16:15
30	05:39	20:38 (WEA VB12)	06:32	07:36 (WEA ZB2)	07:27	07:59 (WEA ZB3)	07:22		08:19	08:46
	21:30	10 20:48 (WEA VB12)	20:25	68 08:44 (WEA ZB2)	19:10	42 08:41 (WEA ZB3)	17:01		16:14	16:16
31	05:40	20:37 (WEA VB12)	06:34	07:35 (WEA ZB2)			07:24			08:45
	21:28	12 20:49 (WEA VB12)	20:23	69 08:44 (WEA ZB2)			16:59			16:17
Sonnenscheinstunden	511		459		382		329		260	234
astr.max.mögl.Beschattung	48		1442		1799		344			

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:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO29 - Depenhausen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni		
1	08:45	09:19 (WEA VB14)	08:16	07:19	07:04		05:55	06:48 (WEA ZB3)	05:06	05:46 (WEA ZB2)			
	16:18	09:22 (WEA VB14)	17:09	18:05	20:02		20:57	07:10 (WEA ZB3)	21:47	06:32 (WEA ZB2)			
2	08:45	09:19 (WEA VB14)	08:14	07:16	07:02		05:53	06:50 (WEA ZB3)	05:06	05:46 (WEA ZB2)			
	16:20	09:23 (WEA VB14)	17:11	18:06	20:04		20:59	07:08 (WEA ZB3)	21:48	06:32 (WEA ZB2)			
3	08:45	09:19 (WEA VB14)	08:12	07:14	06:59		05:51	06:52 (WEA ZB3)	05:05	05:45 (WEA ZB2)			
	16:21	09:24 (WEA VB14)	17:13	18:08	20:06		21:01	07:05 (WEA ZB3)	21:49	06:32 (WEA ZB2)			
4	08:45	09:18 (WEA VB14)	08:10	07:12	06:57		05:49	06:56 (WEA ZB3)	05:04	05:46 (WEA ZB2)			
	16:22	09:23 (WEA VB14)	17:15	18:10	20:08		21:03	07:01 (WEA ZB3)	21:50	06:32 (WEA ZB2)			
5	08:45	09:18 (WEA VB14)	08:09	07:09	06:54		05:47		05:03	05:46 (WEA ZB2)			
	16:23	09:24 (WEA VB14)	17:17	18:12	20:10		21:04		21:51	06:32 (WEA ZB2)			
6	08:44	09:17 (WEA VB14)	08:07	07:07	06:52		05:45		05:02	05:47 (WEA ZB2)			
	16:24	09:24 (WEA VB14)	17:19	18:14	20:12		21:06		21:52	06:33 (WEA ZB2)			
7	08:44	09:16 (WEA VB14)	08:05	07:05	06:50		05:44		05:02	05:47 (WEA ZB2)			
	16:26	09:24 (WEA VB14)	17:21	18:16	20:13		21:08		21:53	06:33 (WEA ZB2)			
8	08:43	09:16 (WEA VB14)	08:03	07:02	06:47		05:42		05:01	05:47 (WEA ZB2)			
	16:27	09:25 (WEA VB14)	17:23	18:18	20:15		21:10		21:54	06:33 (WEA ZB2)			
9	08:43	09:15 (WEA VB14)	08:01	07:00	06:45		05:40	06:06 (WEA ZB2)	05:01	05:47 (WEA ZB2)			
	16:29	09:25 (WEA VB14)	17:25	18:20	20:17		21:11	6	06:12 (WEA ZB2)	21:55	46	06:33 (WEA ZB2)	
10	08:42	09:14 (WEA VB14)	07:59	06:58	06:42		05:38	06:05 (WEA ZB2)	05:00	05:47 (WEA ZB2)			
	16:30	09:25 (WEA VB14)	17:27	18:22	20:19	3	07:09 (WEA ZB3)	21:13	11	06:16 (WEA ZB2)	21:56	46	06:33 (WEA ZB2)
11	08:41	09:13 (WEA VB14)	07:57	06:55	06:40		07:04 (WEA ZB3)	05:36		06:03 (WEA ZB2)	05:00		05:47 (WEA ZB2)
	16:32	09:25 (WEA VB14)	17:29	18:24	20:21	8	07:12 (WEA ZB3)	21:15	15	06:18 (WEA ZB2)	21:57	46	06:33 (WEA ZB2)
12	08:41	09:13 (WEA VB14)	07:55	06:53	06:38		07:02 (WEA ZB3)	05:34		06:01 (WEA ZB2)	04:59		05:47 (WEA ZB2)
	16:33	09:25 (WEA VB14)	17:31	18:25	20:23	12	07:14 (WEA ZB3)	21:17	19	06:20 (WEA ZB2)	21:58	46	06:33 (WEA ZB2)
13	08:40	09:14 (WEA VB14)	07:53	06:50	06:35		06:59 (WEA ZB3)	05:33		06:00 (WEA ZB2)	04:59		05:48 (WEA ZB2)
	16:35	09:25 (WEA VB14)	17:33	18:27	20:24	16	07:15 (WEA ZB3)	21:18	22	06:22 (WEA ZB2)	21:58	46	06:34 (WEA ZB2)
14	08:39	09:15 (WEA VB14)	07:51	06:48	06:33		06:57 (WEA ZB3)	05:31		05:58 (WEA ZB2)	04:59		05:48 (WEA ZB2)
	16:36	09:24 (WEA VB14)	17:35	18:29	20:26	19	07:16 (WEA ZB3)	21:20	24	06:22 (WEA ZB2)	21:59	46	06:34 (WEA ZB2)
15	08:38	09:17 (WEA VB14)	07:49	06:45	06:31		06:55 (WEA ZB3)	05:29		05:57 (WEA ZB2)	04:58		05:49 (WEA ZB2)
	16:38	09:23 (WEA VB14)	17:37	18:31	20:28	22	07:17 (WEA ZB3)	21:22	27	06:24 (WEA ZB2)	22:00	45	06:34 (WEA ZB2)
16	08:37		07:47	06:43	06:28		06:52 (WEA ZB3)	05:28		05:55 (WEA ZB2)	04:58		05:49 (WEA ZB2)
	16:40		17:39	18:33	20:30	25	07:17 (WEA ZB3)	21:23	29	06:24 (WEA ZB2)	22:00	46	06:35 (WEA ZB2)
17	08:36		07:45	06:41	06:26		06:50 (WEA ZB3)	05:26		05:54 (WEA ZB2)	04:58		05:49 (WEA ZB2)
	16:41		17:41	18:35	20:32	28	07:18 (WEA ZB3)	21:25	32	06:26 (WEA ZB2)	22:01	46	06:35 (WEA ZB2)
18	08:35		07:43	06:38	06:24		06:48 (WEA ZB3)	05:24		05:52 (WEA ZB2)	04:58		05:49 (WEA ZB2)
	16:43		17:43	18:37	20:34	30	07:18 (WEA ZB3)	21:27	34	06:26 (WEA ZB2)	22:01	46	06:35 (WEA ZB2)
19	08:34		07:41	06:36	06:22		06:46 (WEA ZB3)	05:23		05:51 (WEA ZB2)	04:58		05:50 (WEA ZB2)
	16:45		17:45	18:39	20:35	32	07:18 (WEA ZB3)	21:28	36	06:27 (WEA ZB2)	22:01	45	06:35 (WEA ZB2)
20	08:33		07:39	06:33	06:19		06:45 (WEA ZB3)	05:21		05:50 (WEA ZB2)	04:58		05:50 (WEA ZB2)
	16:47		17:47	18:40	20:37	33	07:18 (WEA ZB3)	21:30	38	06:28 (WEA ZB2)	22:02	45	06:35 (WEA ZB2)
21	08:32		07:37	06:31	06:17		06:43 (WEA ZB3)	05:20		05:48 (WEA ZB2)	04:58		05:50 (WEA ZB2)
	16:48		17:49	18:42	20:39	34	07:17 (WEA ZB3)	21:31	40	06:28 (WEA ZB2)	22:02	45	06:35 (WEA ZB2)
22	08:30		07:34	06:28	06:15		06:43 (WEA ZB3)	05:18		05:47 (WEA ZB2)	04:59		05:50 (WEA ZB2)
	16:50		17:51	18:44	20:41	34	07:17 (WEA ZB3)	21:33	41	06:28 (WEA ZB2)	22:02	45	06:35 (WEA ZB2)
23	08:29		07:32	06:26	06:13		06:43 (WEA ZB3)	05:17		05:46 (WEA ZB2)	04:59		05:50 (WEA ZB2)
	16:52		17:53	18:46	20:43	34	07:17 (WEA ZB3)	21:34	43	06:29 (WEA ZB2)	22:02	45	06:35 (WEA ZB2)
24	08:28		07:30	06:24	06:10		06:44 (WEA ZB3)	05:16		05:46 (WEA ZB2)	04:59		05:50 (WEA ZB2)
	16:54		17:55	18:48	20:45	33	07:17 (WEA ZB3)	21:36	44	06:30 (WEA ZB2)	22:02	46	06:36 (WEA ZB2)
25	08:26		07:28	06:21	06:08		06:44 (WEA ZB3)	05:14		05:46 (WEA ZB2)	04:59		05:50 (WEA ZB2)
	16:56		17:57	18:50	20:46	32	07:16 (WEA ZB3)	21:37	44	06:30 (WEA ZB2)	22:02	46	06:36 (WEA ZB2)
26	08:25		07:25	06:19	06:06		06:44 (WEA ZB3)	05:13		05:45 (WEA ZB2)	05:00		05:51 (WEA ZB2)
	16:58		17:59	18:51	20:48	31	07:15 (WEA ZB3)	21:39	45	06:30 (WEA ZB2)	22:02	46	06:37 (WEA ZB2)
27	08:23		07:23	06:16	06:04		06:45 (WEA ZB3)	05:12		05:45 (WEA ZB2)	05:00		05:51 (WEA ZB2)
	17:00		18:01	18:53	20:50	30	07:15 (WEA ZB3)	21:40	45	06:30 (WEA ZB2)	22:02	46	06:37 (WEA ZB2)
28	08:22		07:21	06:14	06:02		06:45 (WEA ZB3)	05:11		05:45 (WEA ZB2)	05:01		05:51 (WEA ZB2)
	17:01		18:03	18:55	20:52	29	07:14 (WEA ZB3)	21:42	45	06:30 (WEA ZB2)	22:02	46	06:37 (WEA ZB2)
29	08:20			07:11	06:00		06:46 (WEA ZB3)	05:10		05:45 (WEA ZB2)	05:01		05:51 (WEA ZB2)
	17:03			19:57	20:54	27	07:13 (WEA ZB3)	21:43	45	06:30 (WEA ZB2)	22:02	46	06:37 (WEA ZB2)
30	08:19			07:09	05:58		06:47 (WEA ZB3)	05:08		05:46 (WEA ZB2)	05:02		05:52 (WEA ZB2)
	17:05			19:59	20:55	24	07:11 (WEA ZB3)	21:44	46	06:32 (WEA ZB2)	22:02	46	06:38 (WEA ZB2)
31	08:17			07:07				05:07		05:46 (WEA ZB2)			
	17:07			20:01				21:45	46	06:32 (WEA ZB2)			
Sonnenscheinstunden	251		274	367	419			493		509			
astr.max.mögl.Beschattung	118				536			835		1375			

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO29 - Depenhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober	November	Dezember
1	05:03 22:01 46	05:51 (WEA ZB2) 06:37 (WEA ZB2) 21:27 17	06:12 (WEA ZB2) 06:29 (WEA ZB2) 20:21 8	07:03 (WEA ZB3) 07:11 (WEA ZB3) 19:07 16:57	07:29 16:57	08:21 16:14 12
2	05:03 22:01 46	05:52 (WEA ZB2) 06:38 (WEA ZB2) 21:25 14	06:14 (WEA ZB2) 06:28 (WEA ZB2) 20:18 3	07:05 (WEA ZB3) 07:08 (WEA ZB3) 19:05 16:55	07:30 16:55	08:22 16:13 11
3	05:04 22:01 46	05:52 (WEA ZB2) 06:38 (WEA ZB2) 21:23 9	06:16 (WEA ZB2) 06:25 (WEA ZB2) 20:16 2	07:32 16:53	07:30 16:53	08:24 16:12 10
4	05:05 22:00 47	05:52 (WEA ZB2) 06:39 (WEA ZB2) 21:21 2	06:17 (WEA ZB2) 06:19 (WEA ZB2) 20:13 1	07:34 16:52	07:32 16:52	08:25 16:11 9
5	05:06 22:00 46	05:52 (WEA ZB2) 06:38 (WEA ZB2) 21:19 1	06:43 20:11	07:36 16:50	07:34 16:50	08:27 16:11 8
6	05:07 21:59 46	05:52 (WEA ZB2) 06:38 (WEA ZB2) 21:17 1	06:45 20:09	07:38 16:48	07:36 16:48	08:28 16:10 7
7	05:08 21:58 47	05:52 (WEA ZB2) 06:39 (WEA ZB2) 21:15 1	06:46 20:06	07:39 16:46	07:38 16:46	08:29 16:10 6
8	05:09 21:58 46	05:53 (WEA ZB2) 06:39 (WEA ZB2) 21:14 1	06:48 20:04	07:41 16:44	07:40 16:44	08:31 16:09 6
9	05:10 21:57 46	05:53 (WEA ZB2) 06:39 (WEA ZB2) 21:12 9	07:03 (WEA ZB3) 07:12 (WEA ZB3) 20:01 15	07:43 16:42	07:42 16:42	08:32 16:09 5
10	05:11 21:56 46	05:53 (WEA ZB2) 06:39 (WEA ZB2) 21:10 15	07:00 (WEA ZB3) 07:15 (WEA ZB3) 19:59 19	07:45 16:41	07:44 16:41	08:33 16:09 4
11	05:12 21:55 46	05:53 (WEA ZB2) 06:39 (WEA ZB2) 21:08 19	06:58 (WEA ZB3) 07:17 (WEA ZB3) 19:56 23	07:47 16:39	07:45 16:39	08:34 16:09 3
12	05:13 21:54 46	05:53 (WEA ZB2) 06:39 (WEA ZB2) 21:05 23	06:55 (WEA ZB3) 07:19 (WEA ZB3) 19:54 25	07:48 16:37	07:47 16:37	08:35 16:08 2
13	05:14 21:53 46	05:53 (WEA ZB2) 06:39 (WEA ZB2) 21:03 25	06:57 (WEA ZB3) 07:20 (WEA ZB3) 19:52 27	07:50 16:36	07:49 16:36	08:36 16:08 2
14	05:15 21:52 45	05:55 (WEA ZB2) 06:40 (WEA ZB2) 21:01 27	06:59 (WEA ZB3) 07:20 (WEA ZB3) 19:49 29	07:52 16:34	07:51 16:34	08:37 16:08 1
15	05:17 21:51 45	05:55 (WEA ZB2) 06:40 (WEA ZB2) 20:59 29	07:00 (WEA ZB3) 07:22 (WEA ZB3) 19:47 30	07:54 16:32	07:53 16:32	08:38 16:08 1
16	05:18 21:50 45	05:55 (WEA ZB2) 06:40 (WEA ZB2) 20:57 30	07:02 (WEA ZB3) 07:21 (WEA ZB3) 19:44 31	07:56 16:31	07:55 16:31	08:39 16:08 1
17	05:19 21:49 44	05:55 (WEA ZB2) 06:39 (WEA ZB2) 20:55 31	07:04 (WEA ZB3) 07:22 (WEA ZB3) 19:42 33	07:57 16:29	07:57 16:29	08:40 16:09 1
18	05:21 21:48 44	05:55 (WEA ZB2) 06:39 (WEA ZB2) 20:53 33	07:06 (WEA ZB3) 07:23 (WEA ZB3) 19:39 33	08:00 16:28	07:59 16:28	08:41 16:09 1
19	05:22 21:47 43	05:56 (WEA ZB2) 06:39 (WEA ZB2) 20:50 33	07:07 (WEA ZB3) 07:22 (WEA ZB3) 19:37 34	08:01 16:27	08:00 16:27	08:41 16:09 1
20	05:23 21:45 43	05:56 (WEA ZB2) 06:39 (WEA ZB2) 20:48 34	07:09 (WEA ZB3) 07:23 (WEA ZB3) 19:34 34	08:03 16:25	08:02 16:25	08:42 16:09 1
21	05:25 21:44 42	05:56 (WEA ZB2) 06:38 (WEA ZB2) 20:46 34	07:11 (WEA ZB3) 07:23 (WEA ZB3) 19:32 34	08:05 16:24	08:04 16:24	08:43 16:10 1
22	05:26 21:43 41	05:58 (WEA ZB2) 06:39 (WEA ZB2) 20:44 34	07:13 (WEA ZB3) 07:22 (WEA ZB3) 19:29 34	08:07 16:23	08:06 16:23	08:43 16:10 1
23	05:28 21:41 39	05:59 (WEA ZB2) 06:38 (WEA ZB2) 20:42 34	07:14 (WEA ZB3) 07:22 (WEA ZB3) 19:27 34	08:09 16:21	08:07 16:21	08:44 16:11 1
24	05:29 21:40 37	06:01 (WEA ZB2) 06:38 (WEA ZB2) 20:39 32	07:16 (WEA ZB3) 07:22 (WEA ZB3) 19:25 32	08:11 16:20	08:09 16:20	08:44 16:11 1
25	05:31 21:38 35	06:02 (WEA ZB2) 06:37 (WEA ZB2) 20:37 30	07:18 (WEA ZB3) 07:21 (WEA ZB3) 19:22 30	08:13 16:19	08:11 16:19	08:45 16:12 1
26	05:32 21:37 33	06:03 (WEA ZB2) 06:36 (WEA ZB2) 20:35 27	07:18 (WEA ZB3) 07:20 (WEA ZB3) 19:20 27	08:15 16:18	08:13 16:18	08:45 16:13 1
27	05:34 21:35 31	06:05 (WEA ZB2) 06:36 (WEA ZB2) 20:32 25	07:21 (WEA ZB3) 07:20 (WEA ZB3) 19:17 25	08:17 16:17	08:14 16:17	08:45 16:13 1
28	05:36 21:33 28	06:06 (WEA ZB2) 06:34 (WEA ZB2) 20:30 22	07:23 (WEA ZB3) 07:18 (WEA ZB3) 19:15 22	08:19 16:16	08:16 16:16	08:45 16:14 1
29	05:37 21:32 26	06:08 (WEA ZB2) 06:34 (WEA ZB2) 20:28 19	07:25 (WEA ZB3) 07:17 (WEA ZB3) 19:12 19	08:20 16:15	08:18 16:15	08:45 16:15 1
30	05:39 21:30 23	06:09 (WEA ZB2) 06:32 (WEA ZB2) 20:25 16	07:27 (WEA ZB3) 07:00 (WEA ZB3) 19:10 16	08:22 16:14	08:19 16:14	08:45 16:16 1
31	05:40 21:28 20	06:11 (WEA ZB2) 06:31 (WEA ZB2) 20:23 12	07:01 (WEA ZB3) 07:13 (WEA ZB3) 19:08 11	08:24 16:13	08:21 16:13	08:45 16:17 2
Sonnenscheinstunden	511	459	382	329	260	235
astr.max.mögl.Beschattung	1264	635	11	329	38	90

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO3 - Utwarfe 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar			Februar			März			April			Mai			Juni		
1	08:45	09:23 (WEA VB7)	08:15	09:30 (WEA VB7)	07:18				07:04			05:55	18:51 (WEA VB4)	05:06			
	16:18	110 14:59 (WEA VB5)	17:09	88 15:17 (WEA VB5)	18:04				20:02			20:57	34 19:25 (WEA VB4)	21:47			
2	08:45	09:23 (WEA VB7)	08:14	09:31 (WEA VB7)	07:16				07:02			05:53	18:52 (WEA VB4)	05:05			
	16:19	113 15:00 (WEA VB5)	17:11	86 15:17 (WEA VB5)	18:06				20:04			20:59	32 19:24 (WEA VB4)	21:48			
3	08:45	09:23 (WEA VB7)	08:12	09:32 (WEA VB7)	07:14				06:59			05:51	18:53 (WEA VB4)	05:04			
	16:20	114 15:01 (WEA VB5)	17:13	82 15:16 (WEA VB5)	18:08				20:06			21:01	29 19:22 (WEA VB4)	21:49			
4	08:45	09:23 (WEA VB7)	08:10	09:34 (WEA VB7)	07:12				06:57			19:11 (WEA VB4)	05:49				
	16:22	115 15:02 (WEA VB5)	17:15	79 15:17 (WEA VB5)	18:10				20:08			19:16 (WEA VB4)	21:03	27 19:21 (WEA VB4)	21:50		
5	08:44	09:23 (WEA VB7)	08:09	09:35 (WEA VB7)	07:09				06:54			19:05 (WEA VB4)	05:47				
	16:23	115 15:02 (WEA VB5)	17:17	76 15:16 (WEA VB5)	18:12				20:10			19:22 (WEA VB4)	21:04	23 19:19 (WEA VB4)	21:51		
6	08:44	09:24 (WEA VB7)	08:07	09:36 (WEA VB7)	07:07			17:36 (WEA VB3)	06:52			19:01 (WEA VB4)	05:45				
	16:24	118 15:04 (WEA VB5)	17:19	72 15:16 (WEA VB5)	18:14			5 17:41 (WEA VB3)	20:11			19:24 (WEA VB4)	21:06	18 19:16 (WEA VB4)	21:52		
7	08:44	09:23 (WEA VB7)	08:05	09:38 (WEA VB7)	07:04				17:32 (WEA VB3)	06:49		18:58 (WEA VB4)	05:43				
	16:26	118 15:04 (WEA VB5)	17:21	66 15:15 (WEA VB5)	18:16			14 17:46 (WEA VB3)	20:13			19:45 (WEA VB2)	21:08	10 19:13 (WEA VB4)	21:53		
8	08:43	09:24 (WEA VB7)	08:03	09:41 (WEA VB7)	07:02				17:29 (WEA VB3)	06:47		18:57 (WEA VB4)	05:41				
	16:27	119 15:06 (WEA VB5)	17:23	59 15:14 (WEA VB5)	18:18			18 17:47 (WEA VB3)	20:15			19:47 (WEA VB2)	21:10				
9	08:43	09:24 (WEA VB7)	08:01	09:44 (WEA VB7)	07:00				17:27 (WEA VB3)	06:45		18:54 (WEA VB4)	05:40				
	16:28	119 15:06 (WEA VB5)	17:25	50 15:13 (WEA VB5)	18:20			22 17:49 (WEA VB3)	20:17			19:48 (WEA VB2)	21:11				
10	08:42	09:24 (WEA VB7)	07:59	14:36 (WEA VB5)	06:57				17:25 (WEA VB3)	06:42		18:53 (WEA VB4)	05:38				
	16:30	121 15:07 (WEA VB5)	17:27	36 15:12 (WEA VB5)	18:22			24 17:49 (WEA VB3)	20:19			19:49 (WEA VB2)	21:13				
11	08:41	09:24 (WEA VB7)	07:57	14:37 (WEA VB5)	06:55				17:25 (WEA VB3)	06:40		18:52 (WEA VB4)	05:36				
	16:31	121 15:08 (WEA VB5)	17:29	33 15:10 (WEA VB5)	18:23			25 17:50 (WEA VB3)	20:21			19:50 (WEA VB2)	21:15				
12	08:40	09:24 (WEA VB7)	07:55	14:39 (WEA VB5)	06:53				17:23 (WEA VB3)	06:38		18:50 (WEA VB4)	05:34				
	16:33	121 15:09 (WEA VB5)	17:31	29 15:08 (WEA VB5)	18:25			27 17:50 (WEA VB3)	20:22			19:49 (WEA VB2)	21:17				
13	08:40	09:24 (WEA VB7)	07:53	14:41 (WEA VB5)	06:50				17:23 (WEA VB3)	06:35		18:50 (WEA VB4)	05:32				
	16:35	121 15:09 (WEA VB5)	17:33	25 15:06 (WEA VB5)	18:27			28 17:51 (WEA VB3)	20:24			19:50 (WEA VB2)	21:18				
14	08:39	09:24 (WEA VB7)	07:51	14:45 (WEA VB5)	06:48				17:22 (WEA VB3)	06:33		18:49 (WEA VB4)	05:31				
	16:36	121 15:10 (WEA VB5)	17:35	19 15:04 (WEA VB5)	18:29			28 17:50 (WEA VB3)	20:26			19:50 (WEA VB2)	21:20				
15	08:38	09:24 (WEA VB7)	07:49	14:50 (WEA VB5)	06:45				17:22 (WEA VB3)	06:31		18:48 (WEA VB4)	05:29				
	16:38	121 15:11 (WEA VB5)	17:37	8 14:58 (WEA VB5)	18:31			28 17:50 (WEA VB3)	20:28			19:50 (WEA VB2)	21:22				
16	08:37	09:24 (WEA VB7)	07:47		06:43				17:22 (WEA VB3)	06:28		18:47 (WEA VB4)	05:27				
	16:39	121 15:12 (WEA VB5)	17:39		18:33			30 18:07 (WEA VB1)	20:30			19:49 (WEA VB2)	21:23				
17	08:36	09:25 (WEA VB7)	07:45		06:40				17:22 (WEA VB3)	06:26		18:47 (WEA VB4)	05:26				
	16:41	119 15:13 (WEA VB5)	17:41		18:35			32 18:08 (WEA VB1)	20:32			19:49 (WEA VB2)	21:25				
18	08:35	09:24 (WEA VB7)	07:43		06:38				17:23 (WEA VB3)	06:24		18:47 (WEA VB4)	05:24				
	16:43	118 15:13 (WEA VB5)	17:43		18:36			34 18:11 (WEA VB1)	20:33			19:48 (WEA VB2)	21:27				
19	08:34	09:25 (WEA VB7)	07:41		06:36				17:23 (WEA VB3)	06:21		18:47 (WEA VB4)	05:23				
	16:45	115 15:14 (WEA VB5)	17:45		18:38			35 18:12 (WEA VB1)	20:35			19:47 (WEA VB2)	21:28				
20	08:33	09:25 (WEA VB7)	07:39		06:33				17:24 (WEA VB3)	06:19		18:46 (WEA VB4)	05:21				
	16:46	111 15:14 (WEA VB5)	17:47		18:40			35 18:14 (WEA VB1)	20:37			19:45 (WEA VB2)	21:30				
21	08:31	09:25 (WEA VB7)	07:36		06:31				17:24 (WEA VB3)	06:17		18:46 (WEA VB4)	05:20				
	16:48	106 15:14 (WEA VB5)	17:49		18:42			35 18:15 (WEA VB1)	20:39			19:44 (WEA VB2)	21:31				
22	08:30	09:25 (WEA VB7)	07:34		06:28				17:27 (WEA VB3)	06:15		18:46 (WEA VB4)	05:18				
	16:50	94 15:15 (WEA VB5)	17:51		18:44			32 18:18 (WEA VB1)	20:41			19:42 (WEA VB2)	21:33				
23	08:29	09:25 (WEA VB7)	07:32		06:26				17:29 (WEA VB3)	06:12		18:46 (WEA VB4)	05:17				
	16:52	94 15:15 (WEA VB5)	17:53		18:46			25 18:17 (WEA VB1)	20:43			19:40 (WEA VB2)	21:34				
24	08:28	09:26 (WEA VB7)	07:30		06:23				18:02 (WEA VB1)	06:10		18:46 (WEA VB4)	05:15				
	16:54	94 15:16 (WEA VB5)	17:55		18:48			14 18:16 (WEA VB1)	20:44			19:31 (WEA VB4)	21:36				
25	08:26	09:26 (WEA VB7)	07:28		06:21				18:03 (WEA VB1)	06:08		18:47 (WEA VB4)	05:14				
	16:56	94 15:16 (WEA VB5)	17:57		18:49			11 18:14 (WEA VB1)	20:46			19:30 (WEA VB4)	21:37				
26	08:25	09:27 (WEA VB7)	07:25		06:19				18:06 (WEA VB1)	06:06		18:47 (WEA VB4)	05:13				
	16:57	94 15:17 (WEA VB5)	17:59		18:51			5 18:11 (WEA VB1)	20:48			19:30 (WEA VB4)	21:39				
27	08:23	09:27 (WEA VB7)	07:23		06:16					06:04		18:48 (WEA VB4)	05:12				
	16:59	94 15:17 (WEA VB5)	18:00		18:53				20:50			19:29 (WEA VB4)	21:40				
28	08:22	09:27 (WEA VB7)	07:21		06:14					06:02		18:48 (WEA VB4)	05:10				
	17:01	94 15:17 (WEA VB5)	18:02		18:55				20:52			19:28 (WEA VB4)	21:41				
29	08:20	09:29 (WEA VB7)			07:11				05:59			18:49 (WEA VB4)	05:09				
	17:03	92 15:18 (WEA VB5)			19:57				20:54			19:27 (WEA VB4)	21:43				
30	08:19	09:29 (WEA VB7)			07:09				05:57			18:50 (WEA VB4)	05:08				
	17:05	90 15:17 (WEA VB5)			19:59				20:55			19:26 (WEA VB4)	21:44				
31	08:17	09:29 (WEA VB7)			07:06								05:07				
	17:07	89 15:17 (WEA VB5)			20:00								21:45				
Sonnenscheinstunden			251		274			367		420			493			509	
astr.max.mögl.Beschattung			3386		808			507		1300			173				

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO3 - Utwarfe 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober	November	Dezember
1	05:02 22:01	05:42 21:27	06:36 20:20	18:51 (WEA VB4) 07:28 19:49 (WEA VB2) 19:07	18:03 (WEA VB3) 07:26 18:30 (WEA VB3) 16:57	14:04 (WEA VB5) 08:21 14:41 (WEA VB5) 16:13
2	05:03 22:01	05:43 21:25	06:37 20:18	18:52 (WEA VB4) 07:30 19:48 (WEA VB2) 19:05	18:02 (WEA VB3) 07:28 18:28 (WEA VB3) 16:55	09:12 (WEA VB7) 08:22 14:42 (WEA VB5) 16:13
3	05:04 22:01	05:45 21:23	06:39 20:16	18:52 (WEA VB4) 07:32 19:46 (WEA VB2) 19:02	18:03 (WEA VB3) 07:30 18:27 (WEA VB3) 16:53	09:10 (WEA VB7) 08:24 14:44 (WEA VB5) 16:12
4	05:05 22:00	05:47 21:21	06:41 20:13	18:54 (WEA VB4) 07:34 19:44 (WEA VB2) 19:00	18:04 (WEA VB3) 07:32 18:26 (WEA VB3) 16:51	09:08 (WEA VB7) 08:25 14:45 (WEA VB5) 16:11
5	05:06 22:00	05:49 21:19	06:43 20:11	18:55 (WEA VB4) 07:36 19:42 (WEA VB2) 18:58	18:05 (WEA VB3) 07:34 18:25 (WEA VB3) 16:49	09:06 (WEA VB7) 08:26 14:46 (WEA VB5) 16:11
6	05:06 21:59	05:50 21:17	19:11 (WEA VB4) 06:44 19:24 (WEA VB4) 20:08	18:57 (WEA VB4) 07:37 19:20 (WEA VB4) 18:55	18:07 (WEA VB3) 07:36 18:23 (WEA VB3) 16:48	09:04 (WEA VB7) 08:28 14:46 (WEA VB5) 16:10
7	05:07 21:58	05:52 21:15	19:08 (WEA VB4) 06:46 19:27 (WEA VB4) 20:06	19:00 (WEA VB4) 07:39 19:17 (WEA VB4) 18:53	18:09 (WEA VB3) 07:38 18:20 (WEA VB3) 16:46	09:03 (WEA VB7) 08:29 14:47 (WEA VB5) 16:10
8	05:08 21:58	05:54 21:13	19:05 (WEA VB4) 06:48 19:29 (WEA VB4) 20:04	19:05 (WEA VB4) 07:41 19:12 (WEA VB4) 18:50	07:40 16:44	09:02 (WEA VB7) 08:30 14:47 (WEA VB5) 16:09
9	05:09 21:57	05:55 21:11	19:03 (WEA VB4) 06:50 19:31 (WEA VB4) 20:01	07:43 18:48	07:41 16:42	09:01 (WEA VB7) 08:32 14:47 (WEA VB5) 16:09
10	05:11 21:56	05:57 21:09	19:01 (WEA VB4) 06:51 19:31 (WEA VB4) 19:59	07:45 18:46	07:43 16:40	09:01 (WEA VB7) 08:33 14:48 (WEA VB5) 16:09
11	05:12 21:55	05:59 21:07	19:00 (WEA VB4) 06:53 19:33 (WEA VB4) 19:56	07:46 18:43	07:45 16:39	09:00 (WEA VB7) 08:34 14:48 (WEA VB5) 16:08
12	05:13 21:54	06:01 21:05	18:59 (WEA VB4) 06:55 19:34 (WEA VB4) 19:54	07:48 18:41	07:47 16:37	09:00 (WEA VB7) 08:35 14:48 (WEA VB5) 16:08
13	05:14 21:53	06:02 21:03	18:57 (WEA VB4) 06:57 19:34 (WEA VB4) 19:51	07:50 18:39	07:49 16:35	08:59 (WEA VB7) 08:36 14:49 (WEA VB5) 16:08
14	05:15 21:52	06:04 21:01	18:56 (WEA VB4) 06:58 19:35 (WEA VB4) 19:49	07:52 18:36	07:51 16:34	09:00 (WEA VB7) 08:37 14:50 (WEA VB5) 16:08
15	05:16 21:51	06:06 20:59	18:56 (WEA VB4) 07:00 19:36 (WEA VB4) 19:47	07:54 18:34	07:53 16:32	09:00 (WEA VB7) 08:38 14:50 (WEA VB5) 16:08
16	05:18 21:50	06:08 20:57	18:54 (WEA VB4) 07:02 19:36 (WEA VB4) 19:44	07:56 18:32	07:55 16:31	09:00 (WEA VB7) 08:39 14:50 (WEA VB5) 16:08
17	05:19 21:49	06:09 20:55	18:54 (WEA VB4) 07:04 19:37 (WEA VB4) 19:42	07:58 18:29	07:57 16:29	09:00 (WEA VB7) 08:40 14:50 (WEA VB5) 16:08
18	05:20 21:48	06:11 20:53	18:53 (WEA VB4) 07:05 19:37 (WEA VB4) 19:39	07:59 18:27	07:58 16:28	09:00 (WEA VB7) 08:41 14:50 (WEA VB5) 16:09
19	05:22 21:46	06:13 20:50	18:52 (WEA VB4) 07:07 19:37 (WEA VB4) 19:37	08:01 18:25	08:00 16:26	09:00 (WEA VB7) 08:41 14:50 (WEA VB5) 16:09
20	05:23 21:45	06:15 20:48	18:52 (WEA VB4) 07:09 19:46 (WEA VB2) 19:34	08:03 18:23	08:02 16:25	09:00 (WEA VB7) 08:42 14:50 (WEA VB5) 16:09
21	05:25 21:44	06:16 20:46	18:50 (WEA VB4) 07:11 19:47 (WEA VB2) 19:32	08:05 18:20	08:04 16:24	09:01 (WEA VB7) 08:43 14:50 (WEA VB5) 16:10
22	05:26 21:42	06:18 20:44	18:50 (WEA VB4) 07:12 19:49 (WEA VB2) 19:29	08:07 18:18	08:06 16:22	09:01 (WEA VB7) 08:43 14:51 (WEA VB5) 16:10
23	05:28 21:41	06:20 20:41	18:50 (WEA VB4) 07:14 19:50 (WEA VB2) 19:27	08:09 18:16	08:07 16:21	09:02 (WEA VB7) 08:44 14:51 (WEA VB5) 16:11
24	05:29 21:40	06:22 20:39	18:49 (WEA VB4) 07:16 19:50 (WEA VB2) 19:24	08:11 18:14	08:09 16:20	09:02 (WEA VB7) 08:44 14:51 (WEA VB5) 16:11
25	05:31 21:38	06:23 20:37	18:49 (WEA VB4) 07:18 19:51 (WEA VB2) 19:22	07:13 17:12	08:11 16:19	09:02 (WEA VB7) 08:44 14:50 (WEA VB5) 16:12
26	05:32 21:37	06:25 20:35	18:50 (WEA VB4) 07:19 19:51 (WEA VB2) 19:19	07:15 17:10	08:13 16:18	09:02 (WEA VB7) 08:45 14:50 (WEA VB5) 16:12
27	05:34 21:35	06:27 20:32	18:49 (WEA VB4) 07:21 19:51 (WEA VB2) 19:17	07:16 17:07	08:14 16:17	09:03 (WEA VB7) 08:45 14:50 (WEA VB5) 16:13
28	05:35 21:33	06:29 20:30	18:49 (WEA VB4) 07:23 19:51 (WEA VB2) 19:15	07:18 17:05	08:16 16:16	09:04 (WEA VB7) 08:45 14:50 (WEA VB5) 16:14
29	05:37 21:32	06:30 20:28	18:50 (WEA VB4) 07:25 19:51 (WEA VB2) 19:12	07:20 17:03	08:17 16:15	09:05 (WEA VB7) 08:45 14:50 (WEA VB5) 16:15
30	05:39 21:30	06:32 20:25	18:49 (WEA VB4) 07:27 19:50 (WEA VB2) 19:10	07:22 17:01	08:19 16:14	09:05 (WEA VB7) 08:45 14:50 (WEA VB5) 16:16
31	05:40 21:28	06:34 20:23	18:50 (WEA VB4) 07:28 19:49 (WEA VB2) 19:09	07:24 16:59	14:06 (WEA VB5) 16:14 14:40 (WEA VB5) 16:14	08:45 16:17
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		1191	668	269	2806	3412

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO30 - Purkswarfe 2
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	
1	08:45	09:28 (WEA VB14)	08:16	07:19	07:04	05:55	05:06
	16:18	09:45 (WEA VB14)	17:09	18:04	20:02	20:57	21:47
2	08:45	09:29 (WEA VB14)	08:14	07:16	07:02	05:53	05:06
	16:20	09:45 (WEA VB14)	17:11	18:06	20:04	20:59	21:48
3	08:45	09:29 (WEA VB14)	08:12	07:14	06:59	05:51	05:05
	16:21	09:45 (WEA VB14)	17:13	18:08	20:06	21:01	21:49
4	08:45	09:30 (WEA VB14)	08:10	07:12	06:57	05:49	05:04
	16:22	09:45 (WEA VB14)	17:15	18:10	20:08	21:03	21:50
5	08:44	09:32 (WEA VB14)	08:09	07:09	06:54	05:47	05:03
	16:23	09:46 (WEA VB14)	17:17	18:12	20:10	21:04	21:51
6	08:44	09:32 (WEA VB14)	08:07	07:07	06:52	05:45	05:02
	16:24	09:45 (WEA VB14)	17:19	18:14	20:12	21:06	21:52
7	08:44	09:33 (WEA VB14)	08:05	07:05	06:50	05:44	05:02
	16:26	09:44 (WEA VB14)	17:21	18:16	20:13	21:08	21:53
8	08:43	09:35 (WEA VB14)	08:03	07:02	06:47	05:42	05:01
	16:27	09:44 (WEA VB14)	17:23	18:18	20:15	21:10	21:54
9	08:43	09:37 (WEA VB14)	08:01	07:00	06:45	05:40	05:01
	16:29	09:43 (WEA VB14)	17:25	18:20	20:17	21:11	21:55
10	08:42		07:59	06:57	06:42	05:38	05:00
	16:30		17:27	18:22	20:19	21:13	21:56
11	08:41		07:57	06:55	06:40	05:36	05:00
	16:32		17:29	18:24	20:21	21:15	21:57
12	08:41		07:55	06:53	06:38	05:34	04:59
	16:33		17:31	18:25	20:23	21:17	21:58
13	08:40		07:53	06:50	06:35	05:33	04:59
	16:35		17:33	18:27	20:24	21:18	21:58
14	08:39		07:51	06:48	06:33	05:31	04:59
	16:36		17:35	18:29	20:26	21:20	21:59
15	08:38		07:49	06:45	06:31	05:29	04:58
	16:38		17:37	18:31	20:28	21:22	21:59
16	08:37		07:47	06:43	06:28	05:27	04:58
	16:40		17:39	18:33	20:30	21:23	22:00
17	08:36		07:45	06:41	06:26	05:26	04:58
	16:41		17:41	18:35	20:32	21:25	22:00
18	08:35		07:43	06:38	06:24	05:24	04:58
	16:43		17:43	18:37	20:34	21:27	22:01
19	08:34		07:41	06:36	06:22	05:23	04:58
	16:45		17:45	18:38	20:35	21:28	22:01
20	08:33		07:39	06:33	06:19	05:21	04:58
	16:47		17:47	18:40	20:37	21:30	22:02
21	08:32		07:37	06:31	06:17	05:20	04:58
	16:48		17:49	18:42	20:39	21:31	22:02
22	08:30		07:34	06:28	06:15	05:18	04:58
	16:50		17:51	18:44	20:41	21:33	22:02
23	08:29		07:32	06:26	06:13	05:17	04:59
	16:52		17:53	18:46	20:43	21:34	22:02
24	08:28		07:30	06:24	06:10	05:16	04:59
	16:54		17:55	18:48	20:44	21:36	22:02
25	08:26		07:28	06:21	06:08	05:14	04:59
	16:56		17:57	18:50	20:46	21:37	22:02
26	08:25		07:25	06:19	06:06	05:13	05:00
	16:58		17:59	18:51	20:48	21:39	22:02
27	08:23		07:23	06:16	06:04	05:12	05:00
	17:00		18:01	18:53	20:50	21:40	22:02
28	08:22		07:21	06:14	06:02	05:11	05:01
	17:01		18:03	18:55	20:52	21:42	22:02
29	08:20			07:11	06:00	05:10	05:01
	17:03			19:57	20:54	21:43	22:02
30	08:19			07:09	05:58	05:08	05:02
	17:05			19:59	20:55	21:44	22:02
31	08:17			07:07		05:07	
	17:07			20:01		21:45	
Sonnenscheinstunden	251		274	367	419	493	509
astr.max.mögl.Beschattung	117						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	(WEA mit erstem Schatten)	Zeitpunkt (SS:MM) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO30 - Purkswarfe 2
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:
Die Sonne scheint täglich von Sonnenauf- bis -untergang
Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September	Oktober	November	Dezember
1	05:03 22:01	21:21 (WEA VB13) 21:26 (WEA VB13)	05:42 21:27	06:36 20:21	07:28 19:07	08:21 16:57
2	05:03 22:01	21:22 (WEA VB13) 21:26 (WEA VB13)	05:44 21:25	06:38 20:18	07:30 19:05	08:22 16:55
3	05:04 22:01	21:22 (WEA VB13) 21:25 (WEA VB13)	05:45 21:23	06:39 20:16	07:32 19:03	08:24 16:53
4	05:05 22:00	21:23 (WEA VB13) 21:25 (WEA VB13)	05:47 21:21	06:41 20:13	07:34 19:00	08:25 16:52
5	05:06 22:00	21:22 (WEA VB13) 21:24 (WEA VB13)	05:49 21:19	06:43 20:11	07:36 18:58	08:27 16:50
6	05:07 21:59	21:23 (WEA VB13) 21:24 (WEA VB13)	05:50 21:17	06:45 20:09	07:37 18:55	08:28 16:48
7	05:08 21:58		05:52 21:15	06:46 20:06	07:39 18:53	08:29 16:46
8	05:09 21:58		05:54 21:13	06:48 20:04	07:41 18:51	08:31 16:44
9	05:10 21:57		05:56 21:12	06:50 20:01	07:43 18:48	08:32 16:42
10	05:11 21:56		05:57 21:09	06:52 19:59	07:45 18:46	08:33 16:41
11	05:12 21:55		05:59 21:07	06:53 19:56	07:47 18:43	08:34 16:39
12	05:13 21:54		06:01 21:05	06:55 19:54	07:48 18:41	08:35 16:37
13	05:14 21:53		06:02 21:03	06:57 19:52	07:50 18:39	08:36 16:36
14	05:15 21:52		06:04 21:01	06:58 19:49	07:52 18:36	08:37 16:34
15	05:17 21:51		06:06 20:59	07:00 19:47	07:54 18:34	08:38 16:32
16	05:18 21:50		06:08 20:57	07:02 19:44	07:56 18:32	08:39 16:31
17	05:19 21:49		06:09 20:55	07:04 19:42	07:58 18:30	08:40 16:29
18	05:21 21:48		06:11 20:53	07:05 19:39	08:00 18:27	08:41 16:28
19	05:22 21:47		06:13 20:50	07:07 19:37	08:01 18:25	08:41 16:27
20	05:23 21:45		06:15 20:48	07:09 19:34	08:03 18:23	08:42 16:25
21	05:25 21:44		06:16 20:46	07:11 19:32	08:05 18:21	08:43 16:24
22	05:26 21:42		06:18 20:44	07:13 19:29	08:07 18:18	08:43 16:23
23	05:28 21:41		06:20 20:42	07:14 19:27	08:09 18:16	08:44 16:21
24	05:29 21:40		06:22 20:39	07:16 19:25	08:11 18:14	08:44 16:20
25	05:31 21:38		06:23 20:37	07:18 19:22	08:11 17:12	08:45 16:19
26	05:32 21:37		06:25 20:35	07:20 19:20	07:15 17:10	08:45 16:18
27	05:34 21:35		06:27 20:32	07:21 19:17	07:17 17:08	08:45 16:17
28	05:36 21:33		06:29 20:30	07:23 19:15	07:18 17:05	08:45 16:16
29	05:37 21:32		06:30 20:28	07:25 19:12	07:20 17:03	08:45 16:15
30	05:39 21:30		06:32 20:25	07:27 19:10	07:22 17:01	08:45 16:14
31	05:40 21:28		06:34 20:23		07:24 16:59	08:45 16:17
Sonnenscheinstunden	511		459	382	329	260
astr.max.mögl.Beschattung	17					485

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO31 - Purkswarfe 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:
Die Sonne scheint täglich von Sonnenauf- bis -untergang
Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45 16:18	09:31 (WEA VB19) 09:34 (WEA VB19)	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57
2	08:45 16:20		08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59
3	08:45 16:21		08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01
4	08:45 16:22		08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03
5	08:44 16:23		08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04
6	08:44 16:24		08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06
7	08:44 16:26		08:05 17:21	07:05 18:16	06:50 20:13	05:43 21:08
8	08:43 16:27		08:03 17:23	07:02 18:18	06:47 20:15	05:42 21:10
9	08:43 16:29		08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11
10	08:42 16:30		07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13
11	08:41 16:32		07:57 17:29	06:55 18:24	06:40 20:21	05:36 21:15
12	08:41 16:33		07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17
13	08:40 16:35		07:53 17:33	06:50 18:27	06:35 20:24	05:33 21:18
14	08:39 16:36		07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20
15	08:38 16:38		07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22
16	08:37 16:40		07:47 17:39	06:43 18:33	06:28 20:30	20:50 (WEA VB13) 20:51 (WEA VB13)
17	08:36 16:41		07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25
18	08:35 16:43		07:43 17:43	06:38 18:37	06:24 20:34	05:24 21:27
19	08:34 16:45		07:41 17:45	06:36 18:38	06:22 20:35	05:23 21:28
20	08:33 16:47		07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30
21	08:32 16:48		07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31
22	08:30 16:50		07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33
23	08:29 16:52		07:32 17:53	06:26 18:46	06:13 20:43	05:17 21:34
24	08:28 16:54		07:30 17:55	06:24 18:48	06:10 20:44	05:16 21:36
25	08:26 16:56		07:28 17:57	06:21 18:50	06:08 20:46	05:14 21:37
26	08:25 16:58		07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39
27	08:23 17:00		07:23 18:01	06:16 18:53	06:04 20:50	05:12 21:40
28	08:22 17:01		07:21 18:03	06:14 18:55	06:02 20:52	05:11 21:41
29	08:20 17:03			07:11 19:57	06:00 20:54	05:10 21:43
30	08:19 17:05			07:09 19:59	05:57 20:55	05:08 21:44
31	08:17 17:07			07:06 20:01		05:07 21:45
Sonnenscheinstunden	251		274	367	419	493
astr.max.mögl.Beschattung	3					31
						509

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO31 - Purkswarfe 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:
Die Sonne scheint täglich von Sonnenauf- bis -untergang
Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember	
1	05:03 22:01	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13	
2	05:03 22:01	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13	
3	05:04 22:01	05:45 21:23	06:39 20:16	07:32 19:03	07:30 16:53	08:24 16:12	
4	05:05 22:00	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11	
5	05:06 22:00	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:50	08:26 16:11	
6	05:07 21:59	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10	
7	05:08 21:58	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10	
8	05:09 21:58	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:30 16:09	
9	05:10 21:57	05:56 21:11	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09	
10	05:11 21:56	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:41	08:33 16:09	
11	05:12 21:55	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:09	09:22 (WEA VB19)
12	05:13 21:54	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08	2 09:24 (WEA VB19) 5 09:26 (WEA VB19)
13	05:14 21:53	06:02 21:03	06:57 19:52	07:50 18:39	07:49 16:36	08:36 16:08	09:21 (WEA VB19) 7 09:28 (WEA VB19)
14	05:15 21:52	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08	09:21 (WEA VB19) 8 09:29 (WEA VB19)
15	05:17 21:51	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08	09:21 (WEA VB19) 9 09:30 (WEA VB19)
16	05:18 21:50	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08	09:21 (WEA VB19) 9 09:30 (WEA VB19)
17	05:19 21:49	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08	09:21 (WEA VB19) 10 09:31 (WEA VB19)
18	05:21 21:48	06:11 20:53	07:05 19:39	08:00 18:27	07:58 16:28	08:41 16:09	09:21 (WEA VB19) 11 09:32 (WEA VB19)
19	05:22 21:46	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:27	08:41 16:09	09:22 (WEA VB19) 10 09:32 (WEA VB19)
20	05:23 21:45	06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09	09:22 (WEA VB19) 10 09:32 (WEA VB19)
21	05:25 21:44	06:16 21:04 (WEA VB13) 21:07 (WEA VB13)	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10	09:23 (WEA VB19) 10 09:33 (WEA VB19)
22	05:26 21:42	06:18 21:10 (WEA VB13)	07:12 19:29	08:07 18:18	08:06 16:23	08:43 16:10	09:23 (WEA VB19) 10 09:33 (WEA VB19)
23	05:28 21:41	06:20 21:02 (WEA VB13)	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11	09:24 (WEA VB19) 10 09:34 (WEA VB19)
24	05:29 21:40	06:22 21:08 (WEA VB13) 21:07 (WEA VB13)	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11	09:24 (WEA VB19) 10 09:34 (WEA VB19)
25	05:31 21:38	06:23 21:06 (WEA VB13)	07:18 19:22	08:13 17:12	08:11 16:19	08:44 16:12	09:24 (WEA VB19) 10 09:34 (WEA VB19)
26	05:32 21:37	06:25 21:00 (WEA VB13)	07:20 19:20	08:15 17:10	08:13 16:18	08:45 16:13	09:26 (WEA VB19) 10 09:36 (WEA VB19)
27	05:34 21:35	06:27 21:01 (WEA VB13)	07:21 19:17	08:17 17:08	08:14 16:17	08:45 16:13	09:26 (WEA VB19) 10 09:36 (WEA VB19)
28	05:36 21:33	06:29 21:00 (WEA VB13)	07:23 19:15	08:18 17:05	08:16 16:16	08:45 16:14	09:27 (WEA VB19) 9 09:36 (WEA VB19)
29	05:37 21:32	06:30 20:28	07:25 19:12	08:20 17:03	08:18 16:15	08:45 16:15	09:28 (WEA VB19) 8 09:36 (WEA VB19)
30	05:39 21:30	06:32 20:25	07:27 19:10	08:22 17:01	08:19 16:14	08:45 16:16	09:29 (WEA VB19) 7 09:36 (WEA VB19)
31	05:40 21:28	06:34 20:23		07:24 16:59		08:45 16:17	09:29 (WEA VB19) 6 09:35 (WEA VB19)
Sonnenscheinstunden	511	459	382	329	260	235	
astr.max.mögl.Beschattung	33					181	

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	---------------------------	--------------------------------	----------------------------

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO32 - Putzwei 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:45 16:18	08:16 17:09	07:19 18:04	07:04 20:02	05:55 20:57	05:06 21:47	05:37 (WEA VB6) 21:13 (WEA ZB2)	05:03 22:01	05:40 (WEA VB6) 21:26 (WEA ZB2)	05:42 21:27	06:36 20:21	07:28 19:07	07:26 16:57	08:21 16:13
2	08:45 16:19	08:14 17:11	07:16 18:06	07:02 20:04	05:53 20:59	05:05 21:48	05:36 (WEA VB6) 21:13 (WEA ZB2)	05:03 22:01	05:41 (WEA VB6) 21:26 (WEA ZB2)	05:44 21:25	06:37 20:18	07:30 19:05	07:28 16:55	08:22 16:13
3	08:45 16:21	08:12 17:13	07:14 18:08	06:59 20:06	05:51 21:01	05:05 21:49	05:35 (WEA VB6) 21:14 (WEA ZB2)	05:04 22:01	05:41 (WEA VB6) 21:25 (WEA ZB2)	05:45 21:23	06:39 20:16	07:32 19:02	07:30 16:53	08:24 16:12
4	08:45 16:22	08:10 17:15	07:12 18:10	06:57 20:08	05:49 21:03	05:04 21:50	05:35 (WEA VB6) 21:16 (WEA ZB2)	05:05 22:00	05:41 (WEA VB6) 21:25 (WEA ZB2)	05:47 21:21	06:41 20:13	07:34 19:00	07:32 16:51	08:25 16:11
5	08:44 16:23	08:09 17:17	07:09 18:12	06:54 20:10	05:47 21:04	05:03 21:51	05:35 (WEA VB6) 21:16 (WEA ZB2)	05:06 22:00	05:41 (WEA VB6) 21:24 (WEA ZB2)	05:49 21:19	06:43 20:11	07:36 18:58	07:34 16:50	08:26 16:11
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:12	05:45 21:06	05:02 21:52	05:34 (WEA VB6) 21:17 (WEA ZB2)	05:07 21:59	05:41 (WEA VB6) 21:24 (WEA ZB2)	05:50 21:17	06:44 20:09	07:37 18:55	07:36 16:48	08:28 16:10
7	08:44 16:26	08:05 17:21	07:05 18:16	06:50 20:13	05:43 21:08	05:02 21:53	05:35 (WEA VB6) 21:18 (WEA ZB2)	05:08 21:58	05:41 (WEA VB6) 21:23 (WEA ZB2)	05:52 21:15	06:46 20:06	07:39 18:53	07:38 16:46	08:29 16:10
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15	05:42 21:10	05:01 21:54	05:35 (WEA VB6) 21:19 (WEA ZB2)	05:09 21:58	05:41 (WEA VB6) 21:23 (WEA ZB2)	05:54 21:13	06:48 20:04	07:41 18:50	07:40 16:44	08:30 16:09
9	08:43 16:29	08:01 17:25	07:00 18:20	06:45 20:17	05:40 21:11	05:00 21:55	05:36 (WEA VB6) 21:20 (WEA ZB2)	05:10 21:57	05:42 (WEA VB6) 21:22 (WEA ZB2)	05:55 21:11	06:50 20:01	07:43 18:48	07:42 16:42	08:32 16:09
10	08:42 16:30	07:59 17:27	06:57 18:22	06:42 20:19	05:38 21:13	05:00 21:56	05:36 (WEA VB6) 21:21 (WEA ZB2)	05:11 21:56	05:43 (WEA VB6) 21:21 (WEA ZB2)	05:57 21:09	06:51 19:59	07:45 18:46	07:43 16:41	08:33 16:09
11	08:41 16:32	07:57 17:29	06:55 18:23	06:40 20:21	05:36 21:15	05:00 21:57	05:36 (WEA VB6) 21:21 (WEA ZB2)	05:12 21:55	05:44 (WEA VB6) 21:20 (WEA ZB2)	05:59 21:07	06:53 19:56	07:47 18:43	07:45 16:39	08:34 16:08
12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:23	05:34 21:17	04:59 21:57	05:36 (WEA VB6) 21:22 (WEA ZB2)	05:13 21:54	05:45 (WEA VB6) 21:20 (WEA ZB2)	06:01 21:05	06:55 19:54	07:48 18:41	07:47 16:37	08:35 16:08
13	08:40 16:35	07:53 17:33	06:50 18:27	06:35 20:24	05:32 21:18	04:59 21:58	05:37 (WEA VB6) 21:23 (WEA ZB2)	05:14 21:53	05:46 (WEA VB6) 21:19 (WEA ZB2)	06:02 21:03	06:57 19:51	07:50 18:39	07:49 16:36	08:36 16:08
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26	05:31 21:20	04:59 21:59	05:37 (WEA VB6) 21:24 (WEA ZB2)	05:15 21:52	05:48 (WEA VB6) 21:18 (WEA ZB2)	06:04 21:01	06:58 19:49	07:52 18:36	07:51 16:34	08:37 16:08
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28	05:29 21:22	04:58 21:59	05:38 (WEA VB6) 21:24 (WEA ZB2)	05:17 21:51	05:49 (WEA VB6) 21:19 (WEA ZB2)	06:06 20:59	07:00 19:47	07:54 18:34	07:53 16:32	08:38 16:08
16	08:37 16:40	07:47 17:39	06:43 18:33	06:28 20:30	05:27 21:23	04:58 22:00	05:37 (WEA VB6) 21:24 (WEA ZB2)	05:18 21:50	05:50 (WEA VB6) 21:16 (WEA ZB2)	06:08 20:57	07:02 19:44	07:56 18:32	07:55 16:31	08:39 16:08
17	08:36 16:41	07:45 17:41	06:41 18:35	06:26 20:32	05:26 21:25	04:58 22:00	05:38 (WEA VB6) 21:24 (WEA ZB2)	05:19 21:49	05:51 (WEA VB6) 20:55 (WEA VB6)	06:09 20:55	07:04 19:42	07:58 18:29	07:57 16:29	08:40 16:08
18	08:35 16:43	07:43 17:43	06:38 18:37	06:24 20:33	05:24 21:27	04:58 22:01	05:38 (WEA VB6) 21:25 (WEA ZB2)	05:21 21:48	05:52 (WEA VB6) 20:53 (WEA VB6)	06:11 20:53	07:05 19:39	07:59 18:27	07:58 16:28	08:41 16:09
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	05:23 21:28	04:58 22:01	05:39 (WEA VB6) 21:26 (WEA ZB2)	05:22 21:46	05:54 (WEA VB6) 20:50 (WEA VB6)	06:13 20:50	07:07 19:37	08:01 18:25	08:00 16:27	08:41 16:09
20	08:33 16:47	07:39 17:47	06:33 18:40	06:19 20:37	05:21 21:30	04:58 22:02	05:39 (WEA VB6) 21:26 (WEA ZB2)	05:23 21:45		06:15 20:48	07:09 19:34	08:03 18:23	08:02 16:25	08:42 16:09
21	08:32 16:48	07:37 17:49	06:31 18:42	06:17 20:39	05:20 21:31	04:58 22:02	05:39 (WEA VB6) 21:26 (WEA ZB2)	05:25 21:44		06:16 20:46	07:11 19:32	08:05 18:20	08:04 16:24	08:43 16:10
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	05:18 21:33	04:58 22:02	05:39 (WEA VB6) 21:26 (WEA ZB2)	05:26 21:42		06:18 20:44	07:12 19:29	08:07 18:18	08:06 16:23	08:43 16:10
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:43	05:17 21:34	04:59 22:02	05:39 (WEA VB6) 21:26 (WEA ZB2)	05:28 21:41		06:20 20:41	07:14 19:27	08:09 18:16	08:07 16:21	08:44 16:11
24	08:28 16:54	07:30 17:55	06:24 18:48	06:10 20:44	05:16 21:36	04:59 22:02	05:40 (WEA VB6) 21:27 (WEA ZB2)	05:29 21:40		06:22 20:39	07:16 19:24	08:11 18:14	08:09 16:20	08:44 16:11
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	05:14 21:37	04:59 22:02	05:40 (WEA VB6) 21:27 (WEA ZB2)	05:31 21:38		06:23 20:37	07:18 19:22	07:13 17:12	08:11 16:19	08:44 16:12
26	08:25 16:58	07:25 17:59	06:19 18:51	06:06 20:48	05:13 21:39	05:00 22:02	05:40 (WEA VB6) 21:27 (WEA ZB2)	05:32 21:37		06:25 20:35	07:20 19:20	07:15 17:10	08:13 16:18	08:45 16:13
27	08:23 16:59	07:23 18:01	06:16 18:53	06:04 20:50	05:12 21:40	05:00 22:02	05:41 (WEA VB6) 21:27 (WEA ZB2)	05:34 21:35		06:27 20:32	07:21 19:17	07:17 17:08	08:14 16:17	08:45 16:13
28	08:22 17:01	07:21 18:02	06:14 18:55	06:02 20:52	05:11 21:41	05:01 22:02	05:40 (WEA VB6) 21:07 (WEA ZB2)	05:35 22:02		06:29 20:30	07:23 19:15	07:18 17:05	08:16 16:16	08:45 16:14
29	08:20 17:03		07:11 19:57	06:00 20:54	05:09 21:43	05:01 22:02	05:40 (WEA VB6) 21:26 (WEA ZB2)	05:37 21:32		06:30 20:28	07:25 19:12	07:20 17:03	08:17 16:15	08:45 16:15
30	08:19 17:05		07:09 19:59	05:57 20:55	05:08 21:44	05:02 22:02	05:41 (WEA VB6) 21:26 (WEA ZB2)	05:39 21:30		06:32 20:25	07:27 19:10	07:22 17:01	08:19 16:14	08:45 16:16
31	08:17 17:07		07:06 20:01	05:07 21:45	05:07 21:45	05:07 21:45	05:38 (WEA VB6) 21:12 (WEA ZB2)	05:40 21:28		06:34 20:23	07:24 16:59			08:45 16:17
Sonnenscheinstunden	251	274	367	419	493	509		511		459	382	329	260	235
astr.max.mögl.Beschattung					112	1418		603						

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO33 - Westerhausen 5
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni					
1	08:45	08:16			07:19	16:04 (WEA ZB3)	07:04	16:58 (WEA ZB3)	05:55	06:28 (WEA VB6)	05:06	05:46 (WEA VB5)				
	16:18	17:09			18:04	76	17:20 (WEA ZB3)	20:02	120	19:34 (WEA ZB2)	20:57	50	20:28 (WEA ZB1)	21:47	45	20:26 (WEA ZB1)
2	08:45	08:14			07:16	16:03 (WEA ZB3)	07:02	16:59 (WEA ZB3)	05:53	06:28 (WEA VB6)	05:05	05:46 (WEA VB5)				
	16:19	17:11			18:06	78	17:21 (WEA ZB3)	20:04	121	19:35 (WEA ZB2)	20:59	52	20:29 (WEA ZB1)	21:48	42	20:24 (WEA ZB1)
3	08:45	08:12			07:14	16:02 (WEA ZB3)	06:59	17:01 (WEA ZB3)	05:51	06:29 (WEA VB6)	05:05	05:46 (WEA VB5)				
	16:21	17:13			18:08	79	17:21 (WEA ZB3)	20:06	120	19:36 (WEA ZB2)	21:01	53	20:31 (WEA ZB1)	21:49	40	20:23 (WEA ZB1)
4	08:45	08:10			07:12	16:01 (WEA ZB3)	06:57	17:01 (WEA ZB3)	05:49	06:29 (WEA VB6)	05:04	05:47 (WEA VB5)				
	16:22	17:15			18:10	81	17:22 (WEA ZB3)	20:08	119	19:36 (WEA ZB2)	21:03	53	20:32 (WEA ZB1)	21:50	37	20:22 (WEA ZB1)
5	08:44	08:09			07:09	15:59 (WEA ZB3)	06:54	17:03 (WEA ZB3)	05:47	06:30 (WEA VB6)	05:03	05:47 (WEA VB5)				
	16:23	17:17			18:12	83	17:22 (WEA ZB3)	20:10	117	19:36 (WEA ZB2)	21:04	53	20:34 (WEA ZB1)	21:51	33	20:20 (WEA ZB1)
6	08:44	08:07			07:07	15:59 (WEA ZB3)	06:52	17:05 (WEA ZB3)	05:45	06:32 (WEA VB6)	05:02	05:47 (WEA VB5)				
	16:24	17:19			18:14	84	17:23 (WEA ZB3)	20:12	114	19:37 (WEA ZB2)	21:06	52	20:35 (WEA ZB1)	21:52	25	06:12 (WEA VB5)
7	08:44	08:05			07:05	15:59 (WEA ZB3)	06:50	17:06 (WEA ZB3)	05:43	06:34 (WEA VB6)	05:02	05:47 (WEA VB5)				
	16:26	17:21			18:16	85	17:24 (WEA ZB3)	20:13	111	19:36 (WEA ZB2)	21:08	47	20:35 (WEA ZB1)	21:53	25	06:12 (WEA VB5)
8	08:43	08:03			07:02	15:57 (WEA ZB3)	06:47	17:08 (WEA ZB3)	05:42	19:53 (WEA ZB1)	05:01	05:47 (WEA VB5)				
	16:27	17:23			18:18	86	17:23 (WEA ZB3)	20:15	108	19:37 (WEA ZB2)	21:10	42	20:35 (WEA ZB1)	21:54	25	06:12 (WEA VB5)
9	08:43	08:01			07:00	15:57 (WEA ZB3)	06:45	17:09 (WEA ZB3)	05:40	19:53 (WEA ZB1)	05:00	05:48 (WEA VB5)				
	16:29	17:25			18:20	87	17:24 (WEA ZB3)	20:17	105	19:36 (WEA ZB2)	21:11	41	20:34 (WEA ZB1)	21:55	24	06:12 (WEA VB5)
10	08:42	07:59			06:57	15:56 (WEA ZB3)	06:42	17:12 (WEA ZB3)	05:38	19:53 (WEA ZB1)	05:00	05:48 (WEA VB5)				
	16:30	17:27			18:22	88	17:24 (WEA ZB3)	20:19	100	19:36 (WEA ZB2)	21:13	42	20:35 (WEA ZB1)	21:56	25	06:13 (WEA VB5)
11	08:41	07:57			06:55	15:56 (WEA ZB3)	06:40	17:15 (WEA ZB3)	05:36	19:53 (WEA ZB1)	05:00	05:48 (WEA VB5)				
	16:31	17:29			18:23	88	17:24 (WEA ZB3)	20:21	94	19:36 (WEA ZB2)	21:15	42	20:35 (WEA ZB1)	21:57	24	06:12 (WEA VB5)
12	08:41	07:55			06:53	15:54 (WEA ZB3)	06:38	17:17 (WEA ZB3)	05:34	19:53 (WEA ZB1)	04:59	05:49 (WEA VB5)				
	16:33	17:31			18:25	90	17:24 (WEA ZB3)	20:23	89	19:35 (WEA ZB2)	21:17	41	20:34 (WEA ZB1)	21:57	24	06:13 (WEA VB5)
13	08:40	07:53			06:50	15:54 (WEA ZB3)	06:35	17:21 (WEA ZB3)	05:32	19:53 (WEA ZB1)	04:59	05:49 (WEA VB5)				
	16:35	17:33			18:27	90	17:24 (WEA ZB3)	20:24	81	19:35 (WEA ZB2)	21:18	42	20:35 (WEA ZB1)	21:58	24	06:13 (WEA VB5)
14	08:39	07:51			06:48	15:55 (WEA ZB3)	06:33	17:27 (WEA ZB3)	05:31	19:53 (WEA ZB1)	04:59	05:50 (WEA VB5)				
	16:36	17:35			18:29	90	17:25 (WEA ZB3)	20:26	68	19:34 (WEA ZB2)	21:20	41	20:34 (WEA ZB1)	21:59	23	06:13 (WEA VB5)
15	08:38	07:49			06:45	15:54 (WEA ZB3)	06:31	18:42 (WEA ZB2)	05:29	19:54 (WEA ZB1)	04:58	05:49 (WEA VB5)				
	16:38	17:37			18:31	90	17:24 (WEA ZB3)	20:28	52	19:34 (WEA ZB2)	21:22	41	20:35 (WEA ZB1)	21:59	24	06:13 (WEA VB5)
16	08:37	07:47		16:35 (WEA ZB3)	06:43	15:54 (WEA ZB3)	06:28	18:42 (WEA ZB2)	05:27	19:54 (WEA ZB1)	04:58	05:49 (WEA VB5)				
	16:40	17:39	17	16:52 (WEA ZB3)	18:33	90	17:24 (WEA ZB3)	20:30	51	19:33 (WEA ZB2)	21:23	40	20:34 (WEA ZB1)	22:00	24	06:13 (WEA VB5)
17	08:36	07:45		16:30 (WEA ZB3)	06:41	15:53 (WEA ZB3)	06:26	18:42 (WEA ZB2)	05:26	19:54 (WEA ZB1)	04:58	05:50 (WEA VB5)				
	16:41	17:41	28	16:58 (WEA ZB3)	18:35	90	17:23 (WEA ZB3)	20:32	50	19:32 (WEA ZB2)	21:25	40	20:34 (WEA ZB1)	22:00	23	06:13 (WEA VB5)
18	08:35	07:43		16:25 (WEA ZB3)	06:38	15:53 (WEA ZB3)	06:24	18:43 (WEA ZB2)	05:24	05:54 (WEA VB5)	04:58	05:50 (WEA VB5)				
	16:43	17:43	36	17:01 (WEA ZB3)	18:37	91	17:24 (WEA ZB3)	20:33	48	19:31 (WEA ZB2)	21:27	46	20:33 (WEA ZB1)	22:01	23	06:13 (WEA VB5)
19	08:34	07:41		16:22 (WEA ZB3)	06:36	15:53 (WEA ZB3)	06:21	18:44 (WEA ZB2)	05:23	05:52 (WEA VB5)	04:58	05:51 (WEA VB5)				
	16:45	17:45	42	17:04 (WEA ZB3)	18:38	90	17:23 (WEA ZB3)	20:35	47	19:31 (WEA ZB2)	21:28	49	20:33 (WEA ZB1)	22:01	23	06:14 (WEA VB5)
20	08:33	07:39		16:20 (WEA ZB3)	06:33	15:53 (WEA ZB3)	06:19	18:44 (WEA ZB2)	05:21	05:51 (WEA VB5)	04:58	05:51 (WEA VB5)				
	16:46	17:47	47	17:07 (WEA ZB3)	18:40	90	17:23 (WEA ZB3)	20:37	46	19:30 (WEA ZB2)	21:30	51	20:33 (WEA ZB1)	22:02	23	06:14 (WEA VB5)
21	08:32	07:37		16:18 (WEA ZB3)	06:31	15:53 (WEA ZB3)	06:17	18:44 (WEA ZB2)	05:20	05:49 (WEA VB5)	04:58	05:51 (WEA VB5)				
	16:48	17:49	51	17:09 (WEA ZB3)	18:42	89	17:22 (WEA ZB3)	20:39	44	19:28 (WEA ZB2)	21:31	53	20:32 (WEA ZB1)	22:02	23	06:14 (WEA VB5)
22	08:30	07:34		16:15 (WEA ZB3)	06:28	15:53 (WEA ZB3)	06:15	06:39 (WEA VB6)	05:18	05:48 (WEA VB5)	04:58	05:51 (WEA VB5)				
	16:50	17:51	55	17:10 (WEA ZB3)	18:44	89	17:22 (WEA ZB3)	20:41	43	19:27 (WEA ZB2)	21:33	54	20:32 (WEA ZB1)	22:02	23	06:14 (WEA VB5)
23	08:29	07:32		16:13 (WEA ZB3)	06:26	15:53 (WEA ZB3)	06:12	06:37 (WEA VB6)	05:17	05:48 (WEA VB5)	04:59	05:51 (WEA VB5)				
	16:52	17:53	59	17:12 (WEA ZB3)	18:46	88	17:21 (WEA ZB3)	20:43	46	19:26 (WEA ZB2)	21:34	54	20:31 (WEA ZB1)	22:02	23	06:14 (WEA VB5)
24	08:28	07:30		16:12 (WEA ZB3)	06:24	15:54 (WEA ZB3)	06:10	06:35 (WEA VB6)	05:16	05:48 (WEA VB5)	04:59	05:52 (WEA VB5)				
	16:54	17:55	62	17:14 (WEA ZB3)	18:48	96	18:19 (WEA ZB2)	20:44	51	20:16 (WEA ZB1)	21:36	54	20:31 (WEA ZB1)	22:02	23	06:15 (WEA VB5)
25	08:26	07:28		16:09 (WEA ZB3)	06:21	15:54 (WEA ZB3)	06:08	06:33 (WEA VB6)	05:14	05:46 (WEA VB5)	04:59	05:52 (WEA VB5)				
	16:56	17:57	66	17:15 (WEA ZB3)	18:49	106	18:24 (WEA ZB2)	20:46	58	20:17 (WEA ZB1)	21:37	54	20:30 (WEA ZB1)	22:02	23	06:15 (WEA VB5)
26	08:25	07:25		16:08 (WEA ZB3)	06:19	15:54 (WEA ZB3)	06:06	06:31 (WEA VB6)	05:13	05:46 (WEA VB5)	05:00	05:51 (WEA VB5)				
	16:58	17:59	69	17:17 (WEA ZB3)	18:51	110	18:25 (WEA ZB2)	20:48	61	20:19 (WEA ZB1)	21:39	53	20:29 (WEA ZB1)	22:02	24	06:15 (WEA VB5)
27	08:23	07:23		16:07 (WEA ZB3)	06:16	15:55 (WEA ZB3)	06:04	06:29 (WEA VB6)	05:12	05:46 (WEA VB5)	05:00	05:52 (WEA VB5)				
	16:59	18:01	71	17:18 (WEA ZB3)	18:53	113	18:27 (WEA ZB2)	20:50	64	20:21 (WEA ZB1)	21:40	52	20:29 (WEA ZB1)	22:02	24	06:16 (WEA VB5)
28	08:22	07:21		16:05 (WEA ZB3)	06:14	15:55 (WEA ZB3)	06:02	06:28 (WEA VB6)	05:11	05:46 (WEA VB5)	05:01	05:52 (WEA VB5)				
	17:01	18:02	73	17:18 (WEA ZB3)	18:55	115	18:28 (WEA ZB2)	20:52	62	20:23 (WEA ZB1)	21:41	51	20:28 (WEA ZB1)	22:02	23	06:15 (WEA VB5)
29	08:20				07:11	16:56 (WEA ZB3)	06:00	06:28 (WEA VB6)	05:09	05:46 (WEA VB5)	05:01	05:52 (WEA VB5)				
	17:03				19:57	118	19:31 (WEA ZB2)	20:54	56	20:24 (WEA ZB1)	21:43	49	20:27 (WEA ZB1)	22:02	24	06:16 (WEA VB5)
30	08:19				07:09	16:56 (WEA ZB3)	05:57	06:28 (WEA VB6)	05:08	05:46 (WEA VB5)	05:02	05:53 (WEA VB5)				
	17:05				19:59	120	19:32 (WEA ZB2)	20:55	48	20:26 (WEA ZB1)	21:44	48	20:27 (WEA ZB1)	22:02	24	06:17 (WEA VB5)
31	08:17				07:06	16:57 (WEA ZB3)				05:07			05:47 (WEA VB5)			
	17:07				20:01	121	19:34 (WEA ZB2)			21:45	46	20:27 (WEA ZB1)				
Sonnenscheinstunden		251	274	676		2891		419	2294		493	1486		509	790	
astr.max.mögl.Beschattung																

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO33 - Westerhausen 5
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember
1	05:03		05:52 (WEA VB5)	05:42	20:03 (WEA ZB1)	06:36	17:14 (WEA ZB3)	07:28	16:34 (WEA ZB3)	07:26	08:21
	22:01	24	06:16 (WEA VB5)	21:27	42	20:45 (WEA ZB1)	20:21	94	19:35 (WEA ZB2)	19:07	90
2	05:03		05:53 (WEA VB5)	05:44		20:03 (WEA ZB1)	06:37		17:11 (WEA ZB3)	07:30	16:33 (WEA ZB3)
	22:01	24	06:17 (WEA VB5)	21:25	42	20:45 (WEA ZB1)	20:18	100	19:35 (WEA ZB2)	19:05	89
3	05:04		05:53 (WEA VB5)	05:45		20:03 (WEA ZB1)	06:39		17:07 (WEA ZB3)	07:32	16:34 (WEA ZB3)
	22:01	25	06:18 (WEA VB5)	21:23	42	20:45 (WEA ZB1)	20:16	105	19:34 (WEA ZB2)	19:02	88
4	05:05		05:53 (WEA VB5)	05:47		20:03 (WEA ZB1)	06:41		17:05 (WEA ZB3)	07:34	16:34 (WEA ZB3)
	22:00	25	06:18 (WEA VB5)	21:21	42	20:45 (WEA ZB1)	20:13	108	19:34 (WEA ZB2)	19:00	87
5	05:06		05:53 (WEA VB5)	05:49		20:04 (WEA ZB1)	06:43		17:03 (WEA ZB3)	07:36	16:34 (WEA ZB3)
	22:00	24	06:17 (WEA VB5)	21:19	41	20:45 (WEA ZB1)	20:11	111	19:33 (WEA ZB2)	18:58	87
6	05:07		05:53 (WEA VB5)	05:50		06:43 (WEA VB6)	06:44		17:00 (WEA ZB3)	07:37	16:34 (WEA ZB3)
	21:59	25	06:18 (WEA VB5)	21:17	48	20:44 (WEA ZB1)	20:09	114	19:32 (WEA ZB2)	18:55	86
7	05:08		05:53 (WEA VB5)	05:52		06:41 (WEA VB6)	06:46		16:58 (WEA ZB3)	07:39	16:35 (WEA ZB3)
	21:58	30	20:25 (WEA ZB1)	21:15	52	20:44 (WEA ZB1)	20:06	117	19:32 (WEA ZB2)	18:53	84
8	05:09		05:53 (WEA VB5)	05:54		06:39 (WEA VB6)	06:48		16:57 (WEA ZB3)	07:41	16:35 (WEA ZB3)
	21:58	35	20:28 (WEA ZB1)	21:13	54	20:43 (WEA ZB1)	20:04	118	19:31 (WEA ZB2)	18:50	83
9	05:10		05:54 (WEA VB5)	05:55		06:38 (WEA VB6)	06:50		16:54 (WEA ZB3)	07:43	16:35 (WEA ZB3)
	21:57	39	20:30 (WEA ZB1)	21:11	53	20:41 (WEA ZB1)	20:01	119	19:29 (WEA ZB2)	18:48	82
10	05:11		05:54 (WEA VB5)	05:57		06:38 (WEA VB6)	06:51		16:53 (WEA ZB3)	07:45	16:35 (WEA ZB3)
	21:56	41	20:31 (WEA ZB1)	21:09	52	20:40 (WEA ZB1)	19:59	121	19:29 (WEA ZB2)	18:46	81
11	05:12		05:54 (WEA VB5)	05:59		06:37 (WEA VB6)	06:53		16:51 (WEA ZB3)	07:47	16:36 (WEA ZB3)
	21:55	44	20:33 (WEA ZB1)	21:07	50	20:37 (WEA ZB1)	19:56	122	19:28 (WEA ZB2)	18:43	79
12	05:13		05:54 (WEA VB5)	06:01		06:36 (WEA VB6)	06:55		16:49 (WEA ZB3)	07:48	16:37 (WEA ZB3)
	21:54	46	20:34 (WEA ZB1)	21:05	50	20:36 (WEA ZB1)	19:54	121	19:26 (WEA ZB2)	18:41	76
13	05:14		05:54 (WEA VB5)	06:02		06:36 (WEA VB6)	06:57		16:48 (WEA ZB3)	07:50	16:38 (WEA ZB3)
	21:53	48	20:35 (WEA ZB1)	21:03	46	20:33 (WEA ZB1)	19:52	119	19:23 (WEA ZB2)	18:39	74
14	05:15		05:55 (WEA VB5)	06:04		06:36 (WEA VB6)	06:58		16:47 (WEA ZB3)	07:52	16:39 (WEA ZB3)
	21:52	49	20:36 (WEA ZB1)	21:01	57	20:31 (WEA ZB1)	19:49	118	19:21 (WEA ZB2)	18:36	72
15	05:17		05:55 (WEA VB5)	06:06		06:36 (WEA VB6)	07:00		16:46 (WEA ZB3)	07:54	16:40 (WEA ZB3)
	21:51	50	20:37 (WEA ZB1)	20:59	61	20:30 (WEA ZB1)	19:47	115	19:19 (WEA ZB2)	18:34	70
16	05:18		05:55 (WEA VB5)	06:08		06:36 (WEA VB6)	07:02		16:44 (WEA ZB3)	07:56	16:41 (WEA ZB3)
	21:50	52	20:38 (WEA ZB1)	20:57	63	20:27 (WEA ZB1)	19:44	114	19:16 (WEA ZB2)	18:32	67
17	05:19		05:56 (WEA VB5)	06:09		06:38 (WEA VB6)	07:04		16:43 (WEA ZB3)	07:58	16:42 (WEA ZB3)
	21:49	53	20:39 (WEA ZB1)	20:55	61	20:25 (WEA ZB1)	19:42	110	19:14 (WEA ZB2)	18:29	65
18	05:21		05:56 (WEA VB5)	06:11		06:40 (WEA VB6)	07:05		16:42 (WEA ZB3)	07:59	16:43 (WEA ZB3)
	21:48	53	20:39 (WEA ZB1)	20:53	57	20:24 (WEA ZB1)	19:39	107	19:12 (WEA ZB2)	18:27	62
19	05:22		05:57 (WEA VB5)	06:13		06:41 (WEA VB6)	07:07		16:40 (WEA ZB3)	08:01	16:45 (WEA ZB3)
	21:46	54	20:40 (WEA ZB1)	20:50	50	20:21 (WEA ZB1)	19:37	101	19:08 (WEA ZB2)	18:25	58
20	05:23		05:57 (WEA VB5)	06:15		06:43 (WEA VB6)	07:09		16:40 (WEA ZB3)	08:03	16:47 (WEA ZB3)
	21:45	55	20:41 (WEA ZB1)	20:48	46	19:32 (WEA ZB2)	19:34	87	18:07 (WEA ZB3)	18:23	54
21	05:25		05:58 (WEA VB5)	06:16		18:51 (WEA ZB2)	07:11		16:39 (WEA ZB3)	08:05	16:49 (WEA ZB3)
	21:44	53	20:41 (WEA ZB1)	20:46	42	19:33 (WEA ZB2)	19:32	88	18:07 (WEA ZB3)	18:20	50
22	05:26		05:59 (WEA VB5)	06:18		18:49 (WEA ZB2)	07:12		16:38 (WEA ZB3)	08:07	16:51 (WEA ZB3)
	21:42	53	20:42 (WEA ZB1)	20:44	44	19:33 (WEA ZB2)	19:29	89	18:07 (WEA ZB3)	18:18	45
23	05:28		06:00 (WEA VB5)	06:20		18:48 (WEA ZB2)	07:14		16:37 (WEA ZB3)	08:09	16:53 (WEA ZB3)
	21:41	53	20:43 (WEA ZB1)	20:41	46	19:34 (WEA ZB2)	19:27	89	18:06 (WEA ZB3)	18:16	41
24	05:29		06:01 (WEA VB5)	06:22		18:47 (WEA ZB2)	07:16		16:36 (WEA ZB3)	08:11	16:56 (WEA ZB3)
	21:40	51	20:43 (WEA ZB1)	20:39	48	19:35 (WEA ZB2)	19:24	90	18:06 (WEA ZB3)	18:14	34
25	05:31		06:03 (WEA VB5)	06:23		18:45 (WEA ZB2)	07:18		16:36 (WEA ZB3)	07:13	16:00 (WEA ZB3)
	21:38	49	20:44 (WEA ZB1)	20:37	49	19:34 (WEA ZB2)	19:22	90	18:06 (WEA ZB3)	17:12	26
26	05:32		06:06 (WEA VB5)	06:25		18:45 (WEA ZB2)	07:20		16:36 (WEA ZB3)	07:15	16:06 (WEA ZB3)
	21:37	43	20:44 (WEA ZB1)	20:35	50	19:35 (WEA ZB2)	19:20	90	18:06 (WEA ZB3)	17:10	14
27	05:34		20:05 (WEA ZB1)	06:27		18:44 (WEA ZB2)	07:21		16:35 (WEA ZB3)	07:17	16:20 (WEA ZB3)
	21:35	39	20:44 (WEA ZB1)	20:32	51	19:35 (WEA ZB2)	19:17	90	18:05 (WEA ZB3)	17:07	16:17
28	05:35		20:04 (WEA ZB1)	06:29		18:43 (WEA ZB2)	07:23		16:34 (WEA ZB3)	07:18	16:16
	21:33	40	20:44 (WEA ZB1)	20:30	52	19:35 (WEA ZB2)	19:15	91	18:05 (WEA ZB3)	17:05	16:16
29	05:37		20:04 (WEA ZB1)	06:30		17:28 (WEA ZB3)	07:25		16:34 (WEA ZB3)	07:20	16:16
	21:32	41	20:45 (WEA ZB1)	20:28	69	19:35 (WEA ZB2)	19:12	91	18:05 (WEA ZB3)	17:03	16:15
30	05:39		20:03 (WEA ZB1)	06:32		17:22 (WEA ZB3)	07:27		16:34 (WEA ZB3)	07:22	16:15
	21:30	42	20:45 (WEA ZB1)	20:25	81	19:36 (WEA ZB2)	19:10	90	18:04 (WEA ZB3)	17:01	16:14
31	05:40		20:04 (WEA ZB1)	06:34		17:17 (WEA ZB3)				07:24	16:14
	21:28	41	20:45 (WEA ZB1)	20:23	89	19:35 (WEA ZB2)				16:59	16:17
Sonnenscheinstunden	511			459			382		329		260
astr.max.mögl.Beschattung	1301			1630			3119		1744		235

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO34 - Westerhausen 6
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45 16:18 87	13:19 (WEA ZB3) 14:46 (WEA ZB3) 17:09	08:16 17:09 92	13:27 (WEA ZB3) 14:59 (WEA ZB3) 18:04	07:19 18:04 60	16:30 (WEA ZB2) 17:30 (WEA ZB2) 20:02	07:04 20:02 27	17:40 (WEA ZB2) 18:07 (WEA ZB2) 20:57	05:55 20:57 75	06:33 (WEA VB5) 20:01 (WEA ZB1) 21:47	05:06 21:47 21:47
2	08:45 16:19 86	13:20 (WEA ZB3) 14:46 (WEA ZB3) 17:11	08:14 17:11 91	13:27 (WEA ZB3) 14:58 (WEA ZB3) 18:06	07:16 18:06 62	16:29 (WEA ZB2) 17:31 (WEA ZB2) 20:04	07:02 20:04 20	17:44 (WEA ZB2) 19:37 (WEA VB13) 20:59	05:53 20:59 72	06:33 (WEA VB5) 20:00 (WEA ZB1) 21:48	05:05 21:48 21:48
3	08:45 16:21 87	13:19 (WEA ZB3) 14:46 (WEA ZB3) 17:13	08:12 17:13 91	13:27 (WEA ZB3) 14:58 (WEA ZB3) 18:08	07:14 18:08 64	16:27 (WEA ZB2) 17:31 (WEA ZB2) 20:06	06:59 20:06 4	19:36 (WEA VB13) 19:36 (WEA VB13) 21:01	05:51 21:01 70	06:34 (WEA VB5) 20:00 (WEA ZB1) 21:49	05:05 21:49 21:49
4	08:45 16:22 87	13:20 (WEA ZB3) 14:47 (WEA ZB3) 17:15	08:10 17:15 90	13:29 (WEA ZB3) 14:59 (WEA ZB3) 18:10	07:12 18:10 65	16:27 (WEA ZB2) 17:32 (WEA ZB2) 20:08	06:57 20:08 5	19:36 (WEA VB13) 19:41 (WEA VB13) 21:03	05:49 21:03 66	06:35 (WEA VB5) 20:00 (WEA ZB1) 21:50	05:04 21:50 21:50
5	08:44 16:23 88	13:21 (WEA ZB3) 14:49 (WEA ZB3) 17:17	08:09 17:17 90	13:29 (WEA ZB3) 14:59 (WEA ZB3) 18:12	07:09 18:12 66	16:26 (WEA ZB2) 17:32 (WEA ZB2) 20:10	06:54 20:10 4	19:41 (WEA VB13) 07:16 (WEA VB6) 20:57	05:47 20:57 75	06:36 (WEA VB5) 20:01 (WEA ZB1) 21:51	05:03 21:51 21:51
6	08:44 16:24 88	13:21 (WEA ZB3) 14:49 (WEA ZB3) 17:19	08:07 17:19 88	13:30 (WEA ZB3) 14:58 (WEA ZB3) 18:14	07:07 18:14 67	16:25 (WEA ZB2) 17:32 (WEA ZB2) 20:12	06:52 20:12 4	19:41 (WEA VB13) 07:20 (WEA VB6) 21:06	05:45 21:06 56	06:39 (WEA VB5) 20:01 (WEA ZB1) 21:52	05:02 21:52 21:52
7	08:44 16:26 88	13:21 (WEA ZB3) 14:49 (WEA ZB3) 17:21	08:05 17:21 88	13:30 (WEA ZB3) 14:58 (WEA ZB3) 18:16	07:05 18:16 68	16:25 (WEA ZB2) 17:33 (WEA ZB2) 20:13	06:50 20:13 23	19:46 (WEA ZB1) 07:11 (WEA VB6) 20:52	05:43 20:52 47	19:10 (WEA ZB1) 19:11 (WEA ZB1) 21:53	05:02 21:53 21:53
8	08:43 16:27 89	13:21 (WEA ZB3) 14:50 (WEA ZB3) 17:23	08:03 17:23 87	13:31 (WEA ZB3) 14:58 (WEA ZB3) 18:18	07:02 18:18 68	16:24 (WEA ZB2) 17:32 (WEA ZB2) 20:15	06:47 20:15 32	19:46 (WEA ZB1) 07:08 (WEA VB6) 20:54	05:42 20:54 45	19:11 (WEA ZB1) 19:11 (WEA ZB1) 21:54	05:01 21:54 21:54
9	08:43 16:29 90	13:21 (WEA ZB3) 14:51 (WEA ZB3) 17:25	08:01 17:25 85	13:32 (WEA ZB3) 14:57 (WEA ZB3) 18:20	07:00 18:20 69	16:24 (WEA ZB2) 17:33 (WEA ZB2) 20:17	06:45 20:17 40	19:48 (WEA ZB1) 07:06 (WEA VB6) 20:58	05:40 20:58 44	19:12 (WEA ZB1) 19:12 (WEA ZB1) 21:55	05:00 21:55 21:55
10	08:42 16:30 89	13:22 (WEA ZB3) 14:51 (WEA ZB3) 17:27	07:59 17:27 85	13:32 (WEA ZB3) 14:57 (WEA ZB3) 18:22	06:57 18:22 69	16:23 (WEA ZB2) 17:32 (WEA ZB2) 20:19	06:42 20:19 46	19:49 (WEA ZB1) 07:05 (WEA VB6) 20:59	05:38 20:59 42	19:13 (WEA ZB1) 19:13 (WEA ZB1) 21:56	05:00 21:56 21:56
11	08:41 16:32 90	13:22 (WEA ZB3) 14:52 (WEA ZB3) 17:29	07:57 17:29 83	13:33 (WEA ZB3) 14:56 (WEA ZB3) 18:23	06:55 18:23 70	16:23 (WEA ZB2) 17:33 (WEA ZB2) 20:21	06:40 20:21 52	19:51 (WEA ZB1) 07:04 (WEA VB6) 20:54	05:36 20:54 40	19:14 (WEA ZB1) 19:14 (WEA ZB1) 21:57	05:00 21:57 21:57
12	08:41 16:33 90	13:22 (WEA ZB3) 14:52 (WEA ZB3) 17:31	07:55 17:31 82	13:33 (WEA ZB3) 14:55 (WEA ZB3) 18:25	06:53 18:25 70	16:22 (WEA ZB2) 17:32 (WEA ZB2) 20:23	06:38 20:23 55	19:54 (WEA ZB1) 07:04 (WEA VB6) 20:54	05:34 20:54 38	19:14 (WEA ZB1) 19:14 (WEA ZB1) 21:58	04:59 21:58 21:58
13	08:40 16:35 91	13:22 (WEA ZB3) 14:53 (WEA ZB3) 17:33	07:53 17:33 79	13:35 (WEA ZB3) 14:54 (WEA ZB3) 18:27	06:50 18:27 69	16:23 (WEA ZB2) 17:32 (WEA ZB2) 20:24	06:35 20:24 56	19:55 (WEA ZB1) 07:05 (WEA VB6) 20:53	05:32 20:53 36	19:15 (WEA ZB1) 19:15 (WEA ZB1) 21:59	04:59 21:59 21:59
14	08:39 16:36 91	13:22 (WEA ZB3) 14:53 (WEA ZB3) 17:35	07:51 17:35 77	13:36 (WEA ZB3) 14:53 (WEA ZB3) 18:29	06:48 18:29 69	16:23 (WEA ZB2) 17:32 (WEA ZB2) 20:26	06:33 20:26 59	19:57 (WEA ZB1) 07:05 (WEA VB6) 20:53	05:31 20:53 33	19:16 (WEA ZB1) 19:16 (WEA ZB1) 21:59	04:59 21:59 21:59
15	08:38 16:38 91	13:23 (WEA ZB3) 14:54 (WEA ZB3) 17:37	07:49 17:37 76	13:37 (WEA ZB3) 14:53 (WEA ZB3) 18:31	06:45 18:31 69	16:22 (WEA ZB2) 17:31 (WEA ZB2) 20:28	06:31 20:28 58	19:59 (WEA ZB1) 07:07 (WEA VB6) 20:52	05:29 20:52 30	19:17 (WEA ZB1) 19:17 (WEA ZB1) 21:59	04:58 21:59 21:59
16	08:37 16:40 92	13:23 (WEA ZB3) 14:55 (WEA ZB3) 17:39	07:47 17:39 74	13:38 (WEA ZB3) 14:52 (WEA ZB3) 18:33	06:43 18:33 68	16:22 (WEA ZB2) 17:31 (WEA ZB2) 20:30	06:28 20:30 56	20:01 (WEA ZB1) 07:08 (WEA VB6) 20:52	05:27 20:52 27	19:18 (WEA ZB1) 19:18 (WEA ZB1) 22:00	04:58 22:00 22:00
17	08:36 16:41 92	13:23 (WEA ZB3) 14:55 (WEA ZB3) 17:41	07:45 17:41 71	13:40 (WEA ZB3) 14:51 (WEA ZB3) 18:35	06:41 18:35 68	16:22 (WEA ZB2) 17:30 (WEA ZB2) 20:32	06:26 20:32 50	20:01 (WEA ZB1) 19:11 (WEA ZB1) 20:56	05:26 20:56 23	19:19 (WEA ZB1) 19:19 (WEA ZB1) 22:01	04:58 22:01 22:01
18	08:35 16:43 92	13:23 (WEA ZB3) 14:55 (WEA ZB3) 17:43	07:43 17:43 85	13:41 (WEA ZB3) 17:09 (WEA ZB2) 18:37	06:38 18:37 67	16:23 (WEA ZB2) 17:30 (WEA ZB2) 20:34	06:24 20:34 52	20:01 (WEA ZB1) 19:10 (WEA ZB1) 20:52	05:24 20:52 19	19:20 (WEA ZB1) 19:20 (WEA ZB1) 22:01	04:58 22:01 22:01
19	08:34 16:45 93	13:23 (WEA ZB3) 14:56 (WEA ZB3) 17:45	07:41 17:45 91	13:43 (WEA ZB3) 17:14 (WEA ZB2) 18:38	06:36 18:38 65	16:23 (WEA ZB2) 17:28 (WEA ZB2) 20:35	06:21 20:35 53	20:02 (WEA ZB1) 19:10 (WEA ZB1) 20:53	05:23 20:53 12	19:21 (WEA ZB1) 19:21 (WEA ZB1) 22:01	04:58 22:01 22:01
20	08:33 16:47 93	13:24 (WEA ZB3) 14:57 (WEA ZB3) 17:47	07:39 17:47 93	13:45 (WEA ZB3) 17:17 (WEA ZB2) 18:40	06:33 18:40 64	16:24 (WEA ZB2) 17:28 (WEA ZB2) 20:37	06:19 20:37 58	20:03 (WEA ZB1) 19:11 (WEA ZB1) 20:54	05:21 20:54 8	19:22 (WEA ZB1) 19:22 (WEA ZB1) 22:02	04:58 22:02 22:02
21	08:32 16:48 93	13:24 (WEA ZB3) 14:57 (WEA ZB3) 17:49	07:37 17:49 96	13:47 (WEA ZB3) 17:20 (WEA ZB2) 18:42	06:31 18:42 62	16:24 (WEA ZB2) 17:26 (WEA ZB2) 20:39	06:17 20:39 63	20:04 (WEA ZB1) 19:12 (WEA ZB1) 20:55	05:20 20:55 6	19:23 (WEA ZB1) 19:23 (WEA ZB1) 22:02	04:58 22:02 22:02
22	08:30 16:50 93	13:24 (WEA ZB3) 14:57 (WEA ZB3) 17:51	07:34 17:51 94	13:49 (WEA ZB3) 17:21 (WEA ZB2) 18:44	06:28 18:44 61	16:25 (WEA ZB2) 17:26 (WEA ZB2) 20:41	06:15 20:41 67	20:05 (WEA ZB1) 19:13 (WEA ZB1) 20:56	05:18 20:56 72	19:24 (WEA ZB1) 19:24 (WEA ZB1) 22:02	04:58 22:02 22:02
23	08:29 16:52 93	13:24 (WEA ZB3) 14:57 (WEA ZB3) 17:53	07:32 17:53 92	13:52 (WEA ZB3) 17:23 (WEA ZB2) 18:46	06:26 18:46 59	16:25 (WEA ZB2) 17:24 (WEA ZB2) 20:43	06:12 20:43 72	20:06 (WEA ZB1) 19:14 (WEA ZB1) 20:57	05:17 20:57 7	19:25 (WEA ZB1) 19:25 (WEA ZB1) 22:02	04:59 22:02 22:02
24	08:28 16:54 93	13:25 (WEA ZB3) 14:58 (WEA ZB3) 17:55	07:30 17:55 90	13:56 (WEA ZB3) 17:25 (WEA ZB2) 18:48	06:24 18:48 57	16:26 (WEA ZB2) 17:23 (WEA ZB2) 20:44	06:10 20:44 75	20:07 (WEA ZB1) 19:15 (WEA ZB1) 20:58	05:16 20:58 8	19:26 (WEA ZB1) 19:26 (WEA ZB1) 22:02	04:59 22:02 22:02
25	08:26 16:56 94	13:24 (WEA ZB3) 14:58 (WEA ZB3) 17:57	07:28 17:57 85	13:59 (WEA ZB3) 17:26 (WEA ZB2) 18:50	06:21 18:50 55	16:28 (WEA ZB2) 17:23 (WEA ZB2) 20:46	06:08 20:46 77	20:08 (WEA ZB1) 19:16 (WEA ZB1) 20:59	05:14 20:59 9	19:27 (WEA ZB1) 19:27 (WEA ZB1) 22:02	04:59 22:02 22:02
26	08:25 16:58 94	13:25 (WEA ZB3) 14:59 (WEA ZB3) 17:59	07:25 17:59 76	14:05 (WEA ZB3) 17:27 (WEA ZB2) 18:51	06:19 18:51 52	16:28 (WEA ZB2) 17:20 (WEA ZB2) 20:48	06:06 20:48 76	20:09 (WEA ZB1) 19:17 (WEA ZB1) 20:59	05:13 20:59 10	19:28 (WEA ZB1) 19:28 (WEA ZB1) 22:02	04:59 22:02 22:02
27	08:23 16:59 93	13:25 (WEA ZB3) 14:58 (WEA ZB3) 18:01	07:23 18:01 57	16:32 (WEA ZB2) 17:29 (WEA ZB2) 18:53	06:16 18:53 49	16:30 (WEA ZB2) 17:19 (WEA ZB2) 20:50	06:04 20:50 77	20:10 (WEA ZB1) 19:18 (WEA ZB1) 20:59	05:12 20:59 11	19:29 (WEA ZB1) 19:29 (WEA ZB1) 22:02	04:59 22:02 22:02
28	08:22 17:01 93	13:25 (WEA ZB3) 14:58 (WEA ZB3) 18:02	07:21 18:02 59	16:30 (WEA ZB2) 17:29 (WEA ZB2) 18:55	06:14 18:55 46	16:31 (WEA ZB2) 17:17 (WEA ZB2) 20:52	06:02 20:52 77	20:11 (WEA ZB1) 19:19 (WEA ZB1) 20:59	05:11 20:59 12	19:30 (WEA ZB1) 19:30 (WEA ZB1) 22:02	04:59 22:02 22:02
29	08:20 17:03 93	13:26 (WEA ZB3) 14:59 (WEA ZB3) 18:03	07:19 18:03 57	17:01 (WEA ZB2) 17:33 (WEA ZB2) 19:00	06:11 19:00 42	17:17 (WEA ZB2) 17:33 (WEA ZB2) 20:54	20:54 20:54 77	20:12 (WEA ZB1) 19:20 (WEA ZB1) 20:59	05:10 20:59 13	19:31 (WEA ZB1) 19:31 (WEA ZB1) 22:02	04:59 22:02 22:02
30	08:19 17:05 93	13:26 (WEA ZB3) 14:59 (WEA ZB3) 18:04	07:17 18:04 58	17:02 (WEA ZB2) 17:34 (WEA ZB2) 19:01	06:09 19:01 38	17:34 (WEA ZB2) 18:12 (WEA ZB2) 20:55	20:55 20:55 75	20:13 (WEA ZB1) 19:21 (WEA ZB1) 20:59	05:08 20:59 14	19:32 (WEA ZB1) 19:32 (WEA ZB1) 22:02	04:59 22:02 22:02
31	08:17 17:07 93	13:26 (WEA ZB3) 14:59 (WEA ZB3) 18:05	07:15 18:05 59	17:03 (WEA ZB2) 17:35 (WEA ZB2) 19:02	06:07 19:02 33	18:12 (WEA ZB2) 17:37 (WEA ZB2) 20:56	20:56 20:56 75	20:14 (WEA ZB1) 19:22 (WEA ZB1) 20:59	05:07 20:59 15	19:33 (WEA ZB1) 19:33 (WEA ZB1) 22:02	04:59 22:02 22:02
Sonnenscheinstunden		251	274	367	419	493	509				
astr.max.mögl.Beschattung		2819	2347	1891	1486	837					

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO34 - Westerhausen 6
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

		Juli		August		September		Oktober		November		Dezember				
1	05:03 22:01	05:42 21:27	39	19:24 (WEA ZB1) 20:03 (WEA ZB1)	06:36 20:21	51	07:04 (WEA VB6) 19:52 (WEA ZB1)	07:28 19:07	70	17:02 (WEA ZB2) 18:12 (WEA ZB2)	07:26 16:57	85	13:01 (WEA ZB3) 14:26 (WEA ZB3)	08:21 16:13	90	13:04 (WEA ZB3) 14:34 (WEA ZB3)
2	05:03 22:01	05:44 21:25	40	19:24 (WEA ZB1) 20:04 (WEA ZB1)	06:37 20:18	46	07:05 (WEA VB6) 19:50 (WEA ZB1)	07:30 19:05	69	17:01 (WEA ZB2) 18:10 (WEA ZB2)	07:28 16:55	86	13:01 (WEA ZB3) 14:27 (WEA ZB3)	08:22 16:13	89	13:05 (WEA ZB3) 14:34 (WEA ZB3)
3	05:04 22:01	05:45 21:23	43	19:22 (WEA ZB1) 20:05 (WEA ZB1)	06:39 20:16	40	07:06 (WEA VB6) 19:47 (WEA ZB1)	07:32 19:02	69	17:01 (WEA ZB2) 18:10 (WEA ZB2)	07:30 16:53	87	13:00 (WEA ZB3) 14:27 (WEA ZB3)	08:24 16:12	89	13:05 (WEA ZB3) 14:34 (WEA ZB3)
4	05:05 22:00	05:47 21:21	45	19:21 (WEA ZB1) 20:06 (WEA ZB1)	06:41 20:13	32	07:08 (WEA VB6) 19:45 (WEA ZB1)	07:34 19:00	69	17:01 (WEA ZB2) 18:10 (WEA ZB2)	07:32 16:51	88	13:00 (WEA ZB3) 14:28 (WEA ZB3)	08:25 16:11	88	13:06 (WEA ZB3) 14:34 (WEA ZB3)
5	05:06 22:00	05:49 21:19	46	19:21 (WEA ZB1) 20:07 (WEA ZB1)	06:43 20:11	23	07:10 (WEA VB6) 19:43 (WEA ZB1)	07:34 18:58	69	17:01 (WEA ZB2) 18:10 (WEA ZB2)	07:34 16:50	89	12:59 (WEA ZB3) 14:28 (WEA ZB3)	08:27 16:11	88	13:06 (WEA ZB3) 14:34 (WEA ZB3)
6	05:07 21:59	05:50 21:17	51	06:50 (WEA VB5) 20:07 (WEA ZB1)	06:44 20:09	4	07:11 (WEA VB6) 07:15 (WEA VB6)	07:37 18:55	68	17:01 (WEA ZB2) 18:09 (WEA ZB2)	07:36 16:48	89	12:59 (WEA ZB3) 14:28 (WEA ZB3)	08:28 16:10	88	13:07 (WEA ZB3) 14:35 (WEA ZB3)
7	05:08 21:58	05:52 21:15	60	06:47 (WEA VB5) 20:08 (WEA ZB1)	06:46 20:06			07:39 18:53	68	17:01 (WEA ZB2) 18:09 (WEA ZB2)	07:38 16:46	91	12:58 (WEA ZB3) 14:29 (WEA ZB3)	08:29 16:10	88	13:07 (WEA ZB3) 14:35 (WEA ZB3)
8	05:09 21:58	05:54 21:13	64	06:45 (WEA VB5) 20:08 (WEA ZB1)	06:48 20:04	5	19:31 (WEA VB13) 19:36 (WEA VB13)	07:41 18:50	67	17:01 (WEA ZB2) 18:08 (WEA ZB2)	07:40 16:44	91	12:58 (WEA ZB3) 14:29 (WEA ZB3)	08:31 16:09	88	13:08 (WEA ZB3) 14:36 (WEA ZB3)
9	05:10 21:57	05:55 21:11	67	06:44 (WEA VB5) 20:08 (WEA ZB1)	06:50 20:01	4	19:29 (WEA VB13) 19:33 (WEA VB13)	07:43 18:48	65	17:01 (WEA ZB2) 18:06 (WEA ZB2)	07:42 16:42	91	12:58 (WEA ZB3) 14:29 (WEA ZB3)	08:32 16:09	88	13:08 (WEA ZB3) 14:36 (WEA ZB3)
10	05:11 21:56	05:57 21:09	70	06:43 (WEA VB5) 20:09 (WEA ZB1)	06:51 19:59	19	17:38 (WEA ZB2) 19:31 (WEA VB13)	07:45 18:46	64	17:01 (WEA ZB2) 18:05 (WEA ZB2)	07:42 16:41	92	12:57 (WEA ZB3) 14:29 (WEA ZB3)	08:33 16:09	87	13:09 (WEA ZB3) 14:36 (WEA ZB3)
11	05:12 21:55	05:59 21:07	72	06:42 (WEA VB5) 20:09 (WEA ZB1)	06:53 19:56	27	17:33 (WEA ZB2) 19:29 (WEA VB13)	07:47 18:43	63	17:02 (WEA ZB2) 18:05 (WEA ZB2)	07:45 16:39	93	12:57 (WEA ZB3) 14:30 (WEA ZB3)	08:34 16:08	87	13:09 (WEA ZB3) 14:36 (WEA ZB3)
12	05:13 21:54	06:01 21:05	73	06:42 (WEA VB5) 20:09 (WEA ZB1)	06:55 19:54	32	17:29 (WEA ZB2) 18:01 (WEA ZB2)	07:48 18:41	62	17:02 (WEA ZB2) 18:04 (WEA ZB2)	07:47 16:37	93	12:57 (WEA ZB3) 14:30 (WEA ZB3)	08:35 16:08	86	13:11 (WEA ZB3) 14:37 (WEA ZB3)
13	05:14 21:53	06:02 21:03	76	06:40 (WEA VB5) 20:09 (WEA ZB1)	06:57 19:52	37	17:26 (WEA ZB2) 18:03 (WEA ZB2)	07:50 18:39	60	17:03 (WEA ZB2) 18:03 (WEA ZB2)	07:49 16:36	93	12:58 (WEA ZB3) 14:31 (WEA ZB3)	08:36 16:08	86	13:11 (WEA ZB3) 14:37 (WEA ZB3)
14	05:15 21:52	06:04 21:01	76	06:40 (WEA VB5) 20:09 (WEA ZB1)	06:58 19:49	41	17:24 (WEA ZB2) 18:05 (WEA ZB2)	07:52 18:36	58	17:04 (WEA ZB2) 18:02 (WEA ZB2)	07:51 16:34	93	12:58 (WEA ZB3) 14:31 (WEA ZB3)	08:37 16:08	85	13:12 (WEA ZB3) 14:37 (WEA ZB3)
15	05:17 21:51	06:06 20:59	77	06:40 (WEA VB5) 20:10 (WEA ZB1)	07:00 19:47	46	17:21 (WEA ZB2) 18:07 (WEA ZB2)	07:54 18:34	65	17:04 (WEA ZB2) 18:00 (WEA ZB2)	07:53 16:32	93	12:58 (WEA ZB3) 14:31 (WEA ZB3)	08:38 16:08	86	13:12 (WEA ZB3) 14:38 (WEA ZB3)
16	05:18 21:50	06:08 20:57	76	06:40 (WEA VB5) 20:09 (WEA ZB1)	07:02 19:44	48	17:19 (WEA ZB2) 18:07 (WEA ZB2)	07:56 18:32	80	14:35 (WEA ZB3) 17:59 (WEA ZB2)	07:55 16:31	93	12:58 (WEA ZB3) 14:31 (WEA ZB3)	08:39 16:08	85	13:12 (WEA ZB3) 14:37 (WEA ZB3)
17	05:19 21:49	06:09 20:55	76	06:40 (WEA VB5) 20:09 (WEA ZB1)	07:04 19:42	52	17:17 (WEA ZB2) 18:09 (WEA ZB2)	07:58 18:29	86	14:30 (WEA ZB3) 17:57 (WEA ZB2)	07:57 16:29	94	12:58 (WEA ZB3) 14:32 (WEA ZB3)	08:40 16:08	85	13:13 (WEA ZB3) 14:38 (WEA ZB3)
18	05:21 21:48	06:11 20:53	75	06:41 (WEA VB5) 20:09 (WEA ZB1)	07:05 19:39	55	17:15 (WEA ZB2) 18:10 (WEA ZB2)	08:00 18:27	91	14:26 (WEA ZB3) 17:56 (WEA ZB2)	07:58 16:28	93	12:59 (WEA ZB3) 14:32 (WEA ZB3)	08:41 16:09	85	13:13 (WEA ZB3) 14:38 (WEA ZB3)
19	05:22 21:47	06:13 20:50	74	06:41 (WEA VB5) 20:08 (WEA ZB1)	07:07 19:37	57	17:13 (WEA ZB2) 18:10 (WEA ZB2)	08:01 18:25	94	14:22 (WEA ZB3) 17:54 (WEA ZB2)	08:00 16:27	93	12:59 (WEA ZB3) 14:32 (WEA ZB3)	08:41 16:09	85	13:14 (WEA ZB3) 14:39 (WEA ZB3)
20	05:23 21:45	06:15 20:48	71	06:43 (WEA VB5) 20:08 (WEA ZB1)	07:09 19:34	59	17:12 (WEA ZB2) 18:11 (WEA ZB2)	08:03 18:23	96	14:19 (WEA ZB3) 17:52 (WEA ZB2)	08:02 16:25	93	12:59 (WEA ZB3) 14:33 (WEA ZB3)	08:42 16:10	85	13:14 (WEA ZB3) 14:39 (WEA ZB3)
21	05:25 21:44	06:16 20:46	68	06:45 (WEA VB5) 20:08 (WEA ZB1)	07:11 19:32	60	17:11 (WEA ZB2) 18:11 (WEA ZB2)	08:05 18:20	93	14:17 (WEA ZB3) 17:49 (WEA ZB2)	08:04 16:24	93	12:59 (WEA ZB3) 14:32 (WEA ZB3)	08:43 16:10	85	13:15 (WEA ZB3) 14:40 (WEA ZB3)
22	05:26 21:42	06:18 20:44	63	06:46 (WEA VB5) 20:07 (WEA ZB1)	07:12 19:29	62	17:10 (WEA ZB2) 18:12 (WEA ZB2)	08:07 18:18	93	14:15 (WEA ZB3) 17:47 (WEA ZB2)	08:06 16:23	93	13:00 (WEA ZB3) 14:33 (WEA ZB3)	08:43 16:10	85	13:15 (WEA ZB3) 14:40 (WEA ZB3)
23	05:28 21:41	06:20 20:41	55	06:49 (WEA VB5) 20:07 (WEA ZB1)	07:14 19:27	63	17:08 (WEA ZB2) 18:11 (WEA ZB2)	08:09 18:16	89	14:13 (WEA ZB3) 17:43 (WEA ZB2)	08:07 16:21	93	13:00 (WEA ZB3) 14:33 (WEA ZB3)	08:44 16:11	85	13:16 (WEA ZB3) 14:41 (WEA ZB3)
24	05:29 21:40	06:22 19:41 (WEA ZB1)	52	06:49 (WEA VB5) 20:06 (WEA ZB1)	07:16 19:24	65	17:07 (WEA ZB2) 18:12 (WEA ZB2)	08:11 18:14	83	14:11 (WEA ZB3) 17:38 (WEA ZB2)	08:09 16:20	92	13:01 (WEA ZB3) 14:33 (WEA ZB3)	08:44 16:11	85	13:16 (WEA ZB3) 14:41 (WEA ZB3)
25	05:31 21:38	06:23 19:37 (WEA ZB1)	52	19:13 (WEA ZB1) 20:05 (WEA ZB1)	07:18 19:22	66	17:06 (WEA ZB2) 18:12 (WEA ZB2)	07:13 17:12	72	13:09 (WEA ZB3) 14:21 (WEA ZB3)	08:11 16:19	92	13:00 (WEA ZB3) 14:32 (WEA ZB3)	08:45 16:12	85	13:17 (WEA ZB3) 14:41 (WEA ZB3)
26	05:32 21:37	06:25 19:34 (WEA ZB1)	50	19:14 (WEA ZB1) 20:04 (WEA ZB1)	07:20 19:20	67	17:05 (WEA ZB2) 18:12 (WEA ZB2)	07:15 17:10	74	13:08 (WEA ZB3) 14:22 (WEA ZB3)	08:13 16:18	92	13:01 (WEA ZB3) 14:33 (WEA ZB3)	08:45 16:13	86	13:17 (WEA ZB3) 14:43 (WEA ZB3)
27	05:34 21:35	06:27 19:32 (WEA ZB1)	56	07:10 (WEA VB6) 20:03 (WEA ZB1)	07:21 19:17	68	17:04 (WEA ZB2) 18:12 (WEA ZB2)	07:17 17:08	76	13:06 (WEA ZB3) 14:22 (WEA ZB3)	08:14 16:17	91	13:02 (WEA ZB3) 14:33 (WEA ZB3)	08:45 16:13	85	13:18 (WEA ZB3) 14:43 (WEA ZB3)
28	05:35 21:33	06:29 19:30 (WEA ZB1)	58	07:07 (WEA VB6) 20:01 (WEA ZB1)	07:23 19:15	69	17:03 (WEA ZB2) 18:12 (WEA ZB2)	07:18 17:05	78	13:05 (WEA ZB3) 14:23 (WEA ZB3)	08:16 16:16	91	13:02 (WEA ZB3) 14:33 (WEA ZB3)	08:45 16:14	86	13:18 (WEA ZB3) 14:44 (WEA ZB3)
29	05:37 21:32	06:30 20:00 (WEA ZB1)	58	07:06 (WEA VB6) 19:59 (WEA ZB1)	07:25 19:12	69	17:03 (WEA ZB2) 18:12 (WEA ZB2)	07:20 17:03	80	13:04 (WEA ZB3) 14:24 (WEA ZB3)	08:18 16:15	91	13:03 (WEA ZB3) 14:34 (WEA ZB3)	08:45 16:15	86	13:18 (WEA ZB3) 14:44 (WEA ZB3)
30	05:39 21:30	06:32 19:27 (WEA ZB1)	55	07:06 (WEA VB6) 20:01 (WEA ZB1)	07:27 19:10	70	17:02 (WEA ZB2) 18:12 (WEA ZB2)	07:22 17:01	81	13:03 (WEA ZB3) 14:24 (WEA ZB3)	08:19 16:14	90	13:03 (WEA ZB3) 14:33 (WEA ZB3)	08:45 16:16	86	13:19 (WEA ZB3) 14:45 (WEA ZB3)
31	05:40 21:28	06:34 20:02 (WEA ZB1)	54	07:04 (WEA VB6) 19:54 (WEA ZB1)	07:29 19:08			07:24 16:59	84	13:02 (WEA ZB3) 14:25 (WEA ZB3)	08:20 16:15			16:16 16:17	87	13:18 (WEA ZB3) 14:45 (WEA ZB3)
Sonnenscheinstunden 511		459		382		329		260		234		234		2679		
astr.max.mögl.Beschattung 195		1892		1337		2335		2738		2679						

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		

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO35 - Westerhausen 7
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar		Februar		März		April		Mai		Juni	
1	08:45	12:47 (WEA ZB3)	08:16	13:09 (WEA ZB3)	07:19	15:45 (WEA ZB2)	07:04	07:28 (WEA VB6)	05:55	18:55 (WEA ZB1)	05:06	
	16:18	14:06 (WEA ZB3)	17:09	16:36 (WEA ZB2)	18:04	16:50 (WEA ZB2)	20:02	19:34 (WEA ZB1)	20:57	19:10 (WEA ZB1)	21:47	
2	08:45	12:48 (WEA ZB3)	08:14	13:11 (WEA ZB3)	07:16	15:46 (WEA ZB2)	07:02	07:25 (WEA VB6)	05:53		05:05	
	16:19	14:07 (WEA ZB3)	17:11	16:38 (WEA ZB2)	18:06	16:49 (WEA ZB2)	20:04	19:34 (WEA ZB1)	20:59		21:48	
3	08:45	12:48 (WEA ZB3)	08:12	13:13 (WEA ZB3)	07:14	15:46 (WEA ZB2)	06:59	07:23 (WEA VB6)	05:51		05:05	
	16:21	14:06 (WEA ZB3)	17:13	16:41 (WEA ZB2)	18:08	16:48 (WEA ZB2)	20:06	19:35 (WEA ZB1)	21:01		21:49	
4	08:45	12:49 (WEA ZB3)	08:10	13:15 (WEA ZB3)	07:12	15:47 (WEA ZB2)	06:57	07:21 (WEA VB6)	05:49		05:04	
	16:22	14:07 (WEA ZB3)	17:15	16:42 (WEA ZB2)	18:10	16:47 (WEA ZB2)	20:08	19:35 (WEA ZB1)	21:03		21:50	
5	08:44	12:50 (WEA ZB3)	08:09	13:17 (WEA ZB3)	07:09	15:48 (WEA ZB2)	06:54	07:21 (WEA VB6)	05:47		05:03	
	16:23	14:08 (WEA ZB3)	17:17	16:43 (WEA ZB2)	18:12	16:46 (WEA ZB2)	20:10	19:35 (WEA ZB1)	21:04		21:51	
6	08:44	12:50 (WEA ZB3)	08:07	13:20 (WEA ZB3)	07:07	15:49 (WEA ZB2)	06:52	07:22 (WEA VB6)	05:45		05:02	
	16:24	14:06 (WEA ZB3)	17:19	16:45 (WEA ZB2)	18:14	16:45 (WEA ZB2)	20:12	19:36 (WEA ZB1)	21:06		21:52	
7	08:44	12:50 (WEA ZB3)	08:05	13:23 (WEA ZB3)	07:05	15:50 (WEA ZB2)	06:50	07:22 (WEA VB6)	05:43		05:02	
	16:26	14:08 (WEA ZB3)	17:21	16:46 (WEA ZB2)	18:16	16:44 (WEA ZB2)	20:13	19:35 (WEA ZB1)	21:08		21:53	
8	08:43	12:51 (WEA ZB3)	08:03	13:27 (WEA ZB3)	07:02	15:51 (WEA ZB2)	06:47	07:24 (WEA VB6)	05:42		05:01	
	16:27	14:09 (WEA ZB3)	17:23	16:47 (WEA ZB2)	18:18	16:42 (WEA ZB2)	20:15	19:35 (WEA ZB1)	21:10		21:54	
9	08:43	12:51 (WEA ZB3)	08:01	13:34 (WEA ZB3)	07:00	15:53 (WEA ZB2)	06:45	07:27 (WEA VB6)	05:40		05:00	
	16:29	14:09 (WEA ZB3)	17:25	16:48 (WEA ZB2)	18:20	16:41 (WEA ZB2)	20:17	19:35 (WEA ZB1)	21:11		21:55	
10	08:42	12:52 (WEA ZB3)	07:59	15:49 (WEA ZB2)	06:57	15:54 (WEA ZB2)	06:42	18:36 (WEA ZB1)	05:38		05:00	
	16:30	14:09 (WEA ZB3)	17:27	16:49 (WEA ZB2)	18:22	16:39 (WEA ZB2)	20:19	19:35 (WEA ZB1)	21:13		21:56	
11	08:41	12:52 (WEA ZB3)	07:57	15:49 (WEA ZB2)	06:55	15:56 (WEA ZB2)	06:40	07:04 (WEA VB5)	05:36		05:00	05:31 (WEA VB4)
	16:31	14:10 (WEA ZB3)	17:29	16:49 (WEA ZB2)	18:23	16:37 (WEA ZB2)	20:21	19:35 (WEA ZB1)	21:15		21:57	4 05:35 (WEA VB4)
12	08:41	12:53 (WEA ZB3)	07:55	15:47 (WEA ZB2)	06:53	15:58 (WEA ZB2)	06:38	07:01 (WEA VB5)	05:34		04:59	05:31 (WEA VB4)
	16:33	14:10 (WEA ZB3)	17:31	16:49 (WEA ZB2)	18:25	16:34 (WEA ZB2)	20:23	19:34 (WEA ZB1)	21:17		21:58	6 05:37 (WEA VB4)
13	08:40	12:53 (WEA ZB3)	07:53	15:47 (WEA ZB2)	06:50	16:01 (WEA ZB2)	06:35	06:59 (WEA VB5)	05:32		04:59	05:31 (WEA VB4)
	16:35	14:10 (WEA ZB3)	17:33	16:50 (WEA ZB2)	18:27	16:32 (WEA ZB2)	20:24	19:34 (WEA ZB1)	21:18		21:58	7 05:38 (WEA VB4)
14	08:39	12:54 (WEA ZB3)	07:51	15:46 (WEA ZB2)	06:48	16:06 (WEA ZB2)	06:33	06:57 (WEA VB5)	05:31		04:59	05:31 (WEA VB4)
	16:36	14:10 (WEA ZB3)	17:35	16:51 (WEA ZB2)	18:29	16:28 (WEA ZB2)	20:26	19:34 (WEA ZB1)	21:20		21:59	8 05:39 (WEA VB4)
15	08:38	12:54 (WEA ZB3)	07:49	15:46 (WEA ZB2)	06:45	16:10 (WEA ZB2)	06:31	06:56 (WEA VB5)	05:29		04:58	05:30 (WEA VB4)
	16:38	14:11 (WEA ZB3)	17:37	16:51 (WEA ZB2)	18:31	16:22 (WEA ZB2)	20:28	19:33 (WEA ZB1)	21:22		21:59	9 05:39 (WEA VB4)
16	08:37	12:55 (WEA ZB3)	07:47	15:46 (WEA ZB2)	06:43		06:28	06:54 (WEA VB5)	05:27		04:58	05:30 (WEA VB4)
	16:40	14:11 (WEA ZB3)	17:39	16:52 (WEA ZB2)	18:33		20:30	19:32 (WEA ZB1)	21:23		22:00	9 05:39 (WEA VB4)
17	08:36	12:56 (WEA ZB3)	07:45	15:46 (WEA ZB2)	06:41		06:26	06:54 (WEA VB5)	05:26		04:58	05:30 (WEA VB4)
	16:41	14:11 (WEA ZB3)	17:41	16:52 (WEA ZB2)	18:35		20:32	19:31 (WEA ZB1)	21:25		22:01	10 05:40 (WEA VB4)
18	08:35	12:56 (WEA ZB3)	07:43	15:44 (WEA ZB2)	06:38		06:24	06:54 (WEA VB5)	05:24		04:58	05:30 (WEA VB4)
	16:43	14:11 (WEA ZB3)	17:43	16:52 (WEA ZB2)	18:37		20:34	19:31 (WEA ZB1)	21:27		22:01	10 05:40 (WEA VB4)
19	08:34	12:57 (WEA ZB3)	07:41	15:44 (WEA ZB2)	06:36		06:21	06:54 (WEA VB5)	05:23		04:58	05:31 (WEA VB4)
	16:45	14:11 (WEA ZB3)	17:45	16:52 (WEA ZB2)	18:38		20:35	19:30 (WEA ZB1)	21:28		22:01	11 05:42 (WEA VB4)
20	08:33	12:58 (WEA ZB3)	07:39	15:44 (WEA ZB2)	06:33		06:19	06:54 (WEA VB5)	05:21		04:58	05:31 (WEA VB4)
	16:46	14:11 (WEA ZB3)	17:47	16:53 (WEA ZB2)	18:40		20:37	19:30 (WEA ZB1)	21:30		22:02	11 05:42 (WEA VB4)
21	08:32	12:58 (WEA ZB3)	07:37	15:45 (WEA ZB2)	06:31		06:17	06:54 (WEA VB5)	05:20		04:58	05:31 (WEA VB4)
	16:48	14:11 (WEA ZB3)	17:49	16:53 (WEA ZB2)	18:42		20:39	19:28 (WEA ZB1)	21:31		22:02	11 05:42 (WEA VB4)
22	08:30	12:59 (WEA ZB3)	07:34	15:44 (WEA ZB2)	06:28		06:15	06:54 (WEA VB5)	05:18		04:58	05:31 (WEA VB4)
	16:50	14:11 (WEA ZB3)	17:51	16:52 (WEA ZB2)	18:44		20:41	19:27 (WEA ZB1)	21:33		22:02	11 05:42 (WEA VB4)
23	08:29	12:59 (WEA ZB3)	07:32	15:44 (WEA ZB2)	06:26	18:04 (WEA ZB1)	06:12	06:55 (WEA VB5)	05:17		04:59	05:31 (WEA VB4)
	16:52	14:10 (WEA ZB3)	17:53	16:52 (WEA ZB2)	18:46	13 18:17 (WEA ZB1)	20:43	19:26 (WEA ZB1)	21:34		22:02	11 05:42 (WEA VB4)
24	08:28	13:01 (WEA ZB3)	07:30	15:44 (WEA ZB2)	06:24	17:59 (WEA ZB1)	06:10	06:52 (WEA VB5)	05:16		04:59	05:32 (WEA VB4)
	16:54	14:11 (WEA ZB3)	17:55	16:52 (WEA ZB2)	18:48	22 18:21 (WEA ZB1)	20:44	19:25 (WEA ZB1)	21:36		22:02	10 05:42 (WEA VB4)
25	08:26	13:01 (WEA ZB3)	07:28	15:44 (WEA ZB2)	06:21	17:56 (WEA ZB1)	06:08	06:59 (WEA VB5)	05:14		04:59	05:32 (WEA VB4)
	16:56	14:10 (WEA ZB3)	17:57	16:51 (WEA ZB2)	18:50	28 18:24 (WEA ZB1)	20:46	19:23 (WEA ZB1)	21:37		22:02	10 05:42 (WEA VB4)
26	08:25	13:03 (WEA ZB3)	07:25	15:45 (WEA ZB2)	06:19	17:53 (WEA ZB1)	06:06	18:43 (WEA ZB1)	05:13		05:00	05:32 (WEA VB4)
	16:58	14:10 (WEA ZB3)	17:59	16:51 (WEA ZB2)	18:51	32 18:25 (WEA ZB1)	20:48	19:22 (WEA ZB1)	21:39		22:02	10 05:42 (WEA VB4)
27	08:23	13:03 (WEA ZB3)	07:23	15:45 (WEA ZB2)	06:16	17:51 (WEA ZB1)	06:04	18:45 (WEA ZB1)	05:12		05:00	05:33 (WEA VB4)
	16:59	16:21 (WEA ZB2)	18:01	16:51 (WEA ZB2)	18:53	36 18:27 (WEA ZB1)	20:50	19:20 (WEA ZB1)	21:40		22:02	9 05:42 (WEA VB4)
28	08:22	13:04 (WEA ZB3)	07:21	15:45 (WEA ZB2)	06:14	17:48 (WEA ZB1)	06:02	18:47 (WEA ZB1)	05:11		05:01	05:33 (WEA VB4)
	17:01	16:26 (WEA ZB2)	18:02	16:50 (WEA ZB2)	18:55	40 18:28 (WEA VB13)	20:52	19:18 (WEA ZB1)	21:42		22:02	8 05:41 (WEA VB4)
29	08:20	13:06 (WEA ZB3)			07:11	18:47 (WEA ZB1)	06:00	18:49 (WEA ZB1)	05:09		05:01	05:34 (WEA VB4)
	17:02	16:30 (WEA ZB2)			07:13	44 19:16 (WEA VB13)	20:54	19:16 (WEA ZB1)	21:43		22:02	7 05:41 (WEA VB4)
30	08:19	13:07 (WEA ZB3)			07:09	07:32 (WEA VB6)	05:57	18:51 (WEA ZB1)	05:08		05:02	05:35 (WEA VB4)
	17:05	16:32 (WEA ZB2)			19:59	51 19:32 (WEA VB13)	20:55	19:13 (WEA ZB1)	21:44		22:02	6 05:41 (WEA VB4)
31	08:17	13:08 (WEA ZB3)			07:06	07:30 (WEA VB6)			05:07			
	17:07	16:35 (WEA ZB2)			20:01	57 19:34 (WEA VB13)			21:45			
Sonnenscheinstunden	251		274		367		419		493		509	
astr.max.mögl.Beschattung	2391		2050		1028		1867		15		178	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH

Helmut-A. Müller-Straße 1-5

DE-82152 Planegg / München

0049 89 85 602 0

Felix Bergholz / Felix.Bergholz@mbbm-ind.com

Berechnet:

17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO35 - Westerhausen 7

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember						
1	05:03	5	05:35 (WEA VB4)	05:42	06:36	66	07:03 (WEA VB5)	07:28	16:39 (WEA ZB2)	07:26	15:18 (WEA ZB2)	08:21	12:34 (WEA ZB3)				
	22:01		05:40 (WEA VB4)	21:27	20:21		19:34 (WEA ZB1)	19:07	34	17:13 (WEA ZB2)	16:57	59	16:17 (WEA ZB2)	16:13	78	13:52 (WEA ZB3)	
2	05:03		05:44	05:44	06:37		18:35 (WEA ZB1)	07:30	16:35 (WEA ZB2)	07:28	13:02 (WEA ZB3)	08:22	12:35 (WEA ZB3)				
	22:01		21:25	21:25	20:18	59	19:34 (WEA ZB1)	19:05	39	17:14 (WEA ZB2)	16:55	72	16:17 (WEA ZB2)	16:13	78	13:53 (WEA ZB3)	
3	05:04		05:45	05:45	06:39		18:34 (WEA ZB1)	07:32	16:33 (WEA ZB2)	07:30	12:56 (WEA ZB3)	08:24	12:35 (WEA ZB3)				
	22:01		21:23	21:23	20:16	59	19:33 (WEA ZB1)	19:02	43	17:16 (WEA ZB2)	16:53	82	16:16 (WEA ZB2)	16:12	77	13:52 (WEA ZB3)	
4	05:05		05:47	05:47	06:41		07:21 (WEA VB6)	07:34	16:31 (WEA ZB2)	07:32	12:52 (WEA ZB3)	08:25	12:35 (WEA ZB3)				
	22:00		21:21	21:21	20:13	67	19:32 (WEA ZB1)	19:00	46	17:17 (WEA ZB2)	16:51	87	16:15 (WEA ZB2)	16:11	78	13:53 (WEA ZB3)	
5	05:06		05:49	05:49	06:43		07:19 (WEA VB6)	07:36	16:29 (WEA ZB2)	07:34	12:49 (WEA ZB3)	08:27	12:35 (WEA ZB3)				
	22:00		21:19	21:19	20:11	71	19:32 (WEA ZB1)	18:58	50	17:19 (WEA ZB2)	16:50	91	16:14 (WEA ZB2)	16:11	78	13:53 (WEA ZB3)	
6	05:07		05:50	05:50	06:44		07:17 (WEA VB6)	07:37	16:27 (WEA ZB2)	07:36	12:47 (WEA ZB3)	08:28	12:36 (WEA ZB3)				
	21:59		21:17	21:17	20:09	72	19:31 (WEA ZB1)	18:55	53	17:20 (WEA ZB2)	16:48	93	16:13 (WEA ZB2)	16:10	78	13:54 (WEA ZB3)	
7	05:08		05:52	05:52	06:46		07:17 (WEA VB6)	07:39	16:26 (WEA ZB2)	07:38	12:45 (WEA ZB3)	08:29	12:36 (WEA ZB3)				
	21:58		21:15	21:15	20:06	72	19:30 (WEA ZB1)	18:53	55	17:21 (WEA ZB2)	16:46	95	16:12 (WEA ZB2)	16:10	78	13:54 (WEA ZB3)	
8	05:09		05:54	05:54	06:48		07:16 (WEA VB6)	07:41	16:24 (WEA ZB2)	07:40	12:43 (WEA ZB3)	08:31	12:37 (WEA ZB3)				
	21:58		21:13	21:13	20:04	73	19:30 (WEA ZB1)	18:50	57	17:21 (WEA ZB2)	16:44	95	16:10 (WEA ZB2)	16:09	78	13:55 (WEA ZB3)	
9	05:10		05:55	05:55	06:50		07:16 (WEA VB6)	07:43	16:22 (WEA ZB2)	07:42	12:41 (WEA ZB3)	08:32	12:37 (WEA ZB3)				
	21:57		21:11	21:11	20:01	70	19:28 (WEA ZB1)	18:48	59	17:21 (WEA ZB2)	16:42	96	16:09 (WEA ZB2)	16:09	78	13:55 (WEA ZB3)	
10	05:11		05:57	05:57	06:51		07:18 (WEA VB6)	07:45	16:21 (WEA ZB2)	07:43	12:40 (WEA ZB3)	08:33	12:37 (WEA ZB3)				
	21:56		21:09	21:09	19:59	66	19:27 (WEA ZB1)	18:46	61	17:22 (WEA ZB2)	16:41	94	16:07 (WEA ZB2)	16:09	79	13:56 (WEA ZB3)	
11	05:12		05:59	05:59	19:09 (WEA ZB1)	63	07:20 (WEA VB6)	07:47	16:20 (WEA ZB2)	07:45	12:39 (WEA ZB3)	08:34	12:37 (WEA ZB3)				
	21:55		21:07	4	19:13 (WEA ZB1)	19:56	19:27 (WEA ZB1)	18:43	62	17:22 (WEA ZB2)	16:39	92	16:05 (WEA ZB2)	16:08	79	13:56 (WEA ZB3)	
12	05:13		06:01	06:01	19:02 (WEA ZB1)	06:55	07:21 (WEA VB6)	07:48	16:19 (WEA ZB2)	07:47	12:38 (WEA ZB3)	08:35	12:39 (WEA ZB3)				
	21:54		21:05	17	19:19 (WEA ZB1)	19:54	19:26 (WEA VB13)	18:41	64	17:23 (WEA ZB2)	16:37	90	16:03 (WEA ZB2)	16:08	78	13:57 (WEA ZB3)	
13	05:14		06:02	06:02	18:58 (WEA ZB1)	06:57	07:23 (WEA VB6)	07:50	16:18 (WEA ZB2)	07:49	12:38 (WEA ZB3)	08:36	12:39 (WEA ZB3)				
	21:53		21:03	24	19:22 (WEA ZB1)	19:52	19:23 (WEA VB13)	18:39	65	17:23 (WEA ZB2)	16:36	87	16:02 (WEA ZB2)	16:08	79	13:58 (WEA ZB3)	
14	05:15		06:04	06:04	18:56 (WEA ZB1)	06:58	18:37 (WEA ZB1)	07:52	16:18 (WEA ZB2)	07:51	12:37 (WEA ZB3)	08:37	12:39 (WEA ZB3)				
	21:52		21:01	28	19:24 (WEA ZB1)	19:49	19:21 (WEA VB13)	18:36	65	16:18 (WEA ZB2)	16:34	83	15:59 (WEA ZB2)	16:08	79	13:59 (WEA ZB3)	
15	05:17		06:06	06:06	18:54 (WEA ZB1)	07:00	18:39 (WEA ZB1)	07:54	16:17 (WEA ZB2)	07:53	12:36 (WEA ZB3)	08:38	12:40 (WEA ZB3)				
	21:51		20:59	32	19:26 (WEA ZB1)	19:47	19:19 (WEA VB13)	18:34	66	17:23 (WEA ZB2)	16:32	74	15:53 (WEA ZB2)	16:08	79	13:59 (WEA ZB3)	
16	05:18		06:08	06:08	18:51 (WEA ZB1)	07:02	18:39 (WEA ZB1)	07:56	16:16 (WEA ZB2)	07:55	12:36 (WEA ZB3)	08:39	12:40 (WEA ZB3)				
	21:50		20:57	36	19:27 (WEA ZB1)	19:44	19:16 (WEA ZB1)	18:32	68	17:24 (WEA ZB2)	16:31	67	13:43 (WEA ZB3)	16:08	78	13:58 (WEA ZB3)	
17	05:19		06:09	06:09	18:50 (WEA ZB1)	07:04	18:41 (WEA ZB1)	07:58	16:16 (WEA ZB2)	07:57	12:35 (WEA ZB3)	08:40	12:40 (WEA ZB3)				
	21:49		20:55	39	19:29 (WEA ZB1)	19:42	19:14 (WEA ZB1)	18:29	68	17:24 (WEA ZB2)	16:29	69	13:44 (WEA ZB3)	16:08	79	13:59 (WEA ZB3)	
18	05:21		06:11	06:11	07:05 (WEA VB5)	07:05	18:43 (WEA ZB1)	08:00	16:16 (WEA ZB2)	07:58	12:35 (WEA ZB3)	08:41	12:41 (WEA ZB3)				
	21:48		20:53	51	19:30 (WEA ZB1)	19:39	19:12 (WEA ZB1)	18:27	68	17:24 (WEA ZB2)	16:28	70	13:45 (WEA ZB3)	16:09	78	13:59 (WEA ZB3)	
19	05:22		06:13	06:13	07:02 (WEA VB5)	07:07	18:45 (WEA ZB1)	08:01	16:15 (WEA ZB2)	08:00	12:34 (WEA ZB3)	08:41	12:42 (WEA ZB3)				
	21:47		20:50	58	19:31 (WEA ZB1)	19:37	19:08 (WEA ZB1)	18:25	68	17:23 (WEA ZB2)	16:27	71	13:45 (WEA ZB3)	16:09	78	14:00 (WEA ZB3)	
20	05:23		06:15	06:15	07:01 (WEA VB5)	07:09	18:49 (WEA ZB1)	08:03	16:15 (WEA ZB2)	08:02	12:34 (WEA ZB3)	08:42	12:41 (WEA ZB3)				
	21:45		20:48	63	19:32 (WEA ZB1)	19:34	19:05 (WEA ZB1)	18:23	68	17:23 (WEA ZB2)	16:25	72	13:46 (WEA ZB3)	16:09	79	14:00 (WEA ZB3)	
21	05:25		06:16	06:16	07:00 (WEA VB5)	07:11		08:05	16:15 (WEA ZB2)	08:04	12:34 (WEA ZB3)	08:43	12:42 (WEA ZB3)				
	21:44		20:46	67	19:33 (WEA ZB1)	19:32		18:20	68	17:23 (WEA ZB2)	16:24	73	13:47 (WEA ZB3)	16:10	79	14:01 (WEA ZB3)	
22	05:26		06:18	06:18	06:58 (WEA VB5)	07:12		08:07	16:15 (WEA ZB2)	08:06	12:34 (WEA ZB3)	08:43	12:42 (WEA ZB3)				
	21:43		20:44	71	19:33 (WEA ZB1)	19:29		18:18	68	17:23 (WEA ZB2)	16:23	73	13:47 (WEA ZB3)	16:10	79	14:01 (WEA ZB3)	
23	05:28		06:20	06:20	06:58 (WEA VB5)	07:14		08:09	16:15 (WEA ZB2)	08:07	12:34 (WEA ZB3)	08:44	12:43 (WEA ZB3)				
	21:41		20:41	71	19:33 (WEA ZB1)	19:27		18:16	68	17:23 (WEA ZB2)	16:21	74	13:48 (WEA ZB3)	16:11	79	14:02 (WEA ZB3)	
24	05:29		06:22	06:22	06:58 (WEA VB5)	07:16		08:11	16:15 (WEA ZB2)	08:09	12:34 (WEA ZB3)	08:44	12:44 (WEA ZB3)				
	21:40		20:39	74	19:34 (WEA ZB1)	19:24		18:14	67	17:22 (WEA ZB2)	16:20	75	13:49 (WEA ZB3)	16:11	78	14:02 (WEA ZB3)	
25	05:31		06:23	06:23	06:57 (WEA VB5)	07:18		07:13	15:15 (WEA ZB2)	08:11	12:33 (WEA ZB3)	08:45	12:44 (WEA ZB3)				
	21:38		20:37	76	19:34 (WEA ZB1)	19:22		17:12	67	16:22 (WEA ZB2)	16:19	75	13:48 (WEA ZB3)	16:12	78	14:02 (WEA ZB3)	
26	05:32		06:25	06:25	06:57 (WEA VB5)	07:20		07:15	15:15 (WEA ZB2)	08:13	12:33 (WEA ZB3)	08:45	12:45 (WEA ZB3)				
	21:37		20:35	76	19:34 (WEA ZB1)	19:20		17:10	66	16:21 (WEA ZB2)	16:18	76	13:49 (WEA ZB3)	16:13	79	14:04 (WEA ZB3)	
27	05:34		06:27	06:27	06:57 (WEA VB5)	07:21		07:17	15:15 (WEA ZB2)	08:14	12:34 (WEA ZB3)	08:45	12:45 (WEA ZB3)				
	21:35		20:32	78	19:35 (WEA ZB1)	19:17		17:08	66	16:21 (WEA ZB2)	16:17	76	13:50 (WEA ZB3)	16:13	79	14:04 (WEA ZB3)	
28	05:35		06:29	06:29	06:56 (WEA VB5)	07:23		07:18	15:16 (WEA ZB2)	08:16	12:34 (WEA ZB3)	08:45	12:46 (WEA ZB3)				
	21:33		20:30	77	19:34 (WEA ZB1)	19:15		17:05	64	16:20 (WEA ZB2)	16:16	76	13:50 (WEA ZB3)	16:14	78	14:04 (WEA ZB3)	
29	05:37		06:30	06:30	06:58 (WEA VB5)	07:25		16:46 (WEA ZB2)	20	15:16 (WEA ZB2)	08:18	12:34 (WEA ZB3)	08:45				
	21:32		20:28	75	19:34 (WEA ZB1)	19:12	21	17:07 (WEA ZB2)	17:03	63	16:19 (WEA ZB2)	16:15	77	13:51 (WEA ZB3)	16:15	79	14:05 (WEA ZB3)
30	05:39		06:32	06:32	07:00 (WEA VB5)	07:27		16:42 (WEA ZB2)	17:02	15:17 (WEA ZB2)	08:19	12:34 (WEA ZB3)	08:45				
	21:30		20:25	74	19:35 (WEA ZB1)	19:10	28	17:10 (WEA ZB2)	17:01	62	16:19 (WEA ZB2)	16:14	77	13:51 (WEA ZB3)	16:16	78	14:05 (WEA ZB3)
31	05:40		06:34	06:34	07:01 (WEA VB5)			07:24	61	15:17 (WEA ZB2)			08:45				
	21:28		20:23	70	19:34 (WEA ZB1)			16:59	61	16:18 (WEA ZB2)			16:17	79	14:05 (WEA ZB3)		
Sonnenscheinstunden		511		459		382		329		260		234					
astr.max.mögl.Beschattung		5		1161		1119		1879		2391		2431					

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)

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO36 - Westerhausen 10
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:45 16:18 76	13:19 (WEA ZB3) 14:35 (WEA ZB3) 17:09	08:16 13:38 (WEA ZB3) 18:04	07:19 16:03 (WEA ZB2) 20:02	07:27 (WEA VB6) 19:34 (WEA ZB1) 20:57	05:55 21:47
2	08:45 16:19 75	13:20 (WEA ZB3) 14:35 (WEA ZB3) 17:11	08:14 13:39 (WEA ZB3) 18:06	07:16 16:03 (WEA ZB2) 20:04	07:25 (WEA VB6) 19:35 (WEA ZB1) 20:59	05:05 21:48
3	08:45 16:21 75	13:20 (WEA ZB3) 14:35 (WEA ZB3) 17:13	08:12 13:41 (WEA ZB3) 18:08	07:14 16:03 (WEA ZB2) 20:06	07:23 (WEA VB6) 19:36 (WEA ZB1) 21:01	05:05 21:49
4	08:45 16:22 75	13:21 (WEA ZB3) 14:36 (WEA ZB3) 17:15	08:10 13:43 (WEA ZB3) 18:10	07:12 16:04 (WEA ZB2) 20:08	07:20 (WEA VB6) 19:35 (WEA ZB1) 21:03	05:04 21:50
5	08:44 16:23 75	13:22 (WEA ZB3) 14:37 (WEA ZB3) 17:17	08:09 13:45 (WEA ZB3) 18:12	07:09 16:04 (WEA ZB2) 20:10	07:21 (WEA VB6) 19:36 (WEA ZB1) 21:04	05:03 21:51
6	08:44 16:24 75	13:22 (WEA ZB3) 14:37 (WEA ZB3) 17:19	08:07 13:47 (WEA ZB3) 18:14	07:07 16:05 (WEA ZB2) 20:12	07:21 (WEA VB6) 19:36 (WEA ZB1) 21:06	05:02 21:52
7	08:44 16:26 75	13:22 (WEA ZB3) 14:37 (WEA ZB3) 17:21	08:05 13:49 (WEA ZB3) 18:16	07:05 16:06 (WEA ZB2) 20:13	07:21 (WEA VB6) 19:35 (WEA ZB1) 21:08	05:02 21:53
8	08:43 16:27 75	13:23 (WEA ZB3) 14:38 (WEA ZB3) 17:23	08:03 13:51 (WEA ZB3) 18:18	07:02 16:07 (WEA ZB2) 20:15	07:22 (WEA VB6) 19:36 (WEA ZB1) 21:10	05:01 21:54
9	08:43 16:29 75	13:23 (WEA ZB3) 14:38 (WEA ZB3) 17:25	08:01 13:55 (WEA ZB3) 18:20	07:00 16:08 (WEA ZB2) 20:17	07:23 (WEA VB6) 19:35 (WEA ZB1) 21:11	05:00 21:55
10	08:42 16:30 76	13:23 (WEA ZB3) 14:39 (WEA ZB3) 17:27	07:59 13:59 (WEA ZB3) 18:22	06:57 16:09 (WEA ZB2) 20:19	07:24 (WEA VB6) 19:34 (WEA ZB1) 21:13	05:00 21:56
11	08:41 16:31 75	13:24 (WEA ZB3) 14:39 (WEA ZB3) 17:29	07:57 14:05 (WEA ZB3) 18:23	06:55 16:11 (WEA ZB2) 20:21	07:25 (WEA VB6) 19:33 (WEA ZB1) 21:15	05:00 21:57
12	08:41 16:33 75	13:24 (WEA ZB3) 14:39 (WEA ZB3) 17:31	07:55 14:08 (WEA ZB3) 18:25	06:53 16:12 (WEA ZB2) 20:23	07:26 (WEA VB6) 19:33 (WEA ZB1) 21:17	05:00 21:58
13	08:40 16:35 74	13:25 (WEA ZB3) 14:39 (WEA ZB3) 17:33	07:53 14:11 (WEA ZB3) 18:27	06:50 16:15 (WEA ZB2) 20:24	07:27 (WEA VB6) 19:33 (WEA ZB1) 21:18	05:00 21:58
14	08:39 16:36 75	13:25 (WEA ZB3) 14:40 (WEA ZB3) 17:35	07:51 14:14 (WEA ZB3) 18:29	06:48 16:18 (WEA ZB2) 20:26	07:28 (WEA VB6) 19:33 (WEA ZB1) 21:20	05:00 21:59
15	08:38 16:38 74	13:26 (WEA ZB3) 14:40 (WEA ZB3) 17:37	07:49 14:16 (WEA ZB3) 18:31	06:46 16:21 (WEA ZB2) 20:28	07:29 (WEA VB6) 19:32 (WEA ZB1) 21:22	05:00 21:59
16	08:37 16:40 75	13:26 (WEA ZB3) 14:41 (WEA ZB3) 17:39	07:47 14:19 (WEA ZB3) 18:33	06:44 16:23 (WEA ZB2) 20:30	07:30 (WEA VB6) 19:31 (WEA ZB1) 21:23	05:00 22:00
17	08:36 16:41 74	13:27 (WEA ZB3) 14:41 (WEA ZB3) 17:41	07:45 14:22 (WEA ZB3) 18:35	06:42 16:26 (WEA ZB2) 20:32	07:31 (WEA VB6) 19:30 (WEA ZB1) 21:25	05:00 22:01
18	08:35 16:43 73	13:27 (WEA ZB3) 14:40 (WEA ZB3) 17:43	07:43 14:25 (WEA ZB3) 18:37	06:40 16:29 (WEA ZB2) 20:34	07:32 (WEA VB6) 19:29 (WEA ZB1) 21:27	05:00 22:01
19	08:34 16:45 73	13:28 (WEA ZB3) 14:41 (WEA ZB3) 17:45	07:41 14:28 (WEA ZB3) 18:38	06:38 16:31 (WEA ZB2) 20:35	07:33 (WEA VB6) 19:28 (WEA ZB1) 21:28	05:00 22:01
20	08:33 16:46 72	13:29 (WEA ZB3) 14:41 (WEA ZB3) 17:47	07:39 14:31 (WEA ZB3) 18:40	06:36 16:34 (WEA ZB2) 20:37	07:34 (WEA VB6) 19:27 (WEA ZB1) 21:30	05:00 22:02
21	08:32 16:48 72	13:29 (WEA ZB3) 14:41 (WEA ZB3) 17:49	07:37 14:34 (WEA ZB3) 18:42	06:34 16:37 (WEA ZB2) 20:39	07:35 (WEA VB6) 19:26 (WEA ZB1) 21:31	05:00 22:02
22	08:30 16:50 71	13:30 (WEA ZB3) 14:41 (WEA ZB3) 17:51	07:34 14:37 (WEA ZB3) 18:44	06:32 16:40 (WEA ZB2) 20:41	07:36 (WEA VB6) 19:25 (WEA ZB1) 21:33	05:00 22:02
23	08:29 16:52 71	13:30 (WEA ZB3) 14:41 (WEA ZB3) 17:53	07:32 14:40 (WEA ZB3) 18:46	06:30 16:43 (WEA ZB2) 20:43	07:37 (WEA VB6) 19:24 (WEA ZB1) 21:34	05:00 22:02
24	08:28 16:54 70	13:31 (WEA ZB3) 14:41 (WEA ZB3) 17:55	07:30 14:43 (WEA ZB3) 18:48	06:28 16:46 (WEA ZB2) 20:44	07:38 (WEA VB6) 19:23 (WEA ZB1) 21:36	05:00 22:02
25	08:26 16:56 69	13:31 (WEA ZB3) 14:40 (WEA ZB3) 17:57	07:28 14:46 (WEA ZB3) 18:50	06:26 16:49 (WEA ZB2) 20:46	07:39 (WEA VB6) 19:22 (WEA ZB1) 21:37	05:00 22:02
26	08:25 16:58 68	13:33 (WEA ZB3) 14:41 (WEA ZB3) 17:59	07:25 14:49 (WEA ZB3) 18:51	06:24 16:52 (WEA ZB2) 20:48	07:40 (WEA VB6) 19:21 (WEA ZB1) 21:39	05:00 22:02
27	08:23 16:59 67	13:33 (WEA ZB3) 14:40 (WEA ZB3) 18:01	07:23 14:52 (WEA ZB3) 18:53	06:22 16:55 (WEA ZB2) 20:50	07:41 (WEA VB6) 19:20 (WEA ZB1) 21:40	05:00 22:02
28	08:22 17:01 65	13:34 (WEA ZB3) 14:39 (WEA ZB3) 18:02	07:21 14:55 (WEA ZB3) 18:55	06:20 16:58 (WEA ZB2) 20:52	07:42 (WEA VB6) 19:19 (WEA ZB1) 21:41	05:00 22:02
29	08:20 17:03 64	13:36 (WEA ZB3) 14:40 (WEA ZB3) 18:04	07:19 14:58 (WEA ZB3) 18:57	06:18 17:01 (WEA ZB2) 20:54	07:43 (WEA VB6) 19:18 (WEA ZB1) 21:42	05:00 22:02
30	08:19 17:05 63	13:36 (WEA ZB3) 14:40 (WEA ZB3) 18:06	07:17 15:01 (WEA ZB3) 19:00	06:16 17:04 (WEA ZB2) 20:56	07:44 (WEA VB6) 19:17 (WEA ZB1) 21:43	05:00 22:02
31	08:17 17:07 61	13:37 (WEA ZB3) 14:38 (WEA ZB3) 18:08	07:15 15:04 (WEA ZB3) 19:02	06:14 17:07 (WEA ZB2) 20:58	07:45 (WEA VB6) 19:16 (WEA ZB1) 21:44	05:00 22:02
Sonnenscheinstunden	251	274	367	419	493	509
astr.max.mögl.Beschattung	2233	1775	994	1594		

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO36 - Westerhausen 10

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember	
1	05:03	05:42			06:36	18:41 (WEA ZB1)	07:28	16:53 (WEA ZB2)	07:26	13:26 (WEA ZB3)	08:21	13:06 (WEA ZB3)
	22:01	21:27			20:21	19:33 (WEA ZB1)	19:07	17:29 (WEA ZB2)	16:57	16:26 (WEA ZB2)	16:13	14:21 (WEA ZB3)
2	05:03	05:44			06:37	18:41 (WEA ZB1)	07:30	16:50 (WEA ZB2)	07:28	13:24 (WEA ZB3)	08:22	13:06 (WEA ZB3)
	22:01	21:25			20:18	19:34 (WEA ZB1)	19:05	17:29 (WEA ZB2)	16:55	16:25 (WEA ZB2)	16:13	14:22 (WEA ZB3)
3	05:04	05:45			06:39	07:21 (WEA VB6)	07:32	16:48 (WEA ZB2)	07:30	13:21 (WEA ZB3)	08:24	13:06 (WEA ZB3)
	22:01	21:23			20:16	19:33 (WEA ZB1)	19:02	17:31 (WEA ZB2)	16:53	16:22 (WEA ZB2)	16:12	14:22 (WEA ZB3)
4	05:05	05:47			06:41	07:19 (WEA VB6)	07:34	16:46 (WEA ZB2)	07:32	13:18 (WEA ZB3)	08:25	13:07 (WEA ZB3)
	22:00	21:21			20:13	19:33 (WEA ZB1)	19:00	17:32 (WEA ZB2)	16:51	16:20 (WEA ZB2)	16:11	14:22 (WEA ZB3)
5	05:06	05:49			06:43	07:18 (WEA VB6)	07:36	16:44 (WEA ZB2)	07:34	13:16 (WEA ZB3)	08:27	13:07 (WEA ZB3)
	22:00	21:19			20:11	19:32 (WEA ZB1)	18:58	17:33 (WEA ZB2)	16:50	16:18 (WEA ZB2)	16:11	14:22 (WEA ZB3)
6	05:07	05:50			06:44	07:16 (WEA ZB2)	07:37	16:43 (WEA ZB2)	07:36	13:14 (WEA ZB3)	08:28	13:08 (WEA ZB3)
	21:59	21:17			20:09	19:31 (WEA ZB1)	18:55	17:34 (WEA ZB2)	16:48	16:16 (WEA ZB2)	16:10	14:23 (WEA ZB3)
7	05:08	05:52			06:46	07:16 (WEA VB6)	07:39	16:42 (WEA ZB2)	07:38	13:13 (WEA ZB3)	08:29	13:08 (WEA ZB3)
	21:58	21:15			20:06	19:31 (WEA ZB1)	18:53	17:35 (WEA ZB2)	16:46	16:14 (WEA ZB2)	16:10	14:23 (WEA ZB3)
8	05:09	05:54			06:48	07:15 (WEA VB6)	07:41	16:41 (WEA ZB2)	07:40	13:11 (WEA ZB3)	08:31	13:09 (WEA ZB3)
	21:58	21:13			20:04	19:30 (WEA ZB1)	18:50	17:35 (WEA ZB2)	16:44	16:12 (WEA ZB2)	16:09	14:24 (WEA ZB3)
9	05:10	05:55			06:50	07:16 (WEA VB6)	07:43	16:39 (WEA ZB2)	07:42	13:10 (WEA ZB3)	08:32	13:09 (WEA ZB3)
	21:57	21:11			20:01	19:29 (WEA ZB1)	18:48	17:35 (WEA ZB2)	16:42	14:07 (WEA ZB3)	16:09	14:24 (WEA ZB3)
10	05:11	05:57			06:51	07:18 (WEA VB6)	07:45	16:38 (WEA ZB2)	07:43	13:09 (WEA ZB3)	08:33	13:09 (WEA ZB3)
	21:56	21:09			19:59	19:28 (WEA ZB1)	18:46	17:35 (WEA ZB2)	16:41	14:08 (WEA ZB3)	16:09	14:24 (WEA ZB3)
11	05:12	05:59			06:53	07:20 (WEA VB6)	07:47	16:37 (WEA ZB2)	07:45	13:08 (WEA ZB3)	08:34	13:09 (WEA ZB3)
	21:55	21:07			19:56	19:28 (WEA ZB1)	18:43	17:36 (WEA ZB2)	16:39	14:09 (WEA ZB3)	16:08	14:25 (WEA ZB3)
12	05:13	06:01			06:55	07:21 (WEA VB6)	07:48	16:36 (WEA ZB2)	07:47	13:07 (WEA ZB3)	08:35	13:11 (WEA ZB3)
	21:54	21:05			19:54	19:26 (WEA ZB1)	18:41	17:36 (WEA ZB2)	16:37	14:10 (WEA ZB3)	16:08	14:26 (WEA ZB3)
13	05:14	06:02			06:57	07:23 (WEA VB6)	07:50	16:36 (WEA ZB2)	07:49	13:07 (WEA ZB3)	08:36	13:11 (WEA ZB3)
	21:53	21:03			19:52	19:23 (WEA ZB1)	18:39	17:36 (WEA ZB2)	16:36	14:12 (WEA ZB3)	16:08	14:26 (WEA ZB3)
14	05:15	06:04			06:58	18:41 (WEA ZB1)	07:52	16:35 (WEA ZB2)	07:51	13:07 (WEA ZB3)	08:37	13:12 (WEA ZB3)
	21:52	21:01			19:49	19:21 (WEA ZB1)	18:36	17:36 (WEA ZB2)	16:34	14:12 (WEA ZB3)	16:08	14:27 (WEA ZB3)
15	05:17	06:06		07:07 (WEA VB5)	07:00	18:42 (WEA ZB1)	07:54	16:35 (WEA ZB2)	07:53	13:06 (WEA ZB3)	08:38	13:12 (WEA ZB3)
	21:51	20:59	3	07:10 (WEA VB5)	19:47	19:19 (WEA ZB1)	18:34	17:36 (WEA ZB2)	16:32	14:13 (WEA ZB3)	16:08	14:27 (WEA ZB3)
16	05:18	06:08		07:02 (WEA VB5)	07:02	18:43 (WEA ZB1)	07:56	16:34 (WEA ZB2)	07:55	13:06 (WEA ZB3)	08:39	13:12 (WEA ZB3)
	21:50	20:57	23	19:18 (WEA ZB1)	19:44	19:16 (WEA ZB1)	18:32	17:36 (WEA ZB2)	16:31	14:14 (WEA ZB3)	16:08	14:27 (WEA ZB3)
17	05:19	06:09		07:00 (WEA VB5)	07:04	18:44 (WEA ZB1)	07:58	16:34 (WEA ZB2)	07:57	13:05 (WEA ZB3)	08:40	13:12 (WEA ZB3)
	21:49	20:55	35	19:22 (WEA ZB1)	19:42	19:14 (WEA ZB1)	18:29	17:36 (WEA ZB2)	16:29	14:14 (WEA ZB3)	16:08	14:27 (WEA ZB3)
18	05:21	06:11		06:59 (WEA VB5)	07:05	18:46 (WEA ZB1)	08:00	16:34 (WEA ZB2)	07:58	13:05 (WEA ZB3)	08:41	13:13 (WEA ZB3)
	21:48	20:53	44	19:25 (WEA ZB1)	19:39	19:12 (WEA ZB1)	18:27	17:36 (WEA ZB2)	16:28	14:15 (WEA ZB3)	16:09	14:28 (WEA ZB3)
19	05:22	06:13		06:58 (WEA VB5)	07:07	18:48 (WEA ZB1)	08:01	16:34 (WEA ZB2)	08:00	13:05 (WEA ZB3)	08:41	13:14 (WEA ZB3)
	21:47	20:50	49	19:26 (WEA ZB1)	19:37	19:08 (WEA ZB1)	18:25	17:36 (WEA ZB2)	16:27	14:16 (WEA ZB3)	16:09	14:29 (WEA ZB3)
20	05:23	06:15		06:57 (WEA VB5)	07:09	18:51 (WEA ZB1)	08:03	16:34 (WEA ZB2)	08:02	13:05 (WEA ZB3)	08:42	13:14 (WEA ZB3)
	21:45	20:48	54	19:28 (WEA ZB1)	19:34	19:06 (WEA ZB1)	18:23	17:35 (WEA ZB2)	16:25	14:16 (WEA ZB3)	16:09	14:29 (WEA ZB3)
21	05:25	06:16		06:57 (WEA VB5)	07:11		08:05	16:34 (WEA ZB2)	08:04	13:05 (WEA ZB3)	08:43	13:15 (WEA ZB3)
	21:44	20:46	57	19:29 (WEA ZB1)	19:32		18:20	17:35 (WEA ZB2)	16:24	14:17 (WEA ZB3)	16:10	14:30 (WEA ZB3)
22	05:26	06:18		06:55 (WEA VB5)	07:12		08:07	16:34 (WEA ZB2)	08:06	13:05 (WEA ZB3)	08:43	13:15 (WEA ZB3)
	21:42	20:44	62	19:30 (WEA ZB1)	19:29		18:18	17:34 (WEA ZB2)	16:23	14:17 (WEA ZB3)	16:10	14:30 (WEA ZB3)
23	05:28	06:20		06:55 (WEA VB5)	07:14		08:09	16:34 (WEA ZB2)	08:07	13:05 (WEA ZB3)	08:44	13:16 (WEA ZB3)
	21:41	20:41	64	19:31 (WEA ZB1)	19:27		18:16	17:34 (WEA ZB2)	16:21	14:18 (WEA ZB3)	16:11	14:31 (WEA ZB3)
24	05:29	06:22		06:55 (WEA VB5)	07:16		08:11	16:34 (WEA ZB2)	08:09	13:05 (WEA ZB3)	08:44	13:16 (WEA ZB3)
	21:40	20:39	67	19:32 (WEA ZB1)	19:24		18:14	17:33 (WEA ZB2)	16:20	14:18 (WEA ZB3)	16:11	14:31 (WEA ZB3)
25	05:31	06:23		06:55 (WEA VB5)	07:18		07:13	15:35 (WEA ZB2)	08:11	13:04 (WEA ZB3)	08:45	13:16 (WEA ZB3)
	21:38	20:37	67	19:32 (WEA ZB1)	19:22		17:12	16:33 (WEA ZB2)	16:19	14:18 (WEA ZB3)	16:12	14:31 (WEA ZB3)
26	05:32	06:25		06:55 (WEA VB5)	07:20		07:15	15:35 (WEA ZB2)	08:13	13:04 (WEA ZB3)	08:45	13:17 (WEA ZB3)
	21:37	20:35	68	19:33 (WEA ZB1)	19:20		17:10	16:32 (WEA ZB2)	16:18	14:19 (WEA ZB3)	16:13	14:32 (WEA ZB3)
27	05:34	06:27		06:56 (WEA VB5)	07:21		07:17	15:36 (WEA ZB2)	08:14	13:05 (WEA ZB3)	08:45	13:18 (WEA ZB3)
	21:35	20:32	68	19:33 (WEA ZB1)	19:17		17:07	16:31 (WEA ZB2)	16:17	14:19 (WEA ZB3)	16:13	14:33 (WEA ZB3)
28	05:35	06:29		06:56 (WEA VB5)	07:23		07:18	15:36 (WEA ZB2)	08:16	13:05 (WEA ZB3)	08:45	13:18 (WEA ZB3)
	21:33	20:30	68	19:33 (WEA ZB1)	19:15	16	17:20 (WEA ZB2)	16:30 (WEA ZB2)	16:16	14:20 (WEA ZB3)	16:14	14:33 (WEA ZB3)
29	05:37	06:30		06:58 (WEA VB5)	07:25		07:20	15:37 (WEA ZB2)	08:18	13:06 (WEA ZB3)	08:45	13:18 (WEA ZB3)
	21:32	20:28	65	19:33 (WEA ZB1)	19:12	25	17:24 (WEA ZB2)	16:29 (WEA ZB2)	16:15	14:21 (WEA ZB3)	16:15	14:34 (WEA ZB3)
30	05:39	06:32		07:00 (WEA VB5)	07:27		07:22	15:38 (WEA ZB2)	08:19	13:05 (WEA ZB3)	08:45	13:19 (WEA ZB3)
	21:30	20:25	63	19:34 (WEA ZB1)	19:10	30	17:26 (WEA ZB2)	16:28 (WEA ZB2)	16:14	14:20 (WEA ZB3)	16:16	14:34 (WEA ZB3)
31	05:40	06:34		07:01 (WEA VB5)			07:24	13:32 (WEA ZB3)			08:45	13:19 (WEA ZB3)
	21:28	20:23	58	19:33 (WEA ZB1)			16:59	16:27 (WEA ZB2)			16:17	14:34 (WEA ZB3)
Sonnenscheinstunden	511	459			382		329		260		234	
astr.max.mögl.Beschattung			915		1071		1722		2122		2329	

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)

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO37 - Westerhausen 1

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März		April		Mai		Juni
1	08:45	08:16	07:19		07:04	19:15 (WEA ZB3)	05:55	19:05 (WEA ZB3)	05:06
	16:18	17:09	18:04		20:02	20	19:35 (WEA ZB3)	20:57	61
2	08:45	08:14	07:16		07:02	19:12 (WEA ZB3)	05:53	19:06 (WEA ZB3)	05:05
	16:19	17:11	18:06		20:04	25	19:37 (WEA ZB3)	20:59	59
3	08:45	08:12	07:14		06:59	19:10 (WEA ZB3)	05:51	19:08 (WEA ZB3)	05:05
	16:21	17:13	18:08		20:06	30	19:40 (WEA ZB3)	21:01	56
4	08:45	08:10	07:12		06:57	19:07 (WEA ZB3)	05:49	19:10 (WEA ZB3)	05:04
	16:22	17:15	18:10		20:08	34	19:41 (WEA ZB3)	21:03	51
5	08:44	08:09	07:09		06:54	19:06 (WEA ZB3)	05:47	19:14 (WEA ZB3)	05:03
	16:23	17:17	18:12		20:10	37	19:43 (WEA ZB3)	21:04	42
6	08:44	08:07	07:07		06:52	19:04 (WEA ZB3)	05:45	19:45 (WEA ZB2)	05:02
	16:24	17:19	18:14		20:11	40	19:44 (WEA ZB3)	21:06	28
7	08:44	08:05	07:05		06:50	19:03 (WEA ZB3)	05:43	20:19 (WEA ZB1)	05:02
	16:26	17:21	18:16		20:13	43	19:46 (WEA ZB3)	21:08	19
8	08:43	08:03	07:02		06:47	19:02 (WEA ZB3)	05:42	20:18 (WEA ZB1)	05:01
	16:27	17:23	18:18		20:15	46	19:48 (WEA ZB3)	21:10	21
9	08:43	08:01	07:00		06:45	19:01 (WEA ZB3)	05:40	20:18 (WEA ZB1)	05:00
	16:29	17:25	18:20		20:17	46	19:47 (WEA ZB3)	21:11	22
10	08:42	07:59	06:57		06:42	19:00 (WEA ZB3)	05:38	20:18 (WEA ZB1)	05:00
	16:30	17:27	18:22		20:19	48	19:48 (WEA ZB3)	21:13	25
11	08:41	07:57	06:55		06:40	18:59 (WEA ZB3)	05:36	20:18 (WEA ZB1)	05:00
	16:31	17:29	18:23		20:21	50	19:49 (WEA ZB3)	21:15	26
12	08:40	07:55	06:53		06:38	18:58 (WEA ZB3)	05:34	20:17 (WEA ZB1)	04:59
	16:33	17:31	18:25		20:22	57	19:55 (WEA ZB2)	21:17	28
13	08:40	07:53	06:50		06:35	18:58 (WEA ZB3)	05:32	20:18 (WEA ZB1)	04:59
	16:35	17:33	18:27		20:24	59	19:57 (WEA ZB2)	21:18	29
14	08:39	07:51	06:48		06:33	18:58 (WEA ZB3)	05:31	20:18 (WEA ZB1)	04:59
	16:36	17:35	18:29		20:26	61	19:59 (WEA ZB2)	21:20	28
15	08:38	07:49	06:45		06:31	18:58 (WEA ZB3)	05:29	20:18 (WEA ZB1)	04:58
	16:38	17:37	18:31		20:28	63	20:01 (WEA ZB2)	21:22	28
16	08:37	07:47	06:43		06:28	18:56 (WEA ZB3)	05:27	05:55 (WEA VB7)	04:58
	16:40	17:39	18:33		20:30	66	20:02 (WEA ZB2)	21:23	30
17	08:36	07:45	06:41		06:26	18:57 (WEA ZB3)	05:26	05:54 (WEA VB7)	04:58
	16:41	17:41	18:35		20:32	67	20:04 (WEA ZB2)	21:25	31
18	08:35	07:43	06:38		06:24	18:57 (WEA ZB3)	05:24	05:52 (WEA VB7)	04:58
	16:43	17:43	18:37		20:33	68	20:05 (WEA ZB2)	21:27	32
19	08:34	07:41	06:36		06:21	18:57 (WEA ZB3)	05:23	05:51 (WEA VB7)	04:58
	16:45	17:45	18:38		20:35	70	20:07 (WEA ZB2)	21:28	33
20	08:33	07:39	06:33		06:19	18:57 (WEA ZB3)	05:21	05:50 (WEA VB7)	04:58
	16:46	17:47	18:40		20:37	72	20:09 (WEA ZB2)	21:30	34
21	08:31	07:36	06:31		06:17	18:56 (WEA ZB3)	05:20	05:48 (WEA VB7)	04:58
	16:48	17:49	18:42		20:39	74	20:10 (WEA ZB2)	21:31	33
22	08:30	07:34	06:28		06:15	18:57 (WEA ZB3)	05:18	05:47 (WEA VB7)	04:58
	16:50	17:51	18:44		20:41	74	20:11 (WEA ZB2)	21:33	34
23	08:29	07:32	06:26		06:12	18:57 (WEA ZB3)	05:17	05:46 (WEA VB7)	04:59
	16:52	17:53	18:46		20:43	74	20:11 (WEA ZB2)	21:34	34
24	08:28	07:30	06:23		06:10	18:58 (WEA ZB3)	05:16	05:45 (WEA VB7)	04:59
	16:54	17:55	18:48		20:44	73	20:11 (WEA ZB2)	21:36	33
25	08:26	07:28	06:21		06:08	18:59 (WEA ZB3)	05:14	05:43 (WEA VB7)	04:59
	16:56	17:57	18:49		20:46	71	20:10 (WEA ZB2)	21:37	32
26	08:25	07:25	06:19		06:06	18:59 (WEA ZB3)	05:13	05:42 (WEA VB7)	05:00
	16:58	17:59	18:51		20:48	71	20:10 (WEA ZB2)	21:39	30
27	08:23	07:23	06:16		06:04	19:00 (WEA ZB3)	05:12	05:42 (WEA VB7)	05:00
	16:59	18:01	18:53		20:50	69	20:09 (WEA ZB2)	21:40	26
28	08:22	07:21	06:14		06:02	19:01 (WEA ZB3)	05:11	05:42 (WEA VB7)	05:01
	17:01	18:02	18:55		20:52	68	20:09 (WEA ZB2)	21:41	22
29	08:20		07:11		06:00	19:02 (WEA ZB3)	05:09	05:43 (WEA VB7)	05:01
	17:03		19:57		20:54	66	20:08 (WEA ZB2)	21:43	16
30	08:19		07:09		05:57	19:03 (WEA ZB3)	05:08	05:43 (WEA VB7)	05:02
	17:05		19:59		20:55	64	20:07 (WEA ZB2)	21:44	15
31	08:17		07:06	19:19 (WEA ZB3)				05:07	
	17:07		20:00	19:34 (WEA ZB3)				21:45	14
Sonnenscheinstunden	251	274	367		419			493	
astr. max. mögl. Beschattung				15	1706			972	562

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO37 - Westerhausen 1
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	05:03 22:01 18	05:36 (WEA VB6) 21:27 27	20:28 (WEA ZB1) 06:36 50	18:58 (WEA ZB3) 07:28 19:07	07:26 16:57 16:13	08:21 16:13 08:22
2	05:03 22:01 18	05:37 (WEA VB6) 21:25 26	20:28 (WEA ZB1) 06:37 48	18:59 (WEA ZB3) 07:30 19:05	07:28 16:55 16:13	08:22 16:13 08:24
3	05:04 22:01 17	05:38 (WEA VB6) 21:23 23	20:28 (WEA ZB1) 06:39 46	18:59 (WEA ZB3) 07:32 19:02	07:30 16:53 16:12	08:24 16:12 08:25
4	05:05 22:00 16	05:39 (WEA VB6) 21:21 22	20:28 (WEA ZB1) 06:41 46	18:59 (WEA ZB3) 07:34 19:00	07:32 16:51 16:11	08:25 16:11 08:26
5	05:06 22:00 16	05:38 (WEA VB6) 21:19 20	20:29 (WEA ZB1) 06:43 43	19:00 (WEA ZB3) 07:36 18:58	07:34 16:50 16:11	08:26 16:11 08:28
6	05:07 21:59 14	05:55 (WEA VB6) 21:17 23	19:58 (WEA ZB2) 06:44 40	19:00 (WEA ZB3) 07:37 18:55	07:36 16:48 16:10	08:28 16:10 08:29
7	05:08 21:58 18	05:40 (WEA VB6) 21:15 28	19:55 (WEA ZB2) 06:46 37	19:01 (WEA ZB3) 07:39 18:53	07:38 16:46 16:10	08:29 16:10 08:30
8	05:09 21:58 19	06:01 (WEA VB7) 21:13 45	19:22 (WEA ZB3) 06:48 33	19:03 (WEA ZB3) 07:41 18:50	07:40 16:44 16:09	08:30 16:09 08:32
9	05:10 21:57 18	05:43 (WEA VB6) 21:11 53	19:19 (WEA ZB3) 06:50 30	19:03 (WEA ZB3) 07:43 18:48	07:42 16:42 16:09	08:32 16:09 08:33
10	05:11 21:56 17	06:04 (WEA VB7) 21:09 57	19:17 (WEA ZB3) 06:51 26	19:05 (WEA ZB3) 07:45 18:46	07:43 16:41 16:09	08:33 16:09 08:34
11	05:12 21:55 12	05:53 (WEA VB7) 21:07 60	19:14 (WEA ZB3) 06:53 22	19:07 (WEA ZB3) 07:47 18:43	07:45 16:39 16:08	08:34 16:08 08:35
12	05:13 21:54 14	05:52 (WEA VB7) 21:05 61	19:13 (WEA ZB3) 06:55 16	19:10 (WEA ZB3) 07:48 18:41	07:47 16:37 16:08	08:35 16:08 08:36
13	05:14 21:53 15	06:06 (WEA VB7) 21:02 65	19:10 (WEA ZB3) 06:57 1	19:18 (WEA ZB3) 07:50 18:39	07:49 16:36 16:08	08:36 16:08 08:37
14	05:15 21:52 16	06:07 (WEA VB7) 21:01 67	20:15 (WEA ZB2) 19:51 19:09	19:19 (WEA ZB3) 18:39 07:52	16:36 16:32 07:51	08:37 16:08 08:38
15	05:17 21:51 16	05:52 (WEA VB7) 20:59 69	19:08 (WEA ZB3) 07:00 20:17	07:54 16:32 07:56	08:38 16:08 07:55	08:39 16:08 08:40
16	05:18 21:50 26	05:51 (WEA VB7) 20:57 70	19:06 (WEA ZB3) 07:02 20:16	07:56 16:31 18:32	08:39 16:08 16:31	08:40 16:09 08:41
17	05:19 21:49 30	05:51 (WEA VB7) 20:55 71	19:06 (WEA ZB3) 07:04 20:17	07:58 16:29 18:29	08:40 16:08 16:29	08:41 16:09 08:42
18	05:21 21:48 32	05:52 (WEA VB7) 20:53 72	19:05 (WEA ZB3) 07:05 20:17	07:59 16:28 18:27	08:41 16:09 16:28	08:42 16:10 08:43
19	05:22 21:46 33	05:54 (WEA VB7) 20:50 73	19:03 (WEA ZB3) 07:07 20:16	08:01 16:27 18:25	08:41 16:09 16:27	08:42 16:10 08:43
20	05:23 21:45 34	05:55 (WEA VB7) 20:48 73	19:03 (WEA ZB3) 07:09 20:16	08:03 16:25 18:23	08:42 16:09 16:25	08:43 16:10 08:44
21	05:25 21:44 33	05:56 (WEA VB7) 20:46 74	19:02 (WEA ZB3) 07:11 20:16	08:05 16:24 18:20	08:43 16:10 16:24	08:44 16:11 08:45
22	05:26 21:42 34	05:58 (WEA VB7) 20:44 74	19:01 (WEA ZB3) 07:12 20:15	08:07 16:23 18:18	08:44 16:11 16:23	08:45 16:12 08:46
23	05:28 21:41 34	05:59 (WEA VB7) 20:41 72	19:01 (WEA ZB3) 07:14 20:13	08:09 16:21 18:16	08:46 16:12 16:21	08:47 16:13 08:48
24	05:29 21:40 33	06:00 (WEA VB7) 20:39 70	19:01 (WEA ZB3) 07:16 20:11	08:11 16:20 18:14	08:48 16:14 16:20	08:49 16:15 08:50
25	05:31 21:38 32	06:02 (WEA VB7) 20:37 69	18:59 (WEA ZB3) 07:18 20:08	08:13 16:19 17:12	08:50 16:16 16:19	08:51 16:17 08:52
26	05:32 21:37 31	06:03 (WEA VB7) 20:35 67	18:59 (WEA ZB3) 07:20 20:06	08:15 16:18 17:10	08:52 16:18 16:18	08:53 16:19 08:54
27	05:34 21:35 30	06:05 (WEA VB7) 20:32 65	18:59 (WEA ZB3) 07:21 20:04	08:17 16:17 17:07	08:54 16:20 16:17	08:55 16:21 08:56
28	05:35 21:33 29	06:06 (WEA VB7) 20:30 63	18:58 (WEA ZB3) 07:23 20:01	08:18 16:16 17:05	08:56 16:22 16:18	08:57 16:23 08:58
29	05:37 21:32 28	06:00 (WEA VB7) 20:28 60	18:59 (WEA ZB3) 07:25 19:59	08:20 16:15 17:03	08:58 16:24 16:19	08:59 16:25 09:00
30	05:39 21:30 29	06:32 (WEA ZB1) 20:25 58	18:59 (WEA ZB3) 07:27 19:57	08:22 16:16 17:01	09:00 16:26 16:21	09:01 16:27 09:02
31	05:40 21:28 29	06:34 (WEA ZB1) 20:23 56	18:58 (WEA ZB3) 07:28 19:54	08:24 16:17 16:59	09:03 16:28 16:22	09:04 16:29 09:05
Sonnenscheinstunden	511	459	382	329	260	235
astr.max.mögl.Beschattung	741	1733	438			

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO4 - Utwarfe 4
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar			Februar			März			April			Mai			Juni		
1	08:45	09:19 (WEA VB7)	08:16	09:19 (WEA VB7)	07:19				07:04			05:55	18:37 (WEA VB4)	05:06			
	16:18	108	14:36 (WEA VB5)	17:09	79	14:44 (WEA VB5)	18:04		20:02			20:57	41	19:18 (WEA VB4)	21:47		
2	08:45	09:19 (WEA VB7)	08:14	09:19 (WEA VB7)	07:16				07:02			05:53	18:38 (WEA VB4)	05:05			
	16:19	109	14:37 (WEA VB5)	17:11	77	14:43 (WEA VB5)	18:06		20:04			20:59	39	19:17 (WEA VB4)	21:48		
3	08:45	09:18 (WEA VB7)	08:12	09:20 (WEA VB7)	07:14			17:25 (WEA VB3)	06:59		9	18:59 (WEA VB4)	05:51	18:39 (WEA VB4)	05:04		
	16:20	111	14:37 (WEA VB5)	17:13	73	14:42 (WEA VB5)	18:08	9	17:34 (WEA VB3)	20:06	20	19:14 (WEA VB4)	21:01	19:16 (WEA VB4)	21:49		
4	08:45	09:18 (WEA VB7)	08:10	09:22 (WEA VB7)	07:12			17:22 (WEA VB3)	06:57			18:54 (WEA VB4)	05:49	18:40 (WEA VB4)	05:04		
	16:22	113	14:38 (WEA VB5)	17:15	68	14:42 (WEA VB5)	18:10	16	17:38 (WEA VB3)	20:08	26	19:16 (WEA VB4)	21:03	19:14 (WEA VB4)	21:50		
5	08:44	09:17 (WEA VB7)	08:09	09:23 (WEA VB7)	07:09			17:19 (WEA VB3)	06:54			18:47 (WEA VB4)	05:47	18:42 (WEA VB4)	05:03		
	16:23	113	14:38 (WEA VB5)	17:17	64	14:41 (WEA VB5)	18:12	20	17:39 (WEA VB3)	20:10	31	19:18 (WEA VB4)	21:04	19:13 (WEA VB4)	21:51		
6	08:44	09:17 (WEA VB7)	08:07	09:24 (WEA VB7)	07:07			17:18 (WEA VB3)	06:52			18:45 (WEA VB4)	05:45	18:43 (WEA VB4)	05:02		
	16:24	115	14:39 (WEA VB5)	17:19	58	14:39 (WEA VB5)	18:14	23	17:41 (WEA VB3)	20:11	45	19:41 (WEA VB2)	21:06	19:11 (WEA VB4)	21:52		
7	08:44	09:16 (WEA VB7)	08:05	09:26 (WEA VB7)	07:04			17:17 (WEA VB3)	06:49			18:43 (WEA VB4)	05:43	18:46 (WEA VB4)	05:01		
	16:26	116	14:40 (WEA VB5)	17:21	49	14:37 (WEA VB5)	18:16	25	17:42 (WEA VB3)	20:13	55	19:44 (WEA VB2)	21:08	19:10 (WEA VB4)	21:53		
8	08:43	09:16 (WEA VB7)	08:03	09:28 (WEA VB7)	07:02			17:15 (WEA VB3)	06:47			18:42 (WEA VB4)	05:41	18:48 (WEA VB4)	05:01		
	16:27	118	14:41 (WEA VB5)	17:23	40	14:35 (WEA VB5)	18:18	27	17:42 (WEA VB3)	20:15	59	19:45 (WEA VB2)	21:10	19:07 (WEA VB4)	21:54		
9	08:43	09:16 (WEA VB7)	08:01	09:31 (WEA VB7)	07:00			17:15 (WEA VB3)	06:45			18:40 (WEA VB4)	05:40	18:52 (WEA VB4)	05:00		
	16:28	117	14:41 (WEA VB5)	17:25	27	14:31 (WEA VB5)	18:20	28	17:43 (WEA VB3)	20:17	66	19:46 (WEA VB2)	21:11	19:03 (WEA VB4)	21:55		
10	08:42	09:15 (WEA VB7)	07:59				06:57		17:14 (WEA VB3)	06:42		18:39 (WEA VB4)	05:38		05:00		
	16:30	119	14:42 (WEA VB5)	17:27			18:22	29	17:43 (WEA VB3)	20:19	68	19:47 (WEA VB2)	21:13		21:56		
11	08:41	09:15 (WEA VB7)	07:57				06:55		17:14 (WEA VB3)	06:40		18:38 (WEA VB4)	05:36		04:59		
	16:31	119	14:42 (WEA VB5)	17:29			18:23	29	17:43 (WEA VB3)	20:21	69	19:47 (WEA VB2)	21:15		21:57		
12	08:40	09:15 (WEA VB7)	07:55				06:53		17:13 (WEA VB3)	06:38		18:36 (WEA VB4)	05:34		04:59		
	16:33	119	14:43 (WEA VB5)	17:31			18:25	30	17:43 (WEA VB3)	20:22	71	19:47 (WEA VB2)	21:17		21:57		
13	08:40	09:15 (WEA VB7)	07:53				06:50		17:13 (WEA VB3)	06:35		18:36 (WEA VB4)	05:32		04:59		
	16:35	119	14:43 (WEA VB5)	17:33			18:27	30	17:43 (WEA VB3)	20:24	71	19:47 (WEA VB2)	21:18		21:58		
14	08:39	09:15 (WEA VB7)	07:51				06:48		17:12 (WEA VB3)	06:33		18:35 (WEA VB4)	05:31		04:58		
	16:36	118	14:44 (WEA VB5)	17:35			18:29	31	18:02 (WEA VB1)	20:26	72	19:47 (WEA VB2)	21:20		21:59		
15	08:38	09:15 (WEA VB7)	07:49				06:45		17:13 (WEA VB3)	06:31		18:35 (WEA VB4)	05:29		04:58		
	16:38	117	14:44 (WEA VB5)	17:37			18:31	32	18:04 (WEA VB1)	20:28	72	19:47 (WEA VB2)	21:22		21:59		
16	08:37	09:15 (WEA VB7)	07:47				06:43		17:14 (WEA VB3)	06:28		18:34 (WEA VB4)	05:27		04:58		
	16:39	117	14:45 (WEA VB5)	17:39			18:33	35	18:07 (WEA VB1)	20:30	72	19:46 (WEA VB2)	21:23		22:00		
17	08:36	09:15 (WEA VB7)	07:45				06:40		17:14 (WEA VB3)	06:26		18:34 (WEA VB4)	05:26		04:58		
	16:41	115	14:45 (WEA VB5)	17:41			18:35	36	18:08 (WEA VB1)	20:32	72	19:46 (WEA VB2)	21:25		22:00		
18	08:35	09:14 (WEA VB7)	07:43				06:38		17:15 (WEA VB3)	06:24		18:33 (WEA VB4)	05:24		04:58		
	16:43	112	14:45 (WEA VB5)	17:43			18:36	36	18:10 (WEA VB1)	20:33	72	19:45 (WEA VB2)	21:27		22:01		
19	08:34	09:15 (WEA VB7)	07:41				06:36		17:16 (WEA VB3)	06:21		18:33 (WEA VB4)	05:23		04:58		
	16:45	108	14:46 (WEA VB5)	17:45			18:38	36	18:12 (WEA VB1)	20:35	71	19:44 (WEA VB2)	21:28		22:01		
20	08:33	09:15 (WEA VB7)	07:39				06:33		17:18 (WEA VB3)	06:19		18:32 (WEA VB4)	05:21		04:58		
	16:46	102	14:46 (WEA VB5)	17:47			18:40	33	18:14 (WEA VB1)	20:37	70	19:42 (WEA VB2)	21:30		22:02		
21	08:32	09:15 (WEA VB7)	07:36				06:31		17:21 (WEA VB3)	06:17		18:33 (WEA VB4)	05:20		04:58		
	16:48	91	14:46 (WEA VB5)	17:49			18:42	28	18:15 (WEA VB1)	20:39	68	19:41 (WEA VB2)	21:31		22:02		
22	08:30	09:15 (WEA VB7)	07:34				06:28		17:57 (WEA VB1)	06:15		18:33 (WEA VB4)	05:18		04:58		
	16:50	91	14:46 (WEA VB5)	17:51			18:44	17	18:14 (WEA VB1)	20:41	66	19:39 (WEA VB2)	21:33		22:02		
23	08:29	09:15 (WEA VB7)	07:32				06:26		17:57 (WEA VB1)	06:12		18:33 (WEA VB4)	05:17		04:59		
	16:52	91	14:46 (WEA VB5)	17:53			18:46	15	18:12 (WEA VB1)	20:43	62	19:37 (WEA VB2)	21:34		22:02		
24	08:28	09:16 (WEA VB7)	07:30				06:23		18:00 (WEA VB1)	06:10		18:33 (WEA VB4)	05:15		04:59		
	16:54	91	14:47 (WEA VB5)	17:55			18:48	10	18:10 (WEA VB1)	20:44	50	19:23 (WEA VB4)	21:36		22:02		
25	08:26	09:15 (WEA VB7)	07:28				06:21		18:03 (WEA VB1)	06:08		18:34 (WEA VB4)	05:14		04:59		
	16:56	91	14:46 (WEA VB5)	17:57			18:49	2	18:05 (WEA VB1)	20:46	49	19:23 (WEA VB4)	21:37		22:02		
26	08:25	09:16 (WEA VB7)	07:25				06:19			06:06		18:34 (WEA VB4)	05:13		05:00		
	16:57	91	14:47 (WEA VB5)	17:59			18:51			20:48	48	19:22 (WEA VB4)	21:39		22:02		
27	08:23	09:16 (WEA VB7)	07:23				06:16			06:04		18:35 (WEA VB4)	05:12		05:00		
	16:59	89	14:46 (WEA VB5)	18:00			18:53			20:50	47	19:22 (WEA VB4)	21:40		22:02		
28	08:22	09:16 (WEA VB7)	07:21				06:14			06:02		18:35 (WEA VB4)	05:10		05:01		
	17:01	88	14:46 (WEA VB5)	18:02			18:55			20:52	46	19:21 (WEA VB4)	21:41		22:02		
29	08:20	09:18 (WEA VB7)					07:11			05:59		18:36 (WEA VB4)	05:09		05:01		
	17:03	86	14:46 (WEA VB5)				19:57			20:54	44	19:20 (WEA VB4)	21:43		22:02		
30	08:19	09:18 (WEA VB7)					07:09			05:57		18:37 (WEA VB4)	05:08		05:02		
	17:05	84	14:46 (WEA VB5)				19:59			20:55	42	19:19 (WEA VB4)	21:44		22:02		
31	08:17	09:18 (WEA VB7)					07:06						05:07				
	17:07	83	14:45 (WEA VB5)				20:00						21:45				
Sonnenscheinstunden			251				367			420		493			509		
astr.max.mögl.Beschattung			3261		535		577		1613		264						

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)
	Minuten mit Schatten	

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO4 - Utwarfe 4
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	July	August	September	Oktober	November	Dezember
1	05:02 22:01	05:42 21:27	06:36 20:20	18:37 (WEA VB4) 07:28 19:46 (WEA VB2) 19:07	17:53 (WEA VB3) 07:26 18:23 (WEA VB3) 16:57	09:04 (WEA VB7) 08:21 09:09 (WEA VB7) 16:13
2	05:03 22:01	05:43 21:25	06:37 20:18	18:38 (WEA VB4) 07:30 19:46 (WEA VB2) 19:05	17:52 (WEA VB3) 07:28 18:21 (WEA VB3) 16:55	08:59 (WEA VB7) 08:22 14:00 (WEA VB5) 16:13
3	05:04 22:01	05:45 21:23	06:39 20:16	18:38 (WEA VB4) 07:32 19:44 (WEA VB2) 19:02	17:52 (WEA VB3) 07:30 18:21 (WEA VB3) 16:53	08:57 (WEA VB7) 08:24 14:05 (WEA VB5) 16:12
4	05:05 22:00	05:47 21:21	19:00 (WEA VB4) 06:41 19:15 (WEA VB4) 20:13	18:39 (WEA VB4) 07:34 19:42 (WEA VB2) 19:00	17:52 (WEA VB3) 07:32 18:20 (WEA VB3) 16:51	08:55 (WEA VB7) 08:25 14:07 (WEA VB5) 16:11
5	05:06 22:00	05:49 21:19	18:57 (WEA VB4) 06:43 19:17 (WEA VB4) 20:11	18:40 (WEA VB4) 07:36 19:41 (WEA VB2) 18:58	17:52 (WEA VB3) 07:34 18:20 (WEA VB3) 16:49	08:54 (WEA VB7) 08:26 14:09 (WEA VB5) 16:11
6	05:06 21:59	05:50 21:17	18:55 (WEA VB4) 06:44 19:20 (WEA VB4) 20:08	18:41 (WEA VB4) 07:37 19:37 (WEA VB2) 18:55	17:53 (WEA VB3) 07:36 18:19 (WEA VB3) 16:48	08:53 (WEA VB7) 08:28 14:11 (WEA VB5) 16:10
7	05:07 21:58	05:52 21:15	18:53 (WEA VB4) 06:46 19:22 (WEA VB4) 20:06	18:42 (WEA VB4) 07:39 19:14 (WEA VB4) 18:53	17:54 (WEA VB3) 07:38 18:18 (WEA VB3) 16:46	08:52 (WEA VB7) 08:29 14:12 (WEA VB5) 16:10
8	05:08 21:58	05:54 21:13	18:51 (WEA VB4) 06:48 19:23 (WEA VB4) 20:04	18:45 (WEA VB4) 07:41 19:11 (WEA VB4) 18:50	17:55 (WEA VB3) 07:40 18:16 (WEA VB3) 16:44	08:51 (WEA VB7) 08:30 14:13 (WEA VB5) 16:09
9	05:09 21:57	05:55 21:11	18:49 (WEA VB4) 06:50 19:24 (WEA VB4) 20:01	18:47 (WEA VB4) 07:43 19:07 (WEA VB4) 18:48	17:55 (WEA VB3) 07:41 18:13 (WEA VB3) 16:42	08:50 (WEA VB7) 08:32 14:14 (WEA VB5) 16:09
10	05:11 21:56	05:57 21:09	18:47 (WEA VB4) 06:51 19:25 (WEA VB4) 19:59	18:51 (WEA VB4) 07:45 19:02 (WEA VB4) 18:46	17:58 (WEA VB3) 07:43 18:11 (WEA VB3) 16:40	08:49 (WEA VB7) 08:33 14:15 (WEA VB5) 16:09
11	05:12 21:55	05:59 21:07	18:46 (WEA VB4) 06:53 19:26 (WEA VB4) 19:56	18:51 (WEA VB4) 07:46 18:43	17:58 (WEA VB3) 07:45 18:05 (WEA VB3) 16:39	08:49 (WEA VB7) 08:34 14:16 (WEA VB5) 16:08
12	05:13 21:54	06:01 21:05	18:46 (WEA VB4) 06:55 19:27 (WEA VB4) 19:54	18:47	17:58 (WEA VB3) 07:47 16:37	08:49 (WEA VB7) 08:35 14:17 (WEA VB5) 16:08
13	05:14 21:53	06:02 21:03	18:44 (WEA VB4) 06:57 19:27 (WEA VB4) 19:51	18:49	17:58 (WEA VB3) 07:49 16:35	08:49 (WEA VB7) 08:36 14:18 (WEA VB5) 16:08
14	05:15 21:52	06:04 21:01	18:43 (WEA VB4) 06:58 19:28 (WEA VB4) 19:49	18:50	17:58 (WEA VB3) 07:51 16:34	08:49 (WEA VB7) 08:37 14:19 (WEA VB5) 16:08
15	05:16 21:51	06:06 20:59	18:43 (WEA VB4) 07:00 19:29 (WEA VB4) 19:47	18:51	17:58 (WEA VB3) 07:53 16:32	08:49 (WEA VB7) 08:38 14:19 (WEA VB5) 16:08
16	05:18 21:50	06:08 20:57	18:41 (WEA VB4) 07:02 19:29 (WEA VB4) 19:44	18:52	17:58 (WEA VB3) 07:55 16:31	08:49 (WEA VB7) 08:39 14:20 (WEA VB5) 16:08
17	05:19 21:49	06:09 20:55	18:41 (WEA VB4) 07:04 19:29 (WEA VB4) 19:42	18:53	17:57 (WEA VB3) 07:57 16:29	08:49 (WEA VB7) 08:40 14:20 (WEA VB5) 16:08
18	05:20 21:48	06:11 20:53	18:40 (WEA VB4) 07:05 19:30 (WEA VB4) 19:39	18:54	17:57 (WEA VB3) 07:59 16:28	08:50 (WEA VB7) 08:41 14:21 (WEA VB5) 16:09
19	05:22 21:46	06:13 20:50	18:39 (WEA VB4) 07:07 19:39 (WEA VB2) 19:37	18:47 (WEA VB1) 08:01 18:56 (WEA VB1) 18:25	17:58 (WEA VB3) 08:00 16:26	08:50 (WEA VB7) 08:41 14:21 (WEA VB5) 16:09
20	05:23 21:45	06:15 20:48	18:39 (WEA VB4) 07:09 19:43 (WEA VB2) 19:34	18:44 (WEA VB1) 08:03 18:58 (WEA VB1) 18:23	17:58 (WEA VB3) 08:02 16:25	08:50 (WEA VB7) 08:42 14:21 (WEA VB5) 16:09
21	05:25 21:44	06:16 20:46	18:37 (WEA VB4) 07:11 19:44 (WEA VB2) 19:32	18:43 (WEA VB1) 08:05 18:59 (WEA VB1) 18:20	17:58 (WEA VB3) 08:04 16:24	08:51 (WEA VB7) 08:43 14:22 (WEA VB5) 16:10
22	05:26 21:42	06:18 20:44	18:37 (WEA VB4) 07:12 19:46 (WEA VB2) 19:29	18:08 (WEA VB3) 08:07 19:00 (WEA VB1) 18:18	17:58 (WEA VB3) 08:06 16:22	08:51 (WEA VB7) 08:43 14:22 (WEA VB5) 16:10
23	05:28 21:41	06:20 20:41	18:37 (WEA VB4) 07:14 19:47 (WEA VB2) 19:27	18:03 (WEA VB3) 08:09 18:58 (WEA VB1) 18:16	17:58 (WEA VB3) 08:07 16:21	08:52 (WEA VB7) 08:44 14:23 (WEA VB5) 16:11
24	05:29 21:40	06:22 20:39	18:36 (WEA VB4) 07:16 19:47 (WEA VB2) 19:24	18:00 (WEA VB3) 08:11 18:56 (WEA VB1) 18:14	17:58 (WEA VB3) 08:09 16:20	08:52 (WEA VB7) 08:44 14:23 (WEA VB5) 16:11
25	05:31 21:38	06:23 20:37	18:36 (WEA VB4) 07:18 19:48 (WEA VB2) 19:22	17:59 (WEA VB3) 07:13 18:54 (WEA VB1) 17:12	17:59 (WEA VB3) 07:13 16:19	08:52 (WEA VB7) 08:44 14:22 (WEA VB5) 16:12
26	05:32 21:37	06:25 20:35	18:36 (WEA VB4) 07:19 19:49 (WEA VB2) 19:19	17:57 (WEA VB3) 07:15 18:52 (WEA VB1) 17:10	17:58 (WEA VB3) 07:15 16:18	08:53 (WEA VB7) 08:45 14:23 (WEA VB5) 16:12
27	05:34 21:35	06:27 20:32	18:36 (WEA VB4) 07:21 19:48 (WEA VB2) 19:17	17:55 (WEA VB3) 07:16 18:48 (WEA VB1) 17:07	17:58 (WEA VB3) 07:16 16:17	08:54 (WEA VB7) 08:45 14:23 (WEA VB5) 16:13
28	05:35 21:33	06:29 20:30	18:36 (WEA VB4) 07:23 19:48 (WEA VB2) 19:15	17:54 (WEA VB3) 07:18 18:46 (WEA VB1) 17:05	17:58 (WEA VB3) 07:18 16:16	08:55 (WEA VB7) 08:45 14:24 (WEA VB5) 16:14
29	05:37 21:32	06:30 20:28	18:36 (WEA VB4) 07:25 19:48 (WEA VB2) 19:12	17:53 (WEA VB3) 07:20 18:44 (WEA VB1) 17:03	17:58 (WEA VB3) 07:20 16:15	08:56 (WEA VB7) 08:45 14:24 (WEA VB5) 16:15
30	05:39 21:30	06:32 20:25	18:36 (WEA VB4) 07:27 19:47 (WEA VB2) 19:10	17:53 (WEA VB3) 07:22 18:23 (WEA VB3) 17:01	17:58 (WEA VB3) 07:22 16:14	08:56 (WEA VB7) 08:45 14:24 (WEA VB5) 16:16
31	05:40 21:28	06:34 20:23	18:36 (WEA VB4) 07:29 19:47 (WEA VB2) 19:07	17:54	16:14	08:56 (WEA VB7) 08:45 14:24 (WEA VB5) 16:16
Sonnenscheinstunden	511	459	382	329	260	234
astr.max.mögl.Beschattung		1452	785	248	2550	3312

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO5 - Klein Buschhausen 3

Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar			Februar			März			April			Mai			Juni		
1	08:45		14:35 (WEA VB4)	08:16		16:33 (WEA VB1)	07:19		07:04		05:55		05:06				
	16:18	56	15:36 (WEA VB3)	17:09	4	16:37 (WEA VB1)	18:04		20:02		20:57		21:47				
2	08:45		14:36 (WEA VB4)	08:14		16:33 (WEA VB1)	07:16		07:02		05:53		05:05				
	16:19	56	15:37 (WEA VB3)	17:11	6	16:39 (WEA VB1)	18:06		20:04		20:59		21:48				
3	08:45		14:36 (WEA VB4)	08:12		16:32 (WEA VB1)	07:14		06:59		05:51		05:04				
	16:20	57	15:37 (WEA VB3)	17:13	9	16:41 (WEA VB1)	18:08		20:06		21:01		21:49				
4	08:45		14:37 (WEA VB4)	08:10		16:33 (WEA VB1)	07:12		06:57		05:49		05:04				
	16:22	57	15:38 (WEA VB3)	17:15	11	16:44 (WEA VB1)	18:10		20:08		21:03		21:50				
5	08:44		14:38 (WEA VB4)	08:09		16:33 (WEA VB1)	07:09		06:54		05:47		05:03				
	16:23	57	15:39 (WEA VB3)	17:17	13	16:46 (WEA VB1)	18:12		20:10		21:04		21:51				
6	08:44		14:38 (WEA VB4)	08:07		16:32 (WEA VB2)	07:07		06:52		05:45		05:02				
	16:24	57	15:39 (WEA VB3)	17:19	17	16:49 (WEA VB1)	18:14		20:11		21:06		21:52				
7	08:44		14:38 (WEA VB4)	08:05		16:31 (WEA VB2)	07:05		06:49		05:43		05:01				
	16:26	57	15:39 (WEA VB3)	17:21	20	16:51 (WEA VB1)	18:16		20:13		21:08		21:53				
8	08:43		14:39 (WEA VB4)	08:03		16:30 (WEA VB2)	07:02		06:47		05:41		05:01				
	16:27	57	15:40 (WEA VB3)	17:23	20	16:50 (WEA VB2)	18:18		20:15		21:10		21:54				
9	08:43		14:39 (WEA VB4)	08:01		16:29 (WEA VB2)	07:00		06:45		05:40		05:00				
	16:28	58	15:40 (WEA VB3)	17:25	22	16:51 (WEA VB2)	18:20		20:17		21:11		21:55				
10	08:42		14:39 (WEA VB4)	07:59		16:29 (WEA VB2)	06:57		06:42		05:38		05:00				
	16:30	58	15:40 (WEA VB3)	17:27	23	16:52 (WEA VB2)	18:22		20:19		21:13		21:56				
11	08:41		14:40 (WEA VB4)	07:57		16:27 (WEA VB2)	06:55		06:40		05:36		04:59				
	16:31	57	15:41 (WEA VB3)	17:29	25	16:52 (WEA VB2)	18:23		20:21		21:15		21:57				
12	08:41		14:40 (WEA VB4)	07:55		16:27 (WEA VB2)	06:53		06:38		05:34		04:59				
	16:33	57	15:41 (WEA VB3)	17:31	25	16:52 (WEA VB2)	18:25		20:22		21:17		21:58				
13	08:40		14:41 (WEA VB4)	07:53		16:27 (WEA VB2)	06:50		06:35		05:32		04:59				
	16:34	55	15:41 (WEA VB3)	17:33	25	16:52 (WEA VB2)	18:27		20:24		21:18		21:58				
14	08:39		14:41 (WEA VB4)	07:51		16:28 (WEA VB2)	06:48		06:33		05:31		04:58				
	16:36	56	15:41 (WEA VB3)	17:35	24	16:52 (WEA VB2)	18:29		20:26		21:20		21:59				
15	08:38		14:42 (WEA VB4)	07:49		16:28 (WEA VB2)	06:45		06:31		05:29		04:58				
	16:38	55	15:42 (WEA VB3)	17:37	24	16:52 (WEA VB2)	18:31		20:28		21:22		21:59				
16	08:37		14:43 (WEA VB4)	07:47		16:28 (WEA VB2)	06:43		06:28		05:27		04:58				
	16:39	53	15:42 (WEA VB3)	17:39	24	16:52 (WEA VB2)	18:33		20:30		21:23		22:00				
17	08:36		14:44 (WEA VB4)	07:45		16:29 (WEA VB2)	06:41		06:26		05:26		04:58				
	16:41	51	15:42 (WEA VB3)	17:41	23	16:52 (WEA VB2)	18:35		20:32		21:25		22:01				
18	08:35		14:44 (WEA VB4)	07:43		16:29 (WEA VB2)	06:38		06:24		05:24		04:58				
	16:43	50	15:41 (WEA VB3)	17:43	21	16:50 (WEA VB2)	18:36		20:33		21:27		22:01				
19	08:34		14:45 (WEA VB4)	07:41		16:30 (WEA VB2)	06:36		06:21		05:23		04:58				
	16:45	48	15:41 (WEA VB3)	17:45	19	16:49 (WEA VB2)	18:38		20:35		21:28		22:01				
20	08:33		14:46 (WEA VB4)	07:39		16:32 (WEA VB2)	06:33		06:19		05:21		04:58				
	16:46	45	15:41 (WEA VB3)	17:47	16	16:48 (WEA VB2)	18:40		20:37		21:30		22:02				
21	08:32		14:46 (WEA VB4)	07:36		16:35 (WEA VB2)	06:31		06:17		05:20		04:58				
	16:48	42	15:40 (WEA VB3)	17:49	11	16:46 (WEA VB2)	18:42		20:39		21:31		22:02				
22	08:30		14:48 (WEA VB4)	07:34			06:28		06:15		05:18		04:58				
	16:50	37	15:39 (WEA VB3)	17:51			18:44		20:41		21:33		22:02				
23	08:29		14:48 (WEA VB4)	07:32			06:26		06:12		05:17		04:58				
	16:52	31	15:36 (WEA VB3)	17:53			18:46		20:43		21:34		22:02				
24	08:28		14:50 (WEA VB4)	07:30			06:23		06:10		05:15		04:59				
	16:54	23	15:13 (WEA VB4)	17:55			18:48		20:44		21:36		22:02				
25	08:26		14:52 (WEA VB4)	07:28			06:21		06:08		05:14		04:59				
	16:56	19	15:11 (WEA VB4)	17:57			18:49		20:46		21:37		22:02				
26	08:25		14:54 (WEA VB4)	07:25			06:19		06:06		05:13		05:00				
	16:57	16	15:10 (WEA VB4)	17:59			18:51		20:48		21:39		22:02				
27	08:23		14:57 (WEA VB4)	07:23			06:16		06:04		05:12		05:00				
	16:59	11	15:08 (WEA VB4)	18:00			18:53		20:50		21:40		22:02				
28	08:22			07:21			06:14		06:02		05:10		05:00				
	17:01			18:02			18:55		20:52		21:42		22:02				
29	08:20						07:11		05:59		05:09		05:01				
	17:03						19:57		20:54		21:43		22:02				
30	08:19						07:09		05:57		05:08		05:02				
	17:05						19:59		20:55		21:44		22:02				
31	08:17		16:34 (WEA VB1)				07:06				05:07						
	17:07	1	16:35 (WEA VB1)				20:00				21:45						
Sonnenscheinstunden			251														
astr.max.mögl.Beschattung			1277			382			367		420		493		509		

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO5 - Klein Buschhausen 3
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli	August	September	Oktober		November		Dezember	
1	05:02	05:42	06:36	07:28		07:26	15:58 (WEA VB2)	08:21	14:22 (WEA VB4)
	22:01	21:27	20:20	19:07		16:57	22 16:20 (WEA VB2)	16:13	57 15:23 (WEA VB3)
2	05:03	05:43	06:37	07:30		07:28	15:58 (WEA VB2)	08:22	14:22 (WEA VB4)
	22:01	21:25	20:18	19:05		16:55	22 16:20 (WEA VB2)	16:13	59 15:24 (WEA VB3)
3	05:04	05:45	06:39	07:32		07:30	16:00 (WEA VB2)	08:24	14:22 (WEA VB4)
	22:01	21:23	20:16	19:02		16:53	20 16:20 (WEA VB2)	16:12	58 15:23 (WEA VB3)
4	05:05	05:47	06:41	07:34		07:32	16:01 (WEA VB2)	08:25	14:23 (WEA VB4)
	22:00	21:21	20:13	19:00		16:51	19 16:20 (WEA VB1)	16:11	57 15:24 (WEA VB3)
5	05:06	05:49	06:43	07:36		07:34	16:02 (WEA VB2)	08:27	14:23 (WEA VB4)
	22:00	21:19	20:11	18:58		16:49	16 16:18 (WEA VB1)	16:11	57 15:24 (WEA VB3)
6	05:06	05:50	06:44	07:37		07:36	16:03 (WEA VB1)	08:28	14:24 (WEA VB4)
	21:59	21:17	20:09	18:55		16:48	13 16:16 (WEA VB1)	16:10	57 15:25 (WEA VB3)
7	05:07	05:52	06:46	07:39		07:38	16:03 (WEA VB1)	08:29	14:24 (WEA VB4)
	21:58	21:15	20:06	18:53		16:46	11 16:14 (WEA VB1)	16:10	57 15:25 (WEA VB3)
8	05:08	05:54	06:48	07:41		07:40	16:03 (WEA VB1)	08:30	14:25 (WEA VB4)
	21:58	21:13	20:04	18:50		16:44	9 16:12 (WEA VB1)	16:09	57 15:26 (WEA VB3)
9	05:09	05:55	06:50	07:43		07:42	16:04 (WEA VB1)	08:32	14:25 (WEA VB4)
	21:57	21:11	20:01	18:48		16:42	6 16:10 (WEA VB1)	16:09	56 15:26 (WEA VB3)
10	05:11	05:57	06:51	07:45		07:43	16:04 (WEA VB1)	08:33	14:25 (WEA VB4)
	21:56	21:09	19:59	18:46		16:40	4 16:08 (WEA VB1)	16:09	56 15:26 (WEA VB3)
11	05:12	05:59	06:53	07:46		07:45	16:05 (WEA VB1)	08:34	14:26 (WEA VB4)
	21:55	21:07	19:56	18:43		16:39	1 16:06 (WEA VB1)	16:08	56 15:26 (WEA VB3)
12	05:13	06:01	06:55	07:48		07:47		08:35	14:27 (WEA VB4)
	21:54	21:05	19:54	18:41		16:37		16:08	55 15:27 (WEA VB3)
13	05:14	06:02	06:57	07:50		07:49		08:36	14:27 (WEA VB4)
	21:53	21:03	19:51	18:39		16:35		16:08	55 15:27 (WEA VB3)
14	05:15	06:04	06:58	07:52		07:51		08:37	14:28 (WEA VB4)
	21:52	21:01	19:49	18:36		16:34		16:08	53 15:27 (WEA VB3)
15	05:16	06:06	07:00	07:54		07:53	14:30 (WEA VB4)	08:38	14:28 (WEA VB4)
	21:51	20:59	19:47	18:34		16:32	11 14:41 (WEA VB4)	16:08	55 15:28 (WEA VB3)
16	05:18	06:07	07:02	07:56		07:55	14:27 (WEA VB4)	08:39	14:28 (WEA VB4)
	21:50	20:57	19:44	18:32		16:31	16 14:43 (WEA VB4)	16:08	53 15:27 (WEA VB3)
17	05:19	06:09	07:04	07:58		07:57	14:26 (WEA VB4)	08:40	14:29 (WEA VB4)
	21:49	20:55	19:42	18:29		16:29	19 14:45 (WEA VB4)	16:08	53 15:28 (WEA VB3)
18	05:20	06:11	07:05	07:59		07:58	14:24 (WEA VB4)	08:41	14:29 (WEA VB4)
	21:48	20:53	19:39	18:27		16:28	23 14:47 (WEA VB4)	16:08	54 15:28 (WEA VB3)
19	05:22	06:13	07:07	08:01		08:00	14:23 (WEA VB4)	08:41	14:30 (WEA VB4)
	21:47	20:50	19:37	18:25		16:26	31 15:11 (WEA VB3)	16:09	53 15:29 (WEA VB3)
20	05:23	06:14	07:09	08:03	17:08 (WEA VB2)	08:02	14:23 (WEA VB4)	08:42	14:30 (WEA VB4)
	21:45	20:48	19:34	18:23	6 17:14 (WEA VB2)	16:25	37 15:14 (WEA VB3)	16:09	53 15:29 (WEA VB3)
21	05:25	06:16	07:11	08:05	17:04 (WEA VB2)	08:04	14:22 (WEA VB4)	08:43	14:31 (WEA VB4)
	21:44	20:46	19:32	18:20	13 17:17 (WEA VB2)	16:24	42 15:16 (WEA VB3)	16:09	53 15:30 (WEA VB3)
22	05:26	06:18	07:12	08:07	17:02 (WEA VB2)	08:06	14:22 (WEA VB4)	08:43	14:31 (WEA VB4)
	21:42	20:44	19:29	18:18	17 17:19 (WEA VB2)	16:22	45 15:17 (WEA VB3)	16:10	53 15:30 (WEA VB3)
23	05:28	06:20	07:14	08:09	17:00 (WEA VB2)	08:07	14:22 (WEA VB4)	08:44	14:32 (WEA VB4)
	21:41	20:41	19:27	18:16	20 17:20 (WEA VB2)	16:21	48 15:18 (WEA VB3)	16:10	53 15:31 (WEA VB3)
24	05:29	06:22	07:16	08:11	16:59 (WEA VB2)	08:09	14:22 (WEA VB4)	08:44	14:32 (WEA VB4)
	21:40	20:39	19:24	18:14	22 17:21 (WEA VB2)	16:20	50 15:19 (WEA VB3)	16:11	53 15:31 (WEA VB3)
25	05:31	06:23	07:18	07:13	15:58 (WEA VB2)	08:11	14:21 (WEA VB4)	08:45	14:32 (WEA VB4)
	21:38	20:37	19:22	17:12	23 16:21 (WEA VB2)	16:19	52 15:19 (WEA VB3)	16:12	53 15:31 (WEA VB3)
26	05:32	06:25	07:19	07:15	15:58 (WEA VB2)	08:13	14:21 (WEA VB4)	08:45	14:34 (WEA VB4)
	21:37	20:35	19:19	17:09	24 16:22 (WEA VB2)	16:18	53 15:20 (WEA VB3)	16:12	53 15:33 (WEA VB3)
27	05:34	06:27	07:21	07:17	15:57 (WEA VB2)	08:14	14:21 (WEA VB4)	08:45	14:34 (WEA VB4)
	21:35	20:32	19:17	17:07	25 16:22 (WEA VB2)	16:17	55 15:21 (WEA VB3)	16:13	53 15:33 (WEA VB3)
28	05:35	06:29	07:23	07:18	15:57 (WEA VB2)	08:16	14:21 (WEA VB4)	08:45	14:34 (WEA VB4)
	21:33	20:30	19:15	17:05	25 16:22 (WEA VB2)	16:16	57 15:22 (WEA VB3)	16:14	55 15:34 (WEA VB3)
29	05:37	06:30	07:25	07:20	15:57 (WEA VB2)	08:18	14:22 (WEA VB4)	08:45	14:35 (WEA VB4)
	21:32	20:28	19:12	17:03	25 16:22 (WEA VB2)	16:15	56 15:22 (WEA VB3)	16:15	53 15:34 (WEA VB3)
30	05:39	06:32	07:27	07:22	15:57 (WEA VB2)	08:19	14:21 (WEA VB4)	08:45	14:35 (WEA VB4)
	21:30	20:25	19:10	17:01	24 16:21 (WEA VB2)	16:14	57 15:22 (WEA VB3)	16:16	55 15:35 (WEA VB3)
31	05:40	06:34		07:24	15:57 (WEA VB2)			08:45	14:35 (WEA VB4)
	21:28	20:23		16:59	24 16:21 (WEA VB2)			16:17	55 15:35 (WEA VB3)
Sonnenscheinstunden	511	459	382	329		260		234	
astr.max.mögl.Beschattung				248		795		1700	

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	---------------------------	--------------------------------	----------------------------

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO6 - Bohnenburg 20
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Januar		Februar		März		April		Mai		Juni	
1	08:45 16:18	13:42 (WEA VB7) 15:30 (WEA VB6)	08:15 17:09	15:26 (WEA VB6) 15:33 (WEA VB6)	07:18 18:04	07:04 20:02	19:00 (WEA VB4) 19:31 (WEA VB2)	05:55 20:57	05:06 21:47		
2	08:45 16:19	13:43 (WEA VB7) 15:31 (WEA VB6)	08:14 17:11		07:16 18:06	07:01 20:04	19:18 (WEA VB2) 19:30 (WEA VB2)	05:53 20:59	05:05 21:48		
3	08:45 16:20	13:43 (WEA VB7) 15:32 (WEA VB6)	08:12 17:13		07:14 18:08	06:59 20:06	19:20 (WEA VB2) 19:28 (WEA VB2)	05:51 21:01	05:04 21:49		
4	08:45 16:22	13:44 (WEA VB7) 15:33 (WEA VB6)	08:10 17:15		07:12 18:10	06:57 20:08		05:49 21:02	05:04 21:50		
5	08:44 16:23	13:45 (WEA VB7) 15:33 (WEA VB6)	08:09 17:17		07:09 18:12	06:54 20:10		05:47 21:04	05:03 21:51		
6	08:44 16:24	13:46 (WEA VB7) 15:34 (WEA VB6)	08:07 17:19	16:38 (WEA VB5) 16:47 (WEA VB5)	07:07 18:14	17:46 (WEA VB3) 17:47 (WEA VB3)	06:52 20:11	05:45 21:06	05:02 21:52		
7	08:44 16:26	13:47 (WEA VB7) 15:35 (WEA VB6)	08:05 17:21	16:36 (WEA VB5) 16:49 (WEA VB5)	07:04 18:16	17:44 (WEA VB3) 17:50 (WEA VB3)	06:49 20:13	05:43 21:08	05:01 21:53		
8	08:43 16:27	13:49 (WEA VB7) 15:36 (WEA VB6)	08:03 17:23	16:34 (WEA VB5) 16:51 (WEA VB5)	07:02 18:18	17:42 (WEA VB3) 17:51 (WEA VB3)	06:47 20:15	05:41 21:10	05:01 21:54		
9	08:42 16:28	13:50 (WEA VB7) 15:37 (WEA VB6)	08:01 17:25	16:33 (WEA VB5) 16:53 (WEA VB5)	07:00 18:20	17:41 (WEA VB3) 17:53 (WEA VB3)	06:45 20:17	05:39 21:11	05:00 21:55		
10	08:42 16:30	13:51 (WEA VB7) 15:37 (WEA VB6)	07:59 17:27	16:31 (WEA VB5) 16:53 (WEA VB5)	06:57 18:21	17:40 (WEA VB3) 17:55 (WEA VB3)	06:42 20:19	05:38 21:13	05:00 21:56		
11	08:41 16:31	13:52 (WEA VB7) 15:38 (WEA VB6)	07:57 17:29	16:31 (WEA VB5) 16:53 (WEA VB5)	06:55 18:23	17:40 (WEA VB3) 17:57 (WEA VB3)	06:40 20:21	05:36 21:15	04:59 21:57		
12	08:40 16:33	13:53 (WEA VB7) 15:38 (WEA VB6)	07:55 17:31	16:30 (WEA VB5) 16:54 (WEA VB5)	06:53 18:25	17:39 (WEA VB3) 17:56 (WEA VB3)	06:38 20:22	05:34 21:17	04:59 21:57		
13	08:40 16:34	13:55 (WEA VB7) 15:39 (WEA VB6)	07:53 17:33	16:30 (WEA VB5) 16:55 (WEA VB5)	06:50 18:27	17:40 (WEA VB3) 17:55 (WEA VB3)	06:35 20:24	05:32 21:18	04:59 21:58		
14	08:39 16:36	13:57 (WEA VB7) 15:40 (WEA VB6)	07:51 17:35	16:30 (WEA VB5) 16:55 (WEA VB5)	06:48 18:29	17:40 (WEA VB3) 17:53 (WEA VB3)	06:33 20:26	05:31 21:20	04:58 21:59		
15	08:38 16:38	14:00 (WEA VB7) 15:40 (WEA VB6)	07:49 17:37	16:30 (WEA VB5) 16:55 (WEA VB5)	06:45 18:31	17:42 (WEA VB3) 17:52 (WEA VB3)	06:31 20:28	05:29 21:22	04:58 21:59		
16	08:37 16:39	15:10 (WEA VB6) 15:41 (WEA VB6)	07:47 17:39	16:31 (WEA VB5) 16:55 (WEA VB5)	06:43 18:33	17:47 (WEA VB3) 17:48 (WEA VB3)	06:28 20:30	05:27 21:23	04:58 22:00		
17	08:36 16:41	15:11 (WEA VB6) 15:41 (WEA VB6)	07:45 17:41	16:30 (WEA VB5) 16:54 (WEA VB5)	06:40 18:35	06:26 20:32		05:26 21:25	04:58 22:00		
18	08:35 16:43	15:10 (WEA VB6) 15:41 (WEA VB6)	07:43 17:43	16:31 (WEA VB5) 16:54 (WEA VB5)	06:38 18:36	06:24 20:33		05:24 21:26	04:58 22:01		
19	08:34 16:45	15:11 (WEA VB6) 15:42 (WEA VB6)	07:41 17:45	16:32 (WEA VB5) 16:53 (WEA VB5)	06:36 18:38	18:07 (WEA VB4) 18:12 (WEA VB4)	06:21 20:35	05:22 21:28	04:58 22:01		
20	08:33 16:46	15:12 (WEA VB6) 15:42 (WEA VB6)	07:39 17:47	16:33 (WEA VB5) 16:52 (WEA VB5)	06:33 18:40	18:04 (WEA VB4) 18:14 (WEA VB4)	06:19 20:37	05:21 21:30	04:58 22:02		
21	08:31 16:48	15:12 (WEA VB6) 15:42 (WEA VB6)	07:36 17:49	16:34 (WEA VB5) 16:51 (WEA VB5)	06:31 18:42	18:01 (WEA VB4) 18:15 (WEA VB4)	06:17 20:39	05:20 21:31	04:58 22:02		
22	08:30 16:50	15:13 (WEA VB6) 15:42 (WEA VB6)	07:34 17:51	16:36 (WEA VB5) 16:48 (WEA VB5)	06:28 18:44	18:00 (WEA VB4) 18:18 (WEA VB4)	06:15 20:41	05:18 21:33	04:58 22:02		
23	08:29 16:52	15:13 (WEA VB6) 15:42 (WEA VB6)	07:32 17:53	16:39 (WEA VB5) 16:45 (WEA VB5)	06:26 18:46	17:58 (WEA VB4) 18:18 (WEA VB4)	06:12 20:43	05:17 21:34	04:58 22:02		
24	08:28 16:54	15:14 (WEA VB6) 15:42 (WEA VB6)	07:30 17:55		06:23 18:48	17:58 (WEA VB4) 18:19 (WEA VB4)	06:10 20:44	05:15 21:36	04:59 22:02		
25	08:26 16:56	15:14 (WEA VB6) 15:41 (WEA VB6)	07:28 17:57		06:21 18:49	17:56 (WEA VB4) 18:18 (WEA VB4)	06:08 20:46	05:14 21:37	04:59 22:02		
26	08:25 16:57	15:16 (WEA VB6) 15:42 (WEA VB6)	07:25 17:58		06:19 18:51	17:57 (WEA VB4) 18:25 (WEA VB2)	06:06 20:48	05:13 21:39	05:00 22:02		
27	08:23 16:59	15:16 (WEA VB6) 15:41 (WEA VB6)	07:23 18:00		06:16 18:53	17:57 (WEA VB4) 18:27 (WEA VB2)	06:04 20:50	05:12 21:40	05:00 22:02		
28	08:22 17:01	15:17 (WEA VB6) 15:40 (WEA VB6)	07:21 18:02		06:14 18:55	17:56 (WEA VB4) 18:28 (WEA VB2)	06:01 20:52	05:10 21:41	05:00 22:02		
29	08:20 17:03	15:18 (WEA VB6) 15:39 (WEA VB6)			07:11 19:57	18:57 (WEA VB4) 19:31 (WEA VB2)	05:59 20:53	05:09 21:43	05:01 22:02		
30	08:19 17:05	15:21 (WEA VB6) 15:38 (WEA VB6)			07:09 19:59	18:57 (WEA VB4) 19:32 (WEA VB2)	05:57 20:55	05:08 21:44	05:02 22:02		
31	08:17 17:07	15:23 (WEA VB6) 15:36 (WEA VB6)			07:06 20:00	18:59 (WEA VB4) 19:32 (WEA VB2)		05:07 21:45			
Sonnenscheinstunden		251	274		367	420		493	509		
astr.max.mögl.Beschattung		1242	355		403	44					

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	

Projekt:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO6 - Bohnenburg 20
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September		Oktober		November		Dezember		
1	05:02 22:01	05:42 21:26	06:36 20:20		07:28 19:07	15	18:20 (WEA VB3) 18:35 (WEA VB3)	07:26 16:57	16:01 (WEA VB5) 16:22 (WEA VB5)	08:21 16:13	13:34 (WEA VB7) 15:20 (WEA VB6)
2	05:03 22:01	05:43 21:25	06:37 20:18		07:30 19:05	17	18:18 (WEA VB3) 18:35 (WEA VB3)	07:28 16:55	16:02 (WEA VB5) 16:21 (WEA VB5)	08:22 16:13	13:34 (WEA VB7) 15:20 (WEA VB6)
3	05:04 22:01	05:45 21:23	06:39 20:16		07:32 19:02	16	18:18 (WEA VB3) 18:34 (WEA VB3)	07:30 16:53	16:04 (WEA VB5) 16:21 (WEA VB5)	08:24 16:12	13:33 (WEA VB7) 15:20 (WEA VB6)
4	05:05 22:00	05:47 21:21	06:41 20:13		07:34 19:00	13	18:18 (WEA VB3) 18:31 (WEA VB3)	07:32 16:51	16:06 (WEA VB5) 16:19 (WEA VB5)	08:25 16:11	13:33 (WEA VB7) 15:20 (WEA VB6)
5	05:06 22:00	05:48 21:19	06:43 20:11		07:36 18:58	11	18:18 (WEA VB3) 18:29 (WEA VB3)	07:34 16:49	16:08 (WEA VB5) 16:16 (WEA VB5)	08:26 16:11	13:32 (WEA VB7) 15:20 (WEA VB6)
6	05:06 21:59	05:50 21:17	06:44 20:08		07:37 18:55	8	18:19 (WEA VB3) 18:27 (WEA VB3)	07:36 16:48		08:28 16:10	13:32 (WEA VB7) 15:21 (WEA VB6)
7	05:07 21:58	05:52 21:15	06:46 20:06		07:39 18:53	3	18:21 (WEA VB3) 18:24 (WEA VB3)	07:38 16:46		08:29 16:10	13:32 (WEA VB7) 15:20 (WEA VB6)
8	05:08 21:58	05:54 21:13	06:48 20:04		07:41 18:50			07:40 16:44		08:30 16:09	13:32 (WEA VB7) 15:21 (WEA VB6)
9	05:09 21:57	05:55 21:11	06:50 20:01	8	19:13 (WEA VB2) 19:21 (WEA VB2)			07:41 16:42		08:32 16:09	13:32 (WEA VB7) 15:21 (WEA VB6)
10	05:10 21:56	05:57 21:09	06:51 19:59	12	19:11 (WEA VB2) 19:23 (WEA VB2)			07:43 16:40	14:57 (WEA VB6) 15:04 (WEA VB6)	08:33 16:09	13:32 (WEA VB7) 15:21 (WEA VB6)
11	05:12 21:55	05:59 21:07	06:53 19:56	23	18:54 (WEA VB4) 19:24 (WEA VB2)			07:45 16:39	14:54 (WEA VB6) 15:07 (WEA VB6)	08:34 16:08	13:32 (WEA VB7) 15:20 (WEA VB6)
12	05:13 21:54	06:01 21:05	06:55 19:54	28	18:51 (WEA VB4) 19:24 (WEA VB2)			07:47 16:37	14:52 (WEA VB6) 15:09 (WEA VB6)	08:35 16:08	13:32 (WEA VB7) 15:20 (WEA VB6)
13	05:14 21:53	06:02 21:03	06:57 19:51	32	18:49 (WEA VB4) 19:23 (WEA VB2)			07:49 16:35	14:50 (WEA VB6) 15:11 (WEA VB6)	08:36 16:08	13:33 (WEA VB7) 15:21 (WEA VB6)
14	05:15 21:52	06:04 21:01	06:58 19:49	32	18:48 (WEA VB4) 19:21 (WEA VB2)			07:51 16:34	14:50 (WEA VB6) 15:13 (WEA VB6)	08:37 16:08	13:33 (WEA VB7) 15:22 (WEA VB6)
15	05:16 21:51	06:06 20:59	07:00 19:46	31	18:46 (WEA VB4) 19:18 (WEA VB2)			07:53 16:32	14:49 (WEA VB6) 15:14 (WEA VB6)	08:38 16:08	13:33 (WEA VB7) 15:21 (WEA VB6)
16	05:18 21:50	06:07 20:57	07:02 19:44	30	18:45 (WEA VB4) 19:16 (WEA VB2)			07:55 16:31	14:49 (WEA VB6) 15:15 (WEA VB6)	08:39 16:08	13:33 (WEA VB7) 15:21 (WEA VB6)
17	05:19 21:49	06:09 20:55	07:04 19:42	27	18:45 (WEA VB4) 19:14 (WEA VB2)			07:57 16:29	14:48 (WEA VB6) 15:15 (WEA VB6)	08:40 16:08	13:34 (WEA VB7) 15:22 (WEA VB6)
18	05:20 21:48	06:11 20:53	07:05 19:39	23	18:45 (WEA VB4) 19:12 (WEA VB2)			07:58 16:28	14:48 (WEA VB6) 15:16 (WEA VB6)	08:41 16:08	13:34 (WEA VB7) 15:22 (WEA VB6)
19	05:22 21:46	06:13 20:50	07:07 19:37	21	18:44 (WEA VB4) 19:05 (WEA VB4)	9	17:09 (WEA VB5) 17:18 (WEA VB5)	08:00 16:26	14:48 (WEA VB6) 15:17 (WEA VB6)	08:41 16:09	13:35 (WEA VB7) 15:23 (WEA VB6)
20	05:23 21:45	06:14 20:48	07:09 19:34	21	18:44 (WEA VB4) 19:05 (WEA VB4)	15	17:06 (WEA VB5) 17:21 (WEA VB5)	08:02 16:25	14:48 (WEA VB6) 15:17 (WEA VB6)	08:42 16:09	13:35 (WEA VB7) 15:22 (WEA VB6)
21	05:25 21:44	06:16 20:46	07:11 19:32	19	18:45 (WEA VB4) 19:04 (WEA VB4)	18	17:04 (WEA VB5) 17:22 (WEA VB5)	08:04 16:24	14:48 (WEA VB6) 15:18 (WEA VB6)	08:43 16:09	13:36 (WEA VB7) 15:23 (WEA VB6)
22	05:26 21:42	06:18 20:44	07:12 19:29	16	18:46 (WEA VB4) 19:02 (WEA VB4)	20	17:03 (WEA VB5) 17:23 (WEA VB5)	08:06 16:22	14:48 (WEA VB6) 15:18 (WEA VB6)	08:43 16:10	13:36 (WEA VB7) 15:23 (WEA VB6)
23	05:28 21:41	06:20 20:41	07:14 19:27	11	18:47 (WEA VB4) 18:58 (WEA VB4)	22	17:02 (WEA VB5) 17:24 (WEA VB5)	08:07 16:21	14:48 (WEA VB6) 15:19 (WEA VB6)	08:44 16:10	13:37 (WEA VB7) 15:24 (WEA VB6)
24	05:29 21:40	06:21 20:39	07:16 19:24	7	18:49 (WEA VB4) 18:56 (WEA VB4)	23	17:01 (WEA VB5) 17:24 (WEA VB5)	08:09 16:20	14:47 (WEA VB6) 15:18 (WEA VB6)	08:44 16:11	13:37 (WEA VB7) 15:25 (WEA VB6)
25	05:31 21:38	06:23 20:37	07:18 19:22			25	16:00 (WEA VB5) 16:25 (WEA VB5)	08:11 16:19	14:48 (WEA VB6) 15:18 (WEA VB6)	08:44 16:12	13:37 (WEA VB7) 15:25 (WEA VB6)
26	05:32 21:36	06:25 20:35	07:19 19:19			25	16:00 (WEA VB5) 16:25 (WEA VB5)	08:13 16:18	14:48 (WEA VB6) 15:19 (WEA VB6)	08:45 16:12	13:38 (WEA VB7) 15:26 (WEA VB6)
27	05:34 21:35	06:27 20:32	07:21 19:17			25	16:00 (WEA VB5) 16:25 (WEA VB5)	08:14 16:17	13:40 (WEA VB7) 15:19 (WEA VB6)	08:45 16:13	13:39 (WEA VB7) 15:27 (WEA VB6)
28	05:35 21:33	06:29 20:30	07:23 19:15	8	18:24 (WEA VB3) 18:32 (WEA VB3)	24	16:00 (WEA VB5) 16:24 (WEA VB5)	08:16 16:16	13:38 (WEA VB7) 15:20 (WEA VB6)	08:45 16:14	13:39 (WEA VB7) 15:28 (WEA VB6)
29	05:37 21:32	06:30 20:28	07:25 19:12	12	18:22 (WEA VB3) 18:34 (WEA VB3)	24	16:00 (WEA VB5) 16:24 (WEA VB5)	08:17 16:15	13:36 (WEA VB7) 15:20 (WEA VB6)	08:45 16:15	13:40 (WEA VB7) 15:28 (WEA VB6)
30	05:39 21:30	06:32 20:25	07:27 19:10	15	18:20 (WEA VB3) 18:35 (WEA VB3)	24	16:00 (WEA VB5) 16:24 (WEA VB5)	08:19 16:14	13:35 (WEA VB7) 15:19 (WEA VB6)	08:45 16:16	13:41 (WEA VB7) 15:29 (WEA VB6)
31	05:40 21:28	06:34 20:23				23	16:00 (WEA VB5) 16:23 (WEA VB5)			08:45 16:17	13:41 (WEA VB7) 15:29 (WEA VB6)
Sonnenscheinstunden	511	459	382		329			260		234	
astr.max.mögl.Beschattung			376		360			694		1785	

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende (WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO7 - Sengwarder Chausseehaus
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar			Februar			März			April			Mai		Juni	
1	08:45		12:57 (WEA VB7)	08:15	13:25 (WEA VB7)	07:18		16:44 (WEA VB5)	07:04				05:55		05:06	
	16:18	64	14:01 (WEA VB7)	17:09	15:52 (WEA VB6)	18:04	29	17:13 (WEA VB5)	20:02				20:57		21:47	
2	08:45		12:58 (WEA VB7)	08:14	13:28 (WEA VB7)	07:16		16:45 (WEA VB5)	07:01				05:53		05:05	
	16:19	64	14:02 (WEA VB7)	17:11	15:52 (WEA VB6)	18:06	28	17:13 (WEA VB5)	20:04				20:59		21:48	
3	08:45		12:57 (WEA VB7)	08:12	13:33 (WEA VB7)	07:14		16:45 (WEA VB5)	06:59			19:28 (WEA VB4)	05:51		05:04	
	16:20	64	14:01 (WEA VB7)	17:13	15:52 (WEA VB6)	18:08	27	17:12 (WEA VB5)	20:06	10		19:38 (WEA VB4)	21:01		21:49	
4	08:45		12:58 (WEA VB7)	08:10	15:14 (WEA VB6)	07:12		16:46 (WEA VB5)	06:57			19:25 (WEA VB4)	05:49		05:04	
	16:22	64	14:02 (WEA VB7)	17:15	15:51 (WEA VB6)	18:10	25	17:11 (WEA VB5)	20:08	15		19:40 (WEA VB4)	21:02		21:50	
5	08:44		12:58 (WEA VB7)	08:09	15:16 (WEA VB6)	07:09		16:47 (WEA VB5)	06:54			19:23 (WEA VB4)	05:47		05:03	
	16:23	64	14:02 (WEA VB7)	17:17	15:52 (WEA VB6)	18:12	22	17:09 (WEA VB5)	20:10	20		19:43 (WEA VB2)	21:04		21:51	
6	08:44		12:59 (WEA VB7)	08:07	15:17 (WEA VB6)	07:07		16:49 (WEA VB5)	06:52			19:21 (WEA VB4)	05:45		05:02	
	16:24	64	14:03 (WEA VB7)	17:19	15:51 (WEA VB6)	18:14	19	17:08 (WEA VB5)	20:11	23		19:44 (WEA VB2)	21:06		21:52	
7	08:44		13:00 (WEA VB7)	08:05	15:18 (WEA VB6)	07:04		16:51 (WEA VB5)	06:49			19:20 (WEA VB4)	05:43		05:01	
	16:26	66	15:26 (WEA VB6)	17:21	15:51 (WEA VB6)	18:16	15	17:06 (WEA VB5)	20:13	26		19:46 (WEA VB2)	21:08		21:53	
8	08:43		13:01 (WEA VB7)	08:03	15:19 (WEA VB6)	07:02		16:54 (WEA VB5)	06:47			19:20 (WEA VB4)	05:41		05:01	
	16:27	73	15:31 (WEA VB6)	17:23	15:50 (WEA VB6)	18:18	7	17:01 (WEA VB5)	20:15	28		19:48 (WEA VB2)	21:10		21:54	
9	08:42		13:01 (WEA VB7)	08:01	15:20 (WEA VB6)	07:00			06:45			19:19 (WEA VB4)	05:40		05:00	
	16:28	77	15:33 (WEA VB6)	17:25	15:49 (WEA VB6)	18:20			20:17	30		19:49 (WEA VB2)	21:11		21:55	
10	08:42		13:01 (WEA VB7)	07:59	15:20 (WEA VB6)	06:57			06:42			19:19 (WEA VB4)	05:38		05:00	
	16:30	80	15:35 (WEA VB6)	17:27	15:47 (WEA VB6)	18:21			20:19	32		19:51 (WEA VB2)	21:13		21:56	
11	08:41		13:02 (WEA VB7)	07:57	15:22 (WEA VB6)	06:55			06:40			19:19 (WEA VB4)	05:36		04:59	
	16:31	81	15:36 (WEA VB6)	17:29	15:45 (WEA VB6)	18:23			20:21	32		19:51 (WEA VB2)	21:15		21:57	
12	08:40		13:02 (WEA VB7)	07:55	15:25 (WEA VB6)	06:53			06:38			19:18 (WEA VB4)	05:34		04:59	
	16:33	85	15:38 (WEA VB6)	17:31	15:43 (WEA VB6)	18:25			20:22	31		19:49 (WEA VB2)	21:17		21:57	
13	08:40		13:03 (WEA VB7)	07:53	15:28 (WEA VB6)	06:50			06:35			19:18 (WEA VB4)	05:32		04:59	
	16:34	85	15:39 (WEA VB6)	17:33	15:40 (WEA VB6)	18:27			20:24	31		19:49 (WEA VB2)	21:18		21:58	
14	08:39		13:04 (WEA VB7)	07:51		06:48			06:33			19:19 (WEA VB4)	05:31		04:58	
	16:36	86	15:40 (WEA VB6)	17:35		18:29			20:26	28		19:47 (WEA VB2)	21:20		21:59	
15	08:38		13:04 (WEA VB7)	07:49		06:45			06:31			19:20 (WEA VB4)	05:29		04:58	
	16:38	88	15:42 (WEA VB6)	17:37		18:31			20:28	25		19:45 (WEA VB2)	21:22		21:59	
16	08:37		13:05 (WEA VB7)	07:47		06:43		18:01 (WEA VB3)	06:28			19:20 (WEA VB4)	05:27		04:58	
	16:39	89	15:43 (WEA VB6)	17:39		18:33	6	18:07 (WEA VB3)	20:30	18		19:38 (WEA VB4)	21:23		22:00	
17	08:36		13:06 (WEA VB7)	07:45	16:55 (WEA VB5)	06:40		17:58 (WEA VB3)	06:26			19:22 (WEA VB4)	05:26		04:58	
	16:41	90	15:44 (WEA VB6)	17:41	17:04 (WEA VB5)	18:35	10	18:08 (WEA VB3)	20:32	14		19:36 (WEA VB4)	21:25		22:00	
18	08:35		13:06 (WEA VB7)	07:43	16:52 (WEA VB5)	06:38		17:57 (WEA VB3)	06:24			19:25 (WEA VB4)	05:24		04:58	
	16:43	91	15:45 (WEA VB6)	17:43	17:07 (WEA VB5)	18:36	14	18:11 (WEA VB3)	20:33	8		19:33 (WEA VB4)	21:26		22:01	
19	08:34		13:07 (WEA VB7)	07:41	16:50 (WEA VB5)	06:36		17:56 (WEA VB3)	06:21				05:23		04:58	
	16:45	91	15:46 (WEA VB6)	17:45	17:10 (WEA VB5)	18:38	16	18:12 (WEA VB3)	20:35				21:28		22:01	
20	08:33		13:08 (WEA VB7)	07:39	16:49 (WEA VB5)	06:33		17:55 (WEA VB3)	06:19				05:21		04:58	
	16:46	91	15:47 (WEA VB6)	17:47	17:11 (WEA VB5)	18:40	19	18:14 (WEA VB3)	20:37				21:30		22:02	
21	08:31		13:09 (WEA VB7)	07:36	16:48 (WEA VB5)	06:31		17:55 (WEA VB3)	06:17				05:20		04:58	
	16:48	90	15:47 (WEA VB6)	17:49	17:13 (WEA VB5)	18:42	18	18:13 (WEA VB3)	20:39				21:31		22:02	
22	08:30		13:10 (WEA VB7)	07:34	16:46 (WEA VB5)	06:28		17:55 (WEA VB3)	06:15				05:18		04:58	
	16:50	91	15:49 (WEA VB6)	17:51	17:13 (WEA VB5)	18:44	18	18:13 (WEA VB3)	20:41				21:33		22:02	
23	08:29		13:11 (WEA VB7)	07:32	16:46 (WEA VB5)	06:26		17:55 (WEA VB3)	06:12				05:17		04:58	
	16:52	90	15:49 (WEA VB6)	17:53	17:14 (WEA VB5)	18:46	16	18:11 (WEA VB3)	20:43				21:34		22:02	
24	08:28		13:12 (WEA VB7)	07:30	16:45 (WEA VB5)	06:23		17:56 (WEA VB3)	06:10				05:15		04:59	
	16:54	89	15:50 (WEA VB6)	17:55	17:14 (WEA VB5)	18:48	15	18:11 (WEA VB3)	20:44				21:36		22:02	
25	08:26		13:13 (WEA VB7)	07:28	16:44 (WEA VB5)	06:21		17:56 (WEA VB3)	06:08				05:14		04:59	
	16:56	88	15:50 (WEA VB6)	17:57	17:14 (WEA VB5)	18:49	12	18:08 (WEA VB3)	20:46				21:37		22:02	
26	08:25		13:15 (WEA VB7)	07:25	16:44 (WEA VB5)	06:19		17:59 (WEA VB3)	06:06				05:13		05:00	
	16:57	86	15:51 (WEA VB6)	17:58	17:14 (WEA VB5)	18:51	7	18:06 (WEA VB3)	20:48				21:39		22:02	
27	08:23		13:16 (WEA VB7)	07:23	16:45 (WEA VB5)	06:16			06:04				05:12		05:00	
	16:59	85	15:51 (WEA VB6)	18:00	17:14 (WEA VB5)	18:53			20:50				21:40		22:02	
28	08:22		13:17 (WEA VB7)	07:21	16:44 (WEA VB5)	06:14			06:02				05:10		05:01	
	17:01	82	15:51 (WEA VB6)	18:02	17:13 (WEA VB5)	18:55			20:52				21:41		22:02	
29	08:20		13:18 (WEA VB7)			07:11			05:59				05:09		05:01	
	17:03	80	15:51 (WEA VB6)			19:57			20:53				21:43		22:02	
30	08:19		13:21 (WEA VB7)			07:09			05:57				05:08		05:02	
	17:05	76	15:52 (WEA VB6)			19:59			20:55				21:44		22:02	
31	08:17		13:23 (WEA VB7)			20:00							05:07			
	17:07	73	15:52 (WEA VB6)			20:06							21:45			
Sonnenscheinstunden	251			274			367			420			493		509	
astr.max.mögl.Beschattung		2487			756			323			371					

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:

M180777

Lizenzierter Anwender:

Müller-BBM Industry Solutions GmbH
Helmut-A. Müller-Straße 1-5
DE-82152 Planegg / München
0049 89 85 602 0
Felix Bergholz / Felix.Bergholz@mbbm-ind.com
Berechnet:
17.09.2024 16:15/4.0.531

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO7 - Sengwarter Chausseehaus
Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Juli		August		September		Oktober		November		Dezember	
1	05:02	05:42			06:36	19:18 (WEA VB4)	07:28		07:26	14:50 (WEA VB6)	08:21	12:44 (WEA VB7)
	22:01	21:26			20:20	32 19:50 (WEA VB2)	19:07		16:57	27 15:17 (WEA VB6)	16:13	81 15:18 (WEA VB6)
2	05:03	05:43			06:37	19:17 (WEA VB4)	07:30		07:28	14:48 (WEA VB6)	08:22	12:45 (WEA VB7)
	22:01	21:25			20:18	32 19:49 (WEA VB2)	19:05		16:55	30 15:18 (WEA VB6)	16:13	79 15:18 (WEA VB6)
3	05:04	05:45			06:39	19:17 (WEA VB4)	07:32		07:30	14:48 (WEA VB6)	08:24	12:44 (WEA VB7)
	22:01	21:23			20:16	30 19:47 (WEA VB2)	19:02		16:53	32 15:20 (WEA VB6)	16:12	77 15:16 (WEA VB6)
4	05:05	05:47			06:41	19:17 (WEA VB4)	07:34		07:32	14:47 (WEA VB6)	08:25	12:45 (WEA VB7)
	22:00	21:21			20:13	28 19:45 (WEA VB2)	19:00		16:51	33 15:20 (WEA VB6)	16:11	73 15:15 (WEA VB6)
5	05:06	05:49			06:43	19:17 (WEA VB4)	07:36		07:34	14:46 (WEA VB6)	08:26	12:45 (WEA VB7)
	22:00	21:19			20:11	26 19:43 (WEA VB2)	18:58		16:49	35 15:21 (WEA VB6)	16:11	67 15:12 (WEA VB6)
6	05:06	05:50			06:44	19:17 (WEA VB4)	07:37	17:29 (WEA VB5)	07:36	14:46 (WEA VB6)	08:28	12:46 (WEA VB7)
	21:59	21:17			20:08	23 19:40 (WEA VB2)	18:55	11 17:40 (WEA VB5)	16:48	36 15:22 (WEA VB6)	16:10	63 13:49 (WEA VB7)
7	05:07	05:52			06:46	19:18 (WEA VB4)	07:39	17:26 (WEA VB5)	07:38	14:45 (WEA VB6)	08:29	12:45 (WEA VB7)
	21:58	21:15			20:06	20 19:38 (WEA VB2)	18:53	17 17:43 (WEA VB5)	16:46	37 15:22 (WEA VB6)	16:10	64 13:49 (WEA VB7)
8	05:08	05:54			06:48	19:20 (WEA VB4)	07:41	17:23 (WEA VB5)	07:40	13:03 (WEA VB7)	08:30	12:46 (WEA VB7)
	21:58	21:13			20:04	15 19:35 (WEA VB4)	18:50	20 17:43 (WEA VB5)	16:44	53 15:22 (WEA VB6)	16:09	64 13:50 (WEA VB7)
9	05:09	05:55			06:50	19:21 (WEA VB4)	07:43	17:21 (WEA VB5)	07:41	12:59 (WEA VB7)	08:32	12:46 (WEA VB7)
	21:57	21:11			20:01	11 19:32 (WEA VB4)	18:48	23 17:44 (WEA VB5)	16:42	63 15:23 (WEA VB6)	16:09	64 13:50 (WEA VB7)
10	05:11	05:57			06:51		07:45	17:20 (WEA VB5)	07:43	12:56 (WEA VB7)	08:33	12:47 (WEA VB7)
	21:56	21:09			19:59		18:46	25 17:45 (WEA VB5)	16:40	68 15:23 (WEA VB6)	16:09	64 13:51 (WEA VB7)
11	05:12	05:59			06:53		07:46	17:19 (WEA VB5)	07:45	12:53 (WEA VB7)	08:34	12:47 (WEA VB7)
	21:55	21:07			19:56		18:43	27 17:46 (WEA VB5)	16:39	74 15:23 (WEA VB6)	16:08	64 13:51 (WEA VB7)
12	05:13	06:01			06:55		07:48	17:18 (WEA VB5)	07:47	12:52 (WEA VB7)	08:35	12:47 (WEA VB7)
	21:54	21:05			19:54		18:41	28 17:46 (WEA VB5)	16:37	76 15:23 (WEA VB6)	16:08	64 13:51 (WEA VB7)
13	05:14	06:02			06:57		07:50	17:17 (WEA VB5)	07:49	12:50 (WEA VB7)	08:36	12:48 (WEA VB7)
	21:53	21:03			19:51		18:39	30 17:47 (WEA VB5)	16:35	80 15:23 (WEA VB6)	16:08	65 13:53 (WEA VB7)
14	05:15	06:04			06:58		07:52	17:17 (WEA VB5)	07:51	12:50 (WEA VB7)	08:37	12:49 (WEA VB7)
	21:52	21:01			19:49		18:36	30 17:47 (WEA VB5)	16:34	82 15:24 (WEA VB6)	16:08	64 13:53 (WEA VB7)
15	05:16	06:06			07:00		07:54	17:17 (WEA VB5)	07:53	12:49 (WEA VB7)	08:38	12:48 (WEA VB7)
	21:51	20:59			19:46		18:34	30 17:47 (WEA VB5)	16:32	85 15:24 (WEA VB6)	16:08	65 13:53 (WEA VB7)
16	05:18	06:07			07:02		07:56	17:17 (WEA VB5)	07:55	12:48 (WEA VB7)	08:39	12:49 (WEA VB7)
	21:50	20:57			19:44		18:32	29 17:46 (WEA VB5)	16:31	86 15:24 (WEA VB6)	16:08	64 13:53 (WEA VB7)
17	05:19	06:09			07:04	18:48 (WEA VB3)	07:58	17:17 (WEA VB5)	07:57	12:47 (WEA VB7)	08:40	12:50 (WEA VB7)
	21:49	20:55			19:42	6 18:54 (WEA VB3)	18:29	29 17:46 (WEA VB5)	16:29	88 15:24 (WEA VB6)	16:08	64 13:54 (WEA VB7)
18	05:20	06:11			07:05	18:45 (WEA VB3)	07:59	17:17 (WEA VB5)	07:58	12:46 (WEA VB7)	08:41	12:50 (WEA VB7)
	21:48	20:53			19:39	11 18:56 (WEA VB3)	18:27	28 17:45 (WEA VB5)	16:28	89 15:24 (WEA VB6)	16:08	65 13:55 (WEA VB7)
19	05:22	06:13			07:07	18:42 (WEA VB3)	08:01	17:17 (WEA VB5)	08:00	12:45 (WEA VB7)	08:41	12:51 (WEA VB7)
	21:46	20:50			19:37	15 18:57 (WEA VB3)	18:25	28 17:45 (WEA VB5)	16:26	91 15:24 (WEA VB6)	16:09	64 13:55 (WEA VB7)
20	05:23	06:14			07:09	18:41 (WEA VB3)	08:03	17:18 (WEA VB5)	08:02	12:45 (WEA VB7)	08:42	12:51 (WEA VB7)
	21:45	20:48			19:34	17 18:58 (WEA VB3)	18:23	26 17:44 (WEA VB5)	16:25	91 15:24 (WEA VB6)	16:09	64 13:55 (WEA VB7)
21	05:25	06:16			07:11	18:41 (WEA VB3)	08:05	17:19 (WEA VB5)	08:04	12:45 (WEA VB7)	08:43	12:52 (WEA VB7)
	21:44	20:46			19:32	17 18:58 (WEA VB3)	18:20	24 17:43 (WEA VB5)	16:24	90 15:23 (WEA VB6)	16:10	64 13:56 (WEA VB7)
22	05:26	06:18			07:12	18:40 (WEA VB3)	08:07	17:20 (WEA VB5)	08:06	12:44 (WEA VB7)	08:43	12:52 (WEA VB7)
	21:42	20:44			19:29	18 18:58 (WEA VB3)	18:18	21 17:41 (WEA VB5)	16:22	91 15:23 (WEA VB6)	16:10	64 13:56 (WEA VB7)
23	05:28	06:20			07:14	18:39 (WEA VB3)	08:09	17:21 (WEA VB5)	08:07	12:44 (WEA VB7)	08:44	12:53 (WEA VB7)
	21:41	20:41			19:27	18 18:57 (WEA VB3)	18:16	18 17:39 (WEA VB5)	16:21	91 15:23 (WEA VB6)	16:10	64 13:57 (WEA VB7)
24	05:29	06:22			07:16	18:39 (WEA VB3)	08:11	17:23 (WEA VB5)	08:09	12:43 (WEA VB7)	08:44	12:53 (WEA VB7)
	21:40	20:39			19:24	17 18:56 (WEA VB3)	18:14	14 17:37 (WEA VB5)	16:20	91 15:22 (WEA VB6)	16:11	64 13:57 (WEA VB7)
25	05:31	06:23	19:27 (WEA VB4)		07:18	18:40 (WEA VB3)	07:13	16:27 (WEA VB5)	08:11	12:43 (WEA VB7)	08:44	12:53 (WEA VB7)
	21:38	20:37	9 19:36 (WEA VB4)		19:22	14 18:54 (WEA VB3)	17:12	6 16:33 (WEA VB5)	16:19	90 15:21 (WEA VB6)	16:12	64 13:57 (WEA VB7)
26	05:32	06:25	19:25 (WEA VB4)		07:19	18:40 (WEA VB3)	07:15		08:13	12:43 (WEA VB7)	08:45	12:53 (WEA VB7)
	21:36	20:35	14 19:39 (WEA VB4)		19:19	12 18:52 (WEA VB3)	17:09		16:18	89 15:21 (WEA VB6)	16:12	65 13:58 (WEA VB7)
27	05:34	06:27	19:22 (WEA VB4)		07:21	18:41 (WEA VB3)	07:16		08:14	12:44 (WEA VB7)	08:45	12:55 (WEA VB7)
	21:35	20:32	18 19:40 (WEA VB4)		19:17	7 18:48 (WEA VB3)	17:07		16:17	87 15:21 (WEA VB6)	16:13	64 13:59 (WEA VB7)
28	05:35	06:29	19:21 (WEA VB4)		07:23	18:43 (WEA VB3)	07:18		08:16	12:44 (WEA VB7)	08:45	12:55 (WEA VB7)
	21:33	20:30	25 19:46 (WEA VB2)		19:15	3 18:46 (WEA VB3)	17:05		16:16	87 15:21 (WEA VB6)	16:14	64 13:59 (WEA VB7)
29	05:37	06:30	19:20 (WEA VB4)		07:25		07:20	14:57 (WEA VB6)	08:17	12:44 (WEA VB7)	08:45	12:56 (WEA VB7)
	21:32	20:28	28 19:48 (WEA VB2)		19:12		17:03	13 15:10 (WEA VB6)	16:15	85 15:20 (WEA VB6)	16:15	64 14:00 (WEA VB7)
30	05:39	06:32	19:18 (WEA VB4)		07:27		07:22	14:54 (WEA VB6)	08:19	12:44 (WEA VB7)	08:45	12:56 (WEA VB7)
	21:30	20:25	31 19:49 (WEA VB2)		19:10		17:01	19 15:13 (WEA VB6)	16:14	84 15:19 (WEA VB6)	16:16	64 14:00 (WEA VB7)
31	05:40	06:34	19:18 (WEA VB4)				07:24	14:52 (WEA VB6)			08:45	12:56 (WEA VB7)
	21:28	20:23	31 19:49 (WEA VB2)				16:59	23 15:15 (WEA VB6)			16:17	64 14:00 (WEA VB7)
Sonnenscheinstunden	511	459			382		329		260		234	
astr.max.mögl.Beschattung		156			372		519		2141			2044

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)	Zeitpunkt (SS:MM) Schattenende (WEA mit letztem Schatten)

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO8 - Idschenhausen 1
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April		Mai		Juni	
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02		05:55 20:57	19:55 (WEA VB6)	05:06 21:47	20:42 (WEA VB7)
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04		05:53 20:59	19:55 (WEA VB6)	05:05 21:48	20:41 (WEA VB7)
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06		05:51 21:01	19:55 (WEA VB6)	05:04 21:49	20:41 (WEA VB7)
4	08:45 16:22	08:10 17:15	07:11 18:10	06:57 20:08		05:49 21:02	19:55 (WEA VB6)	05:04 21:50	20:41 (WEA VB7)
5	08:44 16:23	08:08 17:17	07:09 18:12	06:54 20:10		05:47 21:04	19:55 (WEA VB6)	05:03 21:51	20:41 (WEA VB7)
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11		05:45 21:06	19:55 (WEA VB6)	05:02 21:52	20:41 (WEA VB7)
7	08:43 16:26	08:05 17:21	07:04 18:16	06:49 20:13		05:43 21:08	19:56 (WEA VB6)	05:01 21:53	20:41 (WEA VB7)
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15		05:41 21:10	19:56 (WEA VB6)	05:01 21:54	20:41 (WEA VB7)
9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17		05:40 21:11	19:57 (WEA VB6)	05:00 21:55	20:42 (WEA VB7)
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19		05:38 21:13	19:58 (WEA VB6)	05:00 21:56	20:41 (WEA VB7)
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21		05:36 21:15	20:00 (WEA VB6)	04:59 21:57	20:41 (WEA VB7)
12	08:40 16:33	07:55 17:31	06:53 18:25	06:38 20:22		05:34 21:16	20:01 (WEA VB6)	04:59 21:57	20:42 (WEA VB7)
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24		05:32 21:18	20:05 (WEA VB6)	04:59 21:58	20:42 (WEA VB7)
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26		05:31 21:20	20:09 (WEA VB6)	04:58 21:59	20:42 (WEA VB7)
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28		05:29 21:22		04:58 21:59	20:42 (WEA VB7)
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30		05:27 21:23		04:58 22:00	20:42 (WEA VB7)
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32		05:26 21:25		04:58 22:00	20:42 (WEA VB7)
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33		05:24 21:26		04:58 22:01	20:42 (WEA VB7)
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35		05:23 21:28		04:58 22:01	20:43 (WEA VB7)
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37		05:21 21:30	20:51 (WEA VB7)	04:58 22:01	20:44 (WEA VB7)
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39		05:20 21:31	20:57 (WEA VB7)	04:58 22:02	20:44 (WEA VB7)
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41		05:18 21:33	20:49 (WEA VB7)	04:58 22:02	20:44 (WEA VB7)
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:42	8	05:17 21:34	20:58 (WEA VB7)	04:58 22:02	20:44 (WEA VB7)
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	20:05 (WEA VB6)	05:15 21:36	21:00 (WEA VB7)	04:58 22:02	20:45 (WEA VB7)
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	20:13 (WEA VB6)	05:14 21:37	21:02 (WEA VB7)	04:59 22:02	20:44 (WEA VB7)
26	08:25 16:57	07:25 17:58	06:18 18:51	06:06 20:48	20:02 (WEA VB6)	05:13 21:39	21:04 (WEA VB7)	05:00 22:02	20:44 (WEA VB7)
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	20:16 (WEA VB5)	05:12 21:40	20:44 (WEA VB7)	05:00 22:02	20:45 (WEA VB7)
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	20:19 (WEA VB5)	05:10 21:41	21:06 (WEA VB7)	05:01 22:02	20:45 (WEA VB7)
29	08:20 17:03		07:11 19:57	05:59 20:53	20:21 (WEA VB5)	05:09 21:43	21:07 (WEA VB7)	05:01 22:02	20:45 (WEA VB7)
30	08:19 17:05		07:09 19:59	05:57 20:55	20:24 (WEA VB5)	05:08 21:44	21:09 (WEA VB7)	05:02 22:02	20:46 (WEA VB7)
31	08:17 17:07		07:06 20:00		19:55 (WEA VB6)	05:07 21:45	20:42 (WEA VB7)	05:02 22:02	20:46 (WEA VB7)
Sonnenscheinstunden	251	274	367	419	20:25 (WEA VB5)	493	20:41 (WEA VB7)	509	1041
astr.max.mögl.Beschattung				166		512	21:11 (WEA VB7)		

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO8 - Idschenhausen 1
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Jul	August	September	Oktober	November	Dezember
1	05:02 22:01 35	20:46 (WEA VB7) 21:21 (WEA VB7) 21:26	05:42 21:26 12	20:11 (WEA VB6) 20:23 (WEA VB6) 20:20	06:36 19:07 16:57	07:28 16:13 16:13
2	05:03 22:01 35	20:46 (WEA VB7) 21:21 (WEA VB7) 21:25	05:43 21:25 16	20:09 (WEA VB6) 20:25 (WEA VB6) 20:18	06:37 19:05 16:55	07:30 16:13 16:13
3	05:04 22:00 34	20:47 (WEA VB7) 21:21 (WEA VB7) 21:23	05:45 21:23 18	20:08 (WEA VB6) 20:26 (WEA VB6) 20:16	06:39 19:02 16:53	07:32 16:11 16:12
4	05:05 22:00 35	20:46 (WEA VB7) 21:21 (WEA VB7) 21:21	05:47 21:21 20	20:07 (WEA VB6) 20:27 (WEA VB6) 20:13	06:41 19:00 16:51	07:34 16:11 16:11
5	05:06 21:59 34	20:47 (WEA VB7) 21:21 (WEA VB7) 21:19	05:48 21:19 21	20:06 (WEA VB6) 20:27 (WEA VB5) 20:11	06:43 18:57 16:49	07:35 16:49 16:11
6	05:06 21:59 34	20:47 (WEA VB7) 21:21 (WEA VB7) 21:17	05:50 21:17 25	20:05 (WEA VB6) 20:30 (WEA VB5) 20:08	06:44 18:57 16:48	07:37 16:48 16:10
7	05:07 21:58 33	20:48 (WEA VB7) 21:21 (WEA VB7) 21:15	05:52 21:15 26	20:05 (WEA VB6) 20:31 (WEA VB5) 20:06	06:46 18:53 16:46	07:39 16:46 16:10
8	05:08 21:57 33	20:48 (WEA VB7) 21:21 (WEA VB7) 21:13	05:54 21:13 27	20:04 (WEA VB6) 20:31 (WEA VB5) 20:04	06:48 18:50 16:44	07:41 16:44 16:09
9	05:09 21:57 33	20:48 (WEA VB7) 21:21 (WEA VB7) 21:11	05:55 21:11 28	20:04 (WEA VB6) 20:32 (WEA VB5) 20:01	06:50 18:48 16:42	07:43 16:42 16:09
10	05:11 21:56 32	20:49 (WEA VB7) 21:21 (WEA VB7) 21:09	05:57 21:09 29	20:03 (WEA VB6) 20:32 (WEA VB5) 19:59	06:51 18:46 16:40	07:45 16:40 16:09
11	05:12 21:55 32	20:49 (WEA VB7) 21:21 (WEA VB7) 21:07	05:59 21:07 30	20:03 (WEA VB6) 20:33 (WEA VB5) 19:56	06:53 18:43 16:39	07:46 16:39 16:08
12	05:13 21:54 30	20:50 (WEA VB7) 21:20 (WEA VB7) 21:05	06:01 21:05 29	20:04 (WEA VB6) 20:33 (WEA VB5) 19:54	06:55 18:41 16:37	07:48 16:37 16:08
13	05:14 21:53 29	20:50 (WEA VB7) 21:19 (WEA VB7) 21:03	06:02 21:03 29	20:03 (WEA VB6) 20:32 (WEA VB5) 19:51	06:57 18:39 16:35	07:50 16:35 16:08
14	05:15 21:52 28	20:50 (WEA VB7) 21:18 (WEA VB7) 21:01	06:04 21:01 27	20:04 (WEA VB6) 20:31 (WEA VB5) 19:49	06:58 18:36 16:34	07:52 16:34 16:08
15	05:16 21:51 26	20:52 (WEA VB7) 21:18 (WEA VB7) 20:59	06:06 20:59 26	20:04 (WEA VB6) 20:30 (WEA VB5) 19:46	07:00 18:34 16:32	07:54 16:32 16:08
16	05:18 21:50 24	20:52 (WEA VB7) 21:16 (WEA VB7) 20:57	06:07 20:57 23	20:04 (WEA VB6) 20:27 (WEA VB5) 19:44	07:02 18:32 16:31	07:56 16:31 16:08
17	05:19 21:49 22	20:53 (WEA VB7) 21:15 (WEA VB7) 20:55	06:09 20:55 20	20:05 (WEA VB6) 20:25 (WEA VB5) 19:42	07:04 18:29 16:29	07:57 16:29 16:08
18	05:20 21:48 21	20:53 (WEA VB7) 21:14 (WEA VB7) 20:52	06:11 20:52 17	20:06 (WEA VB6) 20:23 (WEA VB5) 19:39	07:05 18:27 16:28	07:59 16:28 16:08
19	05:22 21:46 18	20:55 (WEA VB7) 21:13 (WEA VB7) 20:50	06:13 20:50 13	20:08 (WEA VB6) 20:21 (WEA VB5) 19:37	07:07 18:25 16:26	08:00 16:26 16:09
20	05:23 21:45 16	20:56 (WEA VB7) 21:12 (WEA VB7) 20:48	06:14 20:48 6	20:11 (WEA VB6) 20:17 (WEA VB6) 19:34	07:09 18:23 16:25	08:03 16:25 16:09
21	05:25 21:44 13	20:57 (WEA VB7) 21:10 (WEA VB7) 20:46	06:16 20:46 19:32	07:11 18:20 16:24	08:05 16:24 16:10	08:04 16:10 16:10
22	05:26 21:42 11	20:59 (WEA VB7) 21:10 (WEA VB7) 20:44	06:18 20:44 19:29	07:12 18:18 16:22	08:07 16:22 16:10	08:06 16:10 16:10
23	05:28 21:41 8	21:00 (WEA VB7) 21:08 (WEA VB7) 20:41	06:20 20:41 19:27	07:14 18:16 16:21	08:09 16:21 16:10	08:07 16:10 16:10
24	05:29 21:39 2	21:04 (WEA VB7) 21:06 (WEA VB7) 20:39	06:21 20:39 19:24	07:16 18:14 16:20	08:11 16:20 16:11	08:09 16:11 16:11
25	05:31 21:38 26	06:23 20:37 19:22	06:23 20:37 19:22	07:18 18:13 16:19	08:11 16:19 16:12	08:44 16:12 16:12
26	05:32 21:36 27	06:25 20:34 19:19	06:25 20:34 19:19	07:19 18:11 16:18	08:12 16:18 16:12	08:45 16:12 16:12
27	05:34 21:35 28	06:27 20:32 19:17	06:27 20:32 19:17	07:21 18:07 16:17	08:14 16:17 16:13	08:45 16:13 16:13
28	05:35 21:33 29	06:29 20:30 19:14	06:29 20:30 19:14	07:23 18:05 16:16	08:16 16:16 16:14	08:45 16:14 16:14
29	05:37 21:32 30	06:30 20:27 19:12	06:30 20:27 19:12	07:25 18:03 16:15	08:17 16:15 16:15	08:45 16:15 16:15
30	05:39 21:30 31	06:32 20:25 19:10	06:32 20:25 19:10	07:27 18:01 16:14	08:19 16:14 16:14	08:45 16:14 16:14
31	05:40 21:28 7	20:14 (WEA VB6) 20:21 (WEA VB6) 20:23	06:34 20:23 459	07:24 16:59 382	08:45 16:17 329	08:45 16:17 260
Sonnenscheinstunden	511	459	442	382	329	234
astr.max.mögl.Beschattung	625					

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)

SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO9 - Idschenhausen 2
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung
- Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April		Mai		Juni	
1	08:45 16:18	08:15 17:09	07:18 18:04	07:04 20:02		05:55 20:57	19:49 (WEA VB6)	05:06 21:47	20:23 (WEA VB7)
2	08:45 16:19	08:14 17:11	07:16 18:06	07:01 20:04		05:53 20:59	19:50 (WEA VB6)	05:05 21:48	20:24 (WEA VB7)
3	08:45 16:20	08:12 17:13	07:14 18:08	06:59 20:06		05:51 21:01	19:52 (WEA VB6)	05:04 21:49	20:24 (WEA VB7)
4	08:45 16:22	08:10 17:15	07:11 18:10	06:57 20:08		05:49 21:02	20:01 (WEA VB6)	05:04 21:50	20:24 (WEA VB7)
5	08:44 16:23	08:08 17:17	07:09 18:12	06:54 20:10		05:47 21:04		05:03 21:51	20:25 (WEA VB7)
6	08:44 16:24	08:07 17:19	07:07 18:14	06:52 20:11		05:45 21:06		05:02 21:52	20:25 (WEA VB7)
7	08:43 16:26	08:05 17:21	07:04 18:16	06:49 20:13		05:43 21:08	20:31 (WEA VB7)	05:01 21:53	20:26 (WEA VB7)
8	08:43 16:27	08:03 17:23	07:02 18:18	06:47 20:15		05:41 21:10	20:38 (WEA VB7)	05:01 21:54	20:26 (WEA VB7)
9	08:42 16:28	08:01 17:25	07:00 18:20	06:45 20:17		05:40 21:11	20:28 (WEA VB7)	05:00 21:55	20:27 (WEA VB7)
10	08:42 16:30	07:59 17:27	06:57 18:21	06:42 20:19		05:38 21:13	20:39 (WEA VB7)	05:00 21:56	20:27 (WEA VB7)
11	08:41 16:31	07:57 17:29	06:55 18:23	06:40 20:21		05:36 21:15	20:40 (WEA VB7)	04:59 21:57	20:28 (WEA VB7)
12	08:40 16:33	07:55 17:31	06:52 18:25	06:38 20:22		05:34 21:16	20:42 (WEA VB7)	04:59 21:57	20:29 (WEA VB7)
13	08:40 16:34	07:53 17:33	06:50 18:27	06:35 20:24		05:32 21:18	20:23 (WEA VB7)	04:59 21:58	20:30 (WEA VB7)
14	08:39 16:36	07:51 17:35	06:48 18:29	06:33 20:26		05:31 21:20	20:45 (WEA VB7)	04:58 21:59	20:30 (WEA VB7)
15	08:38 16:38	07:49 17:37	06:45 18:31	06:31 20:28		05:29 21:22	20:47 (WEA VB7)	04:58 21:59	20:30 (WEA VB7)
16	08:37 16:39	07:47 17:39	06:43 18:33	06:28 20:30		05:27 21:23	20:22 (WEA VB7)	04:58 22:00	20:30 (WEA VB7)
17	08:36 16:41	07:45 17:41	06:40 18:35	06:26 20:32	9	19:55 (WEA VB6) 20:04 (WEA VB6)	20:51 (WEA VB7)	04:58 22:00	20:31 (WEA VB7)
18	08:35 16:43	07:43 17:43	06:38 18:36	06:24 20:33	12	19:53 (WEA VB6) 20:05 (WEA VB6)	20:20 (WEA VB7)	04:58 22:01	20:31 (WEA VB7)
19	08:34 16:45	07:41 17:45	06:36 18:38	06:21 20:35	16	19:51 (WEA VB6) 20:07 (WEA VB5)	20:21 (WEA VB7)	04:58 22:01	20:31 (WEA VB7)
20	08:33 16:46	07:39 17:47	06:33 18:40	06:19 20:37	19	19:49 (WEA VB6) 20:08 (WEA VB5)	20:53 (WEA VB7)	04:58 22:01	20:32 (WEA VB7)
21	08:31 16:48	07:36 17:49	06:31 18:42	06:17 20:39	22	19:48 (WEA VB6) 20:10 (WEA VB5)	20:20 (WEA VB7)	04:58 22:02	20:32 (WEA VB7)
22	08:30 16:50	07:34 17:51	06:28 18:44	06:15 20:41	25	19:47 (WEA VB6) 20:12 (WEA VB5)	20:53 (WEA VB7)	04:58 22:02	20:32 (WEA VB7)
23	08:29 16:52	07:32 17:53	06:26 18:46	06:12 20:42	27	19:47 (WEA VB6) 20:14 (WEA VB5)	20:21 (WEA VB7)	04:58 22:02	20:32 (WEA VB7)
24	08:28 16:54	07:30 17:55	06:23 18:48	06:10 20:44	29	19:47 (WEA VB6) 20:16 (WEA VB5)	20:20 (WEA VB7)	04:59 22:02	20:33 (WEA VB7)
25	08:26 16:56	07:28 17:57	06:21 18:49	06:08 20:46	31	19:46 (WEA VB6) 20:17 (WEA VB5)	20:52 (WEA VB7)	04:59 22:02	20:33 (WEA VB7)
26	08:25 16:57	07:25 17:58	06:18 18:51	06:06 20:48	30	19:46 (WEA VB6) 20:16 (WEA VB5)	20:21 (WEA VB7)	05:00 22:02	20:32 (WEA VB7)
27	08:23 16:59	07:23 18:00	06:16 18:53	06:04 20:50	29	19:47 (WEA VB6) 20:16 (WEA VB5)	20:53 (WEA VB7)	05:00 22:02	20:33 (WEA VB7)
28	08:22 17:01	07:21 18:02	06:14 18:55	06:01 20:52	28	19:47 (WEA VB6) 20:15 (WEA VB5)	20:21 (WEA VB7)	05:01 22:02	20:32 (WEA VB7)
29	08:20 17:03		07:11 19:57	05:59 20:53	27	19:47 (WEA VB6) 20:14 (WEA VB5)	20:52 (WEA VB7)	05:01 22:02	20:33 (WEA VB7)
30	08:19 17:05		07:09 19:59	05:57 20:55	25	19:48 (WEA VB6) 20:13 (WEA VB5)	20:22 (WEA VB7)	05:02 22:02	20:33 (WEA VB7)
31	08:17 17:07		07:06 20:00			05:07 21:45	20:22 (WEA VB7)		20:55 (WEA VB7)
Sonnenscheinstunden	251	274	367	419		493	20:52 (WEA VB7)	509	666
astr.max.mögl.Beschattung				329		718			

Tabellen-Layout: Die Daten für jeden Tag 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)
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SHADOW - Kalender

Berechnung: M180777_02 Gesamtbelastung Schattenrezeptor: IO9 - Idschenhausen 2
 Annahmen für Schattenwurfberechnung

Die dargestellten Zeiten sind die astronomisch maximal mögliche Beschattungsdauer, berechnet unter folgenden Annahmen:

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlung

Die Windenergieanlage/n ist/sind immer in Betrieb

Juli			August			September			Oktober			November			Dezember		
1	05:02	20:32 (WEA VB7)	05:42	20:34 (WEA VB7)	06:36	07:28	07:26	08:21									
	22:01	23	20:55 (WEA VB7)	21:26	21	20:55 (WEA VB7)	20:20	16:13									
2	05:03	20:33 (WEA VB7)	05:43	20:35 (WEA VB7)	06:37	07:30	07:28	08:22									
	22:01	23	20:56 (WEA VB7)	21:25	19	20:54 (WEA VB7)	20:18	16:13									
3	05:04	20:33 (WEA VB7)	05:45	20:36 (WEA VB7)	06:39	07:32	07:30	08:24									
	22:00	23	20:56 (WEA VB7)	21:23	15	20:51 (WEA VB7)	20:16	16:12									
4	05:05	20:32 (WEA VB7)	05:47	20:37 (WEA VB7)	06:41	07:34	07:32	08:25									
	22:00	24	20:56 (WEA VB7)	21:21	13	20:50 (WEA VB7)	20:13	16:11									
5	05:06	20:32 (WEA VB7)	05:48	20:39 (WEA VB7)	06:43	07:35	07:34	08:26									
	21:59	25	20:57 (WEA VB7)	21:19	9	20:48 (WEA VB7)	20:11	16:11									
6	05:06	20:32 (WEA VB7)	05:50	20:42 (WEA VB7)	06:44	07:37	07:36	08:28									
	21:59	25	20:57 (WEA VB7)	21:17	4	20:46 (WEA VB7)	20:08	16:10									
7	05:07	20:32 (WEA VB7)	05:52			06:46	07:39	08:29									
	21:58	26	20:58 (WEA VB7)	21:15		20:06	18:53	16:10									
8	05:08	20:32 (WEA VB7)	05:54			06:48	07:41	08:30									
	21:57	26	20:58 (WEA VB7)	21:13		20:04	18:50	16:09									
9	05:09	20:31 (WEA VB7)	05:55	20:05 (WEA VB6)	06:50	07:43	07:41	08:32									
	21:57	28	20:59 (WEA VB7)	21:11	2	20:07 (WEA VB6)	20:01	16:09									
10	05:11	20:31 (WEA VB7)	05:57	20:00 (WEA VB6)	06:51	07:45	07:43	08:33									
	21:56	28	20:59 (WEA VB7)	21:09	10	20:10 (WEA VB6)	19:59	16:09									
11	05:12	20:31 (WEA VB7)	05:59	19:58 (WEA VB6)	06:53	07:46	07:45	08:34									
	21:55	29	21:00 (WEA VB7)	21:07	15	20:13 (WEA VB6)	19:56	16:08									
12	05:13	20:31 (WEA VB7)	06:01	19:57 (WEA VB6)	06:55	07:48	07:47	08:35									
	21:54	29	21:00 (WEA VB7)	21:05	23	20:20 (WEA VB5)	19:54	16:08									
13	05:14	20:30 (WEA VB7)	06:02	19:55 (WEA VB6)	06:57	07:50	07:49	08:36									
	21:53	30	21:00 (WEA VB7)	21:03	26	20:21 (WEA VB5)	19:51	16:08									
14	05:15	20:30 (WEA VB7)	06:04	19:55 (WEA VB6)	06:58	07:52	07:51	08:37									
	21:52	31	21:01 (WEA VB7)	21:01	27	20:22 (WEA VB5)	19:49	16:08									
15	05:16	20:31 (WEA VB7)	06:06	19:54 (WEA VB6)	07:00	07:54	07:53	08:38									
	21:51	31	21:02 (WEA VB7)	20:59	29	20:23 (WEA VB5)	19:46	16:08									
16	05:18	20:31 (WEA VB7)	06:07	19:53 (WEA VB6)	07:02	07:56	07:55	08:39									
	21:50	31	21:02 (WEA VB7)	20:57	29	20:22 (WEA VB5)	19:44	16:08									
17	05:19	20:30 (WEA VB7)	06:09	19:53 (WEA VB6)	07:04	07:57	07:56	08:40									
	21:49	32	21:02 (WEA VB7)	20:55	30	20:23 (WEA VB5)	19:42	16:08									
18	05:20	20:30 (WEA VB7)	06:11	19:52 (WEA VB6)	07:05	07:59	07:58	08:41									
	21:48	32	21:02 (WEA VB7)	20:52	30	20:22 (WEA VB5)	19:39	16:08									
19	05:22	20:31 (WEA VB7)	06:13	19:52 (WEA VB6)	07:07	08:01	08:00	08:41									
	21:46	32	21:03 (WEA VB7)	20:50	29	20:21 (WEA VB5)	19:37	16:09									
20	05:23	20:30 (WEA VB7)	06:14	19:53 (WEA VB6)	07:09	08:03	08:02	08:42									
	21:45	33	21:03 (WEA VB7)	20:48	26	20:19 (WEA VB5)	19:34	16:09									
21	05:25	20:30 (WEA VB7)	06:16	19:52 (WEA VB6)	07:11	08:05	08:04	08:43									
	21:44	33	21:03 (WEA VB7)	20:46	24	20:16 (WEA VB5)	19:32	16:10									
22	05:26	20:31 (WEA VB7)	06:18	19:53 (WEA VB6)	07:12	08:07	08:06	08:43									
	21:42	32	21:03 (WEA VB7)	20:44	22	20:15 (WEA VB5)	19:29	16:10									
23	05:28	20:30 (WEA VB7)	06:20	19:54 (WEA VB6)	07:14	08:09	08:07	08:44									
	21:41	33	21:03 (WEA VB7)	20:41	19	20:13 (WEA VB5)	19:27	16:10									
24	05:29	20:30 (WEA VB7)	06:21	19:54 (WEA VB6)	07:16	08:11	08:09	08:44									
	21:39	32	21:02 (WEA VB7)	20:39	16	20:10 (WEA VB5)	19:24	16:11									
25	05:31	20:31 (WEA VB7)	06:23	19:56 (WEA VB6)	07:18	07:13	08:11	08:44									
	21:38	32	21:03 (WEA VB7)	20:37	12	20:08 (WEA VB6)	19:22	16:12									
26	05:32	20:31 (WEA VB7)	06:25	19:58 (WEA VB6)	07:19	07:14	08:12	08:45									
	21:36	31	21:02 (WEA VB7)	20:34	8	20:06 (WEA VB6)	19:19	16:12									
27	05:34	20:32 (WEA VB7)	06:27			07:21	07:16	08:45									
	21:35	31	21:03 (WEA VB7)	20:32		19:17	17:07	16:13									
28	05:35	20:32 (WEA VB7)	06:29			07:23	07:18	08:45									
	21:33	29	21:01 (WEA VB7)	20:30		19:14	17:05	16:14									
29	05:37	20:32 (WEA VB7)	06:30			07:25	07:20	08:45									
	21:32	28	21:00 (WEA VB7)	20:27		19:12	17:03	16:15									
30	05:39	20:32 (WEA VB7)	06:32			07:26	07:22	08:45									
	21:30	26	20:58 (WEA VB7)	20:25		19:10	17:01	16:16									
31	05:40	20:34 (WEA VB7)	06:34				07:24	08:45									
	21:28	23	20:57 (WEA VB7)	20:23			16:59	16:17									
Sonnenscheinstunden		511	459	458	382	329	260	234									
astr.max.mögl.Beschattung		891															

Tabellen-Layout: Die Daten für jeden Tag 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) Schattenende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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