



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

Bericht Nr.: I17-SCHATTEN-2015-18 Rev.01

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

Bericht-Nr. I17-SCHATTEN-2015-18 Rev.01

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Haftungsausschluss

Die vorliegende Revision 01 des Schattenwurfimmissionsgutachtens für den Standort Miltzow wurde von der Altenhagen Wind GmbH & Co. KG im September 2015 bei der I17-Wind GmbH & Co. KG in Auftrag gegeben. Das Schattenwurfgutachten wurde nach bestem Wissen und Gewissen unparteiisch und nach dem gegenwärtigen Stand von Wissenschaft und Technik erstellt. Für die Daten, die nicht von der I17-Wind GmbH & Co. KG gemessen, erhoben und verarbeitet wurden, kann keine Garantie übernommen werden. Eine auszugsweise Vervielfältigung dieses Berichtes ist nur mit ausdrücklicher Zustimmung der I17-Wind GmbH & Co. KG erlaubt.

Für die physikalische Einhaltung der prognostizierten Werte an den Immissionsorten können seitens des Gutachters keine Garantien übernommen werden. Die Ergebnisse basieren auf vom Auftraggeber und Anlagenhersteller zur Verfügung gestellten Angaben zum Standort und der Windenergieanlagen.

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0	05.06.2015	Erstellung des Gutachtens	Gefke
1	09.10.2015	Änderung der Vorbelastung	Gefke

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1 Aufgabenstellung

Der Auftraggeber plant die Errichtung von drei Vestas V112-3.3/3.45MW mit einer Nabenhöhe von 119 m im Windpark Miltzow. Der Windpark liegt ca. 15 km südöstlich der Stadt Stralsund in der Gemeinde Sundhagen in Mecklenburg-Vorpommern.

Eine WEA mit einer Gesamthöhe von mehr als 50 m stellt nach der 4. Bundes-Immissionsschutzverordnung eine genehmigungsbedürftige Anlage dar, welche das Genehmigungsverfahren nach dem Bundes-Immissionsschutzgesetz (BImSchG) [2] zu durchlaufen hat.

Für das Genehmigungsverfahren nach dem BImSchG [2] ist der Nachweis der Einhaltung der Empfehlungswerte für die Schattenwurfimmissionen zu führen. Die Berechnungen sollen Auskunft darüber geben, ob schädliche Umwelteinwirkungen durch Schattenwurf von den geplanten Anlagen ausgehen können.

Am Standort befinden sich bereits Windenergieanlagen in Betrieb, welche im vorliegenden Schattenwurfgutachten als Vorbelastung Berücksichtigung finden.

2 Örtliche Beschreibung

Der Windpark Miltzow befindet sich in der Gemeinde Sundhagen in einem Gebiet nördlich der Ortschaft Wilmshagen und westlich der Ortschaft Miltzow. Der Windpark wird durch die Bundesstraße B96n geteilt, wobei sich ein Großteil der Anlagen östlich der Bundesstraße befindet. Direkt südlich des Windparks schließt sich der Windpark Miltzow-Mannhagen an. In der Umgebung des Windparks erstrecken sich vereinzelte Höfe und dörfliche Siedlungen. Das Gelände um die Windenergieanlagenstandorte variiert in der Höhe von 10 bis 30m über NN.

Für die Koordinatenangaben in diesem Gutachten findet das System UTM ETRS 89 Zone 33 Anwendung. Die Windenergieanlagenpositionen sind in der nachfolgenden Abbildung 2.1 dargestellt.

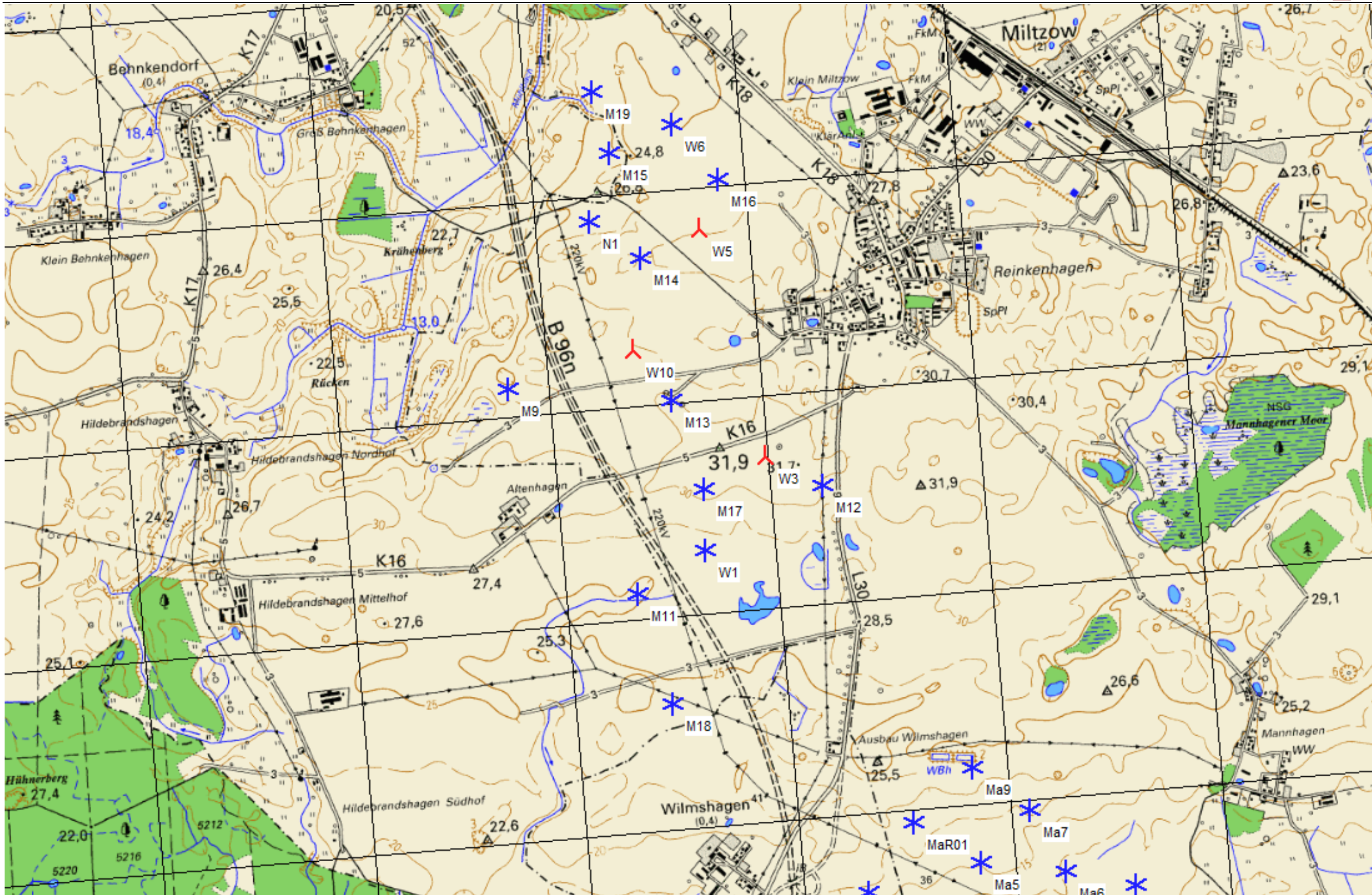


Abbildung 2.1: WEA Standorte
 Blaue Sterne: Bestandsanlagen bzw. im Genehmigungsverfahren befindliche WEA; Rote(s) Kreuz(e): Neu geplante WEA; Kartenmaterial [3]

3 Beurteilungsgrundlagen

3.1 Berechnungs- und Beurteilungsverfahren

Die hier zu untersuchenden Immissionen durch direkten Schattenwurf des Rotors können bei drehendem Rotor störend wirken. Aus der Anzahl der Rotorblätter und der Drehzahl des Rotors ergibt sich die jeweilige Frequenz mit der wechselnde Lichtverhältnisse im Schattenbereich auftreten können. Bei den gegenwärtigen Anlagengrößen handelt es sich um niedrige Frequenzen im Bereich von ca. 0,5 bis 3 Hz. Die Bund-Länder-Arbeitsgemeinschaft für Immissionsschutz (LAI) [1] hat die federführend vom staatlichen Umweltamt Schleswig unter Mitarbeit von Fachleuten, Gutachtern, Gewerbeaufsichtsdirektoren und Weiteren erarbeiteten *Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen (WEA-Schattenwurf-Hinweise)* [1] im Jahr 2002 als Standard anerkannt. Die WEA-Schattenwurf-Hinweise enthalten folgende Anhaltswerte:

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

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

- Es herrscht durchgehender Sonnenschein von Sonnenaufgang bis Sonnenuntergang.
- Die Sonnenstrahlung steht senkrecht zur Rotorkreisfläche.
- Die WEA befindet sich permanent in Betrieb.

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

4 Beschreibung der geplanten Windenergieanlagen

4.1 Anlagenbeschreibung

Der Auftraggeber plant am Standort Miltzow die Errichtung und den Betrieb von drei Windenergieanlagen des Herstellers Vestas vom Typ V112-3.3/3.45 MW. Nachfolgend werden die Eckdaten und die Koordinaten der berücksichtigten Windenergieanlagen zusammengefasst.

Hersteller:	Vestas
Anlagentyp:	V112-3.3/3.45 MW
Nabenhöhe:	119 m
Rotordurchmesser:	112 m
Nennleistung:	3.300 kW bzw. 3.450 kW
Drehzahlbereich:	6.2 – 17.7 U/min
Maximale Blatttiefe:	4.00 m
Blatttiefe bei 90% Radius:	1.03 m

4.2 Position der geplanten Windenergieanlagen

Tabelle 4.1 sind die Positionen [4] und der Anlagentyp mit Nabenhöhe der geplanten Windenergieanlagen am Standort Miltzow zu entnehmen.

Nr.	Typ	Bez.	Rotor-durchmesser [m]	Nabenhöhe [m]	Koordinaten UTM ETRS 89 Zone 33 Ost	Koordinaten UTM ETRS 89 Zone 33 Nord	Höhe über NN [m]
1	V112-3.3/3.45MW	W3	112	119	3380987	6005709	27
2	V112-3.3/3.45MW	W5	112	119	3380771	6006801	25
3	V112-3.3/3.45MW	W10	112	119	3380408	6006259	26

Tabelle 4.1: Positionen der geplanten WEA

4.3 Vorbelastung

Am Standort Miltzow sind derzeit 27 Windenergieanlagen in Betrieb, genehmigt oder geplant, welche als Vorbelastung berücksichtigt werden müssen. In Tabelle 4.2 sind die Windenergieanlagen mit Typ, Nabenhöhe und Position aufgeführt.

Nr.	Typ	Bez.	Rotor-durch-messer [m]	Naben-höhe [m]	Koordinaten UTM ETRS 89 Zone 33 Ost	Koordinaten UTM ETRS 89 Zone 33 Nord	Höhe über NN [m]
1	V80-2.0MW	Ma3	80	78	3381716	6003135	10
2	V80-2.0MW	Ma4	80	78	3381825	6002839	10
3	V80-2.0MW	Ma5	80	78	3381841	6003718	13
4	V80-2.0MW	Ma6	80	78	3382234	6003642	10
5	V80-2.0MW	Ma7	80	78	3382091	6003945	16
6	V80-2.0MW	Ma8	80	78	3382555	6003551	10
7	V90-2.0MW	Ma9	90	105	3381835	6004165	20
8	GE_1.5sl	Ma10	77	100	3381393	6003081	10
9	V112-3.0MW	Ma11	112	94	3381906	6003313	10
10	V112-3.0MW	Ma12	112	119	3382068	6003040	10
11	V112-3.0MW	Ma13	112	119	3382362	6003062	10
12	V112-3.0MW	MaR1	112	140	3381539	6003932	18
13	V112-3.0MW	MaR2	112	140	3381628	6003435	10
14	V126-3.3MW	MaW1	126	137	3381299	6003623	14
15	V90-2.0MW	N1	90	105	3380256	6006880	22
16	V90-2.0MW	M13	90	105	3380570	6006010	30
17	V90-2.0MW	M14	90	105	3380480	6006690	24
18	V90-2.0MW	M15	90	105	3380381	6007196	22
19	V90-2.0MW	M16	90	105	3380876	6007030	25
20	V90-2.0MW	M17	90	105	3380692	6005580	27
21	V90-2.0MW	M18	90	105	3380456	6004584	21
22	V90-2.0MW	M19	90	105	3380322	6007487	20
23	V112-3.3MW	M9	112	119	3379812	6006127	23
24	V112-3.3MW	M11	112	119	3380338	6005115	26
25	V112-3.3MW	M12	112	94	3381244	6005548	25
26	V112-3.3/3.45MW	W1	112	140	3380673	6005294	25
27	V112-3.3/3.45MW	W6	112	119	3380681	6007305	23

Tabelle 4.2: Positionen der Bestandsanlagen am Standort

5 Einwirkungsbereiche der Windenergieanlage und Immissionspunkte

Als Immissionsorte für die Schattenwurfprognose wurden die nächstgelegenen Gebäude berücksichtigt. Die Auswahl der Immissionsorte wurde anhand einer Standortbesichtigung vom 10.02.2014, sowie der vorliegenden Dokumentation vorgenommen. Bei der Standortbesichtigung wurde die bestehende Wohnbebauung mit Angaben aus dem Kartenmaterial abgeglichen und Abweichungen dokumentiert und korrigiert. Laut den WEA-Schattenwurf-Hinweisen des Länderausschusses für Immissionsschutz (LAI) [1] sind maßgebliche Immissionsorte u.a.:

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

Die nächstgelegene Bebauung, welche diese Kriterien erfüllt, ist die Ortschaft Miltzow-Reinkenhagen östlich der geplanten Anlagen (siehe Abbildung 5.1). Im Anschluss wurden nur die Immissionsorte berücksichtigt, die innerhalb oder nahe am Rande der Schattenwurf-Isolinie liegen (Siehe Tabelle 5.1).

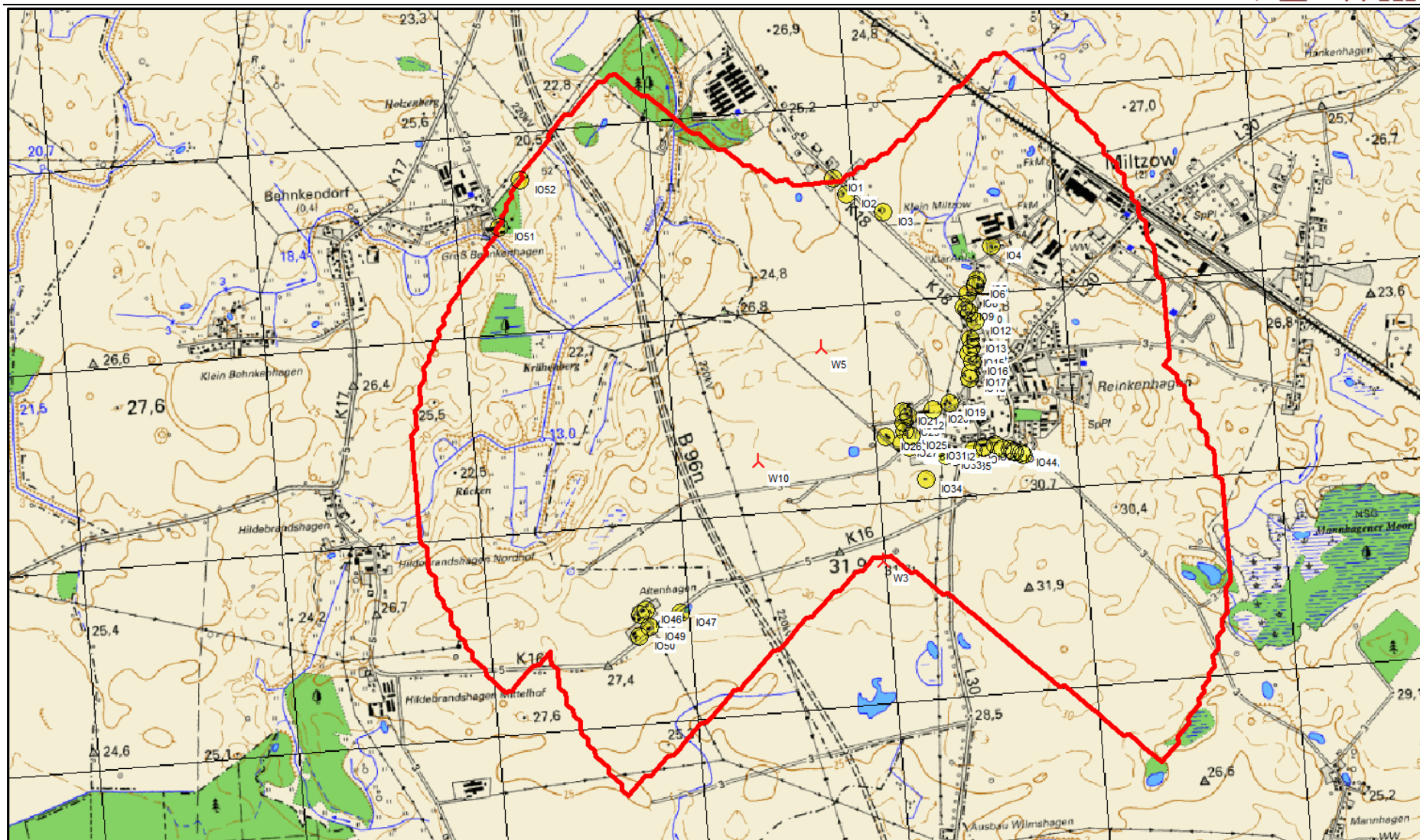


Abbildung 5.1: Einwirkungsbereich der geplanten WEA

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

Nr.	Immissionspunkte	Koordinaten UTM ETRS 89 Zone 33 Ost	Koordinaten UTM ETRS 89 Zone 33 Nord	Höhe über NN [m]
IO1	Landstr. 19, Engelswacht	3380904	6007636	23
IO2	Landstr. 21, Engelswacht	3380963	6007554	23
IO3	Landstr. 1, Engelswacht,	3381135	6007447	25
IO4	Kleine Straße 12, Reinkenhagen	3381661	6007235	25
IO5	An den Weiden 8, Miltzow	3381578	6007071	27
IO6	An den Weiden 9, Miltzow	3381566	6007047	27
IO7	An den Weiden 11, Miltzow	3381565	6007037	27
IO8	An den Weiden 1, Reinkenhagen,	3381522	6007003	28
IO9	Engelswachter Straße 12, Reinkenhagen	3381499	6006942	29
IO10	Engelswachter Str. 11, Reinkenhagen	3381513	6006925	29
IO11	Engelswachter Str. 10, Reinkenhagen	3381522	6006908	29
IO12	Engelswachter Str. 9, Reinkenhagen	3381550	6006865	29
IO13	Engelswachter Str. 8, Reinkenhagen	3381516	6006778	29
IO14	Engelswachter Str. 5, Reinkenhagen	3381521	6006735	30
IO15	Engelswachter Str. 4a, Reinkenhagen	3381503	6006710	30
IO16	Engelswachter Str. 3, Reinkenhagen	3381516	6006664	30
IO17	Schwarzer Weg 6b, Reinkenhagen	3381503	6006607	30
IO18	Schwarzer Weg 6a, Reinkenhagen	3381497	6006580	30
IO19	Schreberweg 15, Reinkenhagen	3381386	6006466	30
IO20	Schreberweg 11, Reinkenhagen	3381300	6006440	30
IO21	Sondenweg 10, Reinkenhagen	3381149	6006445	29
IO22	Sondenweg 9, Reinkenhagen	3381174	6006421	30
IO23	Sondenweg 4, Reinkenhagen	3381148	6006387	30
IO24	Sondenweg 2, Reinkenhagen	3381150	6006347	30
IO25	Sondenweg 1, Reinkenhagen	3381180	6006320	30
IO26	Alte Dorfstr. 10, Reinkenhagen	3381056	6006325	30
IO27	Alte Dorfstr. 12, Reinkenhagen	3381130	6006285	30
IO28	Alte Dorfstr. 11, Reinkenhagen	3381166	6006263	30
IO29	Alte Dorfstr. 9, Reinkenhagen	3381223	6006257	29
IO30	Alte Dorfstr. 7a - 8, Reinkenhagen	3381249	6006258	29
IO31	Alte Dorfstr. 6, Reinkenhagen	3381275	6006259	29
IO32	Alte Dorfstr. 5, Reinkenhagen	3381318	6006250	29
IO33	Alte Dorfstr. 4, Reinkenhagen	3381348	6006206	29
IO34	Hauptstr. 1, Reinkenhagen	3381237	6006098	28
IO35	Hauptstr. 2, Reinkenhagen	3381392	6006197	28
IO36	Hauptstr. 59, Reinkenhagen	3381483	6006225	28
IO37	Hauptstr. 58, Reinkenhagen	3381534	6006232	29
IO38	Hauptstr. 57, Reinkenhagen	3381543	6006233	29
IO39	Hauptstr. 56, Reinkenhagen	3381596	6006242	29
IO40	Hauptstr. 55a, Reinkenhagen	3381632	6006222	29
IO41	Reinkenhagen, Mannhäger Straße 9	3381666	6006214	29
IO42	Reinkenhagen, Mannhäger Straße 8	3381682	6006201	29
IO43	Reinkenhagen, Mannhäger Straße 5	3381690	6006198	29
IO44	Reinkenhagen, Mannhäger Straße 4	3381722	6006191	29
IO45	Reinkenhagen, Mannhäger Straße 3	3381731	6006181	29
IO46	Altenhagen 4	3379788	6005568	30
IO47	Altenhagen 3	3379957	6005538	30
IO48	Altenhagen 6	3379757	6005543	30
IO49	Altenhagen 2	3379799	6005479	30
IO50	Altenhagen 1	3379744	6005439	30
IO51	Gutshaus Groß Behnkenhagen	3379216	6007536	20
IO52	Dorfstr. 21, Groß Behnkenhagen	3379339	6007763	20

Tabelle 5.1: Immissionsorte

6 Rechenergebnisse und Beurteilungen

In den nachfolgenden Tabellen sind die Ergebnisse der Analysen sowohl für die Vorbelastung als auch Zusatz- und Gesamtbelastung der im Einwirkungsbereich befindlichen Immissionsorte dargestellt. Überschreitungen der Grenzwerte sind **fett** gekennzeichnet. Im Anhang befinden sich die Ausdrücke der Berechnung der Vor-, Zusatz- und Gesamtbelastung.

Vorbelastung					
Nr.	Immissionspunkte	Astron. max. mögl. Beschattungsdauer			Meteorologisch wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std / Jahr	Anzahl der Tage mit Schatten pro Jahr	Max. Schattendauer, in Std/ Tag	Std. / Jahr
IO1	Landstr. 19, Engelswacht	157:52	186	01:34	22:05
IO2	Landstr. 21, Engelswacht	160:26	209	01:33	25:10
IO3	Landstr. 1, Engelswacht,	149:55	210	01:03	23:36
IO4	Kleine Straße 12, Reinkenhagen	35:34	116	00:37	07:56
IO5	An den Weiden 8, Miltzow	56:12	188	00:41	12:16
IO6	An den Weiden 9, Miltzow	57:28	182	00:44	12:52
IO7	An den Weiden 11, Miltzow	57:25	179	00:44	13:00
IO8	An den Weiden 1, Reinkenhagen,	65:05	196	00:49	15:10
IO9	Engelswachter Straße 12, Reinkenhagen	71:56	205	00:51	17:21
IO10	Engelswachter Str. 11, Reinkenhagen	69:06	199	00:48	16:47
IO11	Engelswachter Str. 10, Reinkenhagen	67:38	195	00:45	16:30
IO12	Engelswachter Str. 9, Reinkenhagen	64:03	195	00:38	15:43
IO13	Engelswachter Str. 8, Reinkenhagen	76:10	197	00:45	18:58
IO14	Engelswachter Str. 5, Reinkenhagen	78:30	198	00:48	19:25
IO15	Engelswachter Str. 4a, Reinkenhagen	83:18	200	00:52	20:24
IO16	Engelswachter Str. 3, Reinkenhagen	77:56	207	00:50	18:21
IO17	Schwarzer Weg 6b, Reinkenhagen	61:35	200	00:40	13:34
IO18	Schwarzer Weg 6a, Reinkenhagen	54:23	192	00:32	11:16
IO19	Schreberweg 15, Reinkenhagen	58:51	198	00:33	11:17
IO20	Schreberweg 11, Reinkenhagen	50:00	172	00:40	09:55
IO21	Sondenweg 10, Reinkenhagen	56:07	134	00:51	13:11
IO22	Sondenweg 9, Reinkenhagen	57:43	149	00:48	12:58
IO23	Sondenweg 4, Reinkenhagen	68:50	167	00:47	15:25
IO24	Sondenweg 2, Reinkenhagen	83:45	194	00:43	18:17
IO25	Sondenweg 1, Reinkenhagen	88:31	199	00:42	17:57
IO26	Alte Dorfstr. 10, Reinkenhagen	73:30	165	00:42	15:31
IO27	Alte Dorfstr. 12, Reinkenhagen	86:30	183	00:47	16:34
IO28	Alte Dorfstr. 11, Reinkenhagen	92:36	192	00:50	16:57
IO29	Alte Dorfstr. 9, Reinkenhagen	97:09	204	00:47	17:47
IO30	Alte Dorfstr. 7a - 8, Reinkenhagen	95:14	209	00:45	17:21
IO31	Alte Dorfstr. 6, Reinkenhagen	88:33	204	00:44	15:33
IO32	Alte Dorfstr. 5, Reinkenhagen	84:59	189	00:45	14:12
IO33	Alte Dorfstr. 4, Reinkenhagen	89:39	198	00:47	14:39

IO34	Hauptstr. 1, Reinkenhagen	<u>119:39</u>	174	<u>01:24</u>	<u>15:18</u>
IO35	Hauptstr. 2, Reinkenhagen	<u>86:03</u>	189	<u>00:47</u>	<u>13:35</u>
IO36	Hauptstr. 59, Reinkenhagen	<u>71:29</u>	180	<u>00:40</u>	<u>11:04</u>
IO37	Hauptstr. 58, Reinkenhagen	<u>63:31</u>	180	<u>00:39</u>	<u>09:40</u>
IO38	Hauptstr. 57, Reinkenhagen	<u>62:15</u>	164	<u>00:38</u>	<u>09:23</u>
IO39	Hauptstr. 56, Reinkenhagen	<u>59:36</u>	162	<u>00:37</u>	<u>08:46</u>
IO40	Hauptstr. 55a, Reinkenhagen	<u>59:26</u>	160	<u>00:35</u>	<u>08:02</u>
IO41	Reinkenhagen, Mannhäger Straße 9	<u>56:34</u>	161	<u>00:35</u>	07:37
IO42	Reinkenhagen, Mannhäger Straße 8	<u>58:49</u>	161	<u>00:36</u>	07:52
IO43	Reinkenhagen, Mannhäger Straße 5	<u>59:19</u>	163	<u>00:36</u>	07:55
IO44	Reinkenhagen, Mannhäger Straße 4	<u>60:14</u>	163	<u>00:37</u>	07:58
IO45	Reinkenhagen, Mannhäger Straße 3	<u>61:36</u>	164	<u>00:38</u>	<u>08:10</u>
IO46	Altenhagen 4	<u>80:16</u>	229	<u>00:37</u>	<u>15:33</u>
IO47	Altenhagen 3	<u>79:41</u>	170	<u>00:46</u>	<u>13:29</u>
IO48	Altenhagen 6	<u>80:17</u>	234	<u>00:36</u>	<u>15:26</u>
IO49	Altenhagen 2	<u>75:05</u>	215	<u>00:40</u>	<u>13:19</u>
IO50	Altenhagen 1	<u>71:20</u>	223	<u>00:38</u>	<u>13:00</u>
IO51	Gutshaus Groß Behnkenhagen	20:44	90	00:19	04:00
IO52	Dorfstr. 21, Groß Behnkenhagen	23:38	95	00:24	03:38

Tabelle 6.1: Analyseergebnisse Vorbelastung

Zusatzbelastung					
Nr.	Immissionspunkte	Astron. max. mögl. Beschattungsdauer			Meteorologisch wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std/ Jahr	Anzahl der Tage mit Schatten pro Jahr	Max. Schattendauer, in Std/ Tag	Std. / Jahr
IO1	Landstr. 19, Engelswacht	00:00	0	00:00	00:00
IO2	Landstr. 21, Engelswacht	12:24	36	00:27	01:01
IO3	Landstr. 1, Engelswacht,	<u>40:29</u>	74	<u>00:37</u>	04:09
IO4	Kleine Straße 12, Reinkenhagen	17:48	64	00:26	03:03
IO5	An den Weiden 8, Miltzow	21:43	68	00:30	04:08
IO6	An den Weiden 9, Miltzow	22:30	69	<u>00:31</u>	04:22
IO7	An den Weiden 11, Miltzow	22:38	68	<u>00:31</u>	04:26
IO8	An den Weiden 1, Reinkenhagen,	25:04	71	<u>00:33</u>	05:00
IO9	Engelswachter Straße 12, Reinkenhagen	27:17	74	<u>00:34</u>	05:44
IO10	Engelswachter Str. 11, Reinkenhagen	26:38	73	<u>00:34</u>	05:41
IO11	Engelswachter Str. 10, Reinkenhagen	26:09	73	<u>00:34</u>	05:41
IO12	Engelswachter Str. 9, Reinkenhagen	24:50	70	<u>00:33</u>	05:35
IO13	Engelswachter Str. 8, Reinkenhagen	28:17	75	<u>00:34</u>	06:53
IO14	Engelswachter Str. 5, Reinkenhagen	28:33	75	<u>00:34</u>	07:08
IO15	Engelswachter Str. 4a, Reinkenhagen	<u>30:41</u>	80	<u>00:35</u>	07:46
IO16	Engelswachter Str. 3, Reinkenhagen	<u>36:39</u>	107	<u>00:34</u>	<u>08:23</u>
IO17	Schwarzer Weg 6b, Reinkenhagen	<u>45:23</u>	123	<u>00:35</u>	<u>09:55</u>
IO18	Schwarzer Weg 6a, Reinkenhagen	<u>50:07</u>	132	<u>00:35</u>	<u>10:50</u>
IO19	Schreberweg 15, Reinkenhagen	<u>78:42</u>	164	<u>00:40</u>	<u>16:59</u>
IO20	Schreberweg 11, Reinkenhagen	<u>52:12</u>	125	<u>00:32</u>	<u>09:35</u>

IO21	Sondenweg 10, Reinkenhagen	29:12	74	<u>00:34</u>	04:51
IO22	Sondenweg 9, Reinkenhagen	<u>33:44</u>	81	<u>00:33</u>	05:09
IO23	Sondenweg 4, Reinkenhagen	<u>40:44</u>	90	<u>00:34</u>	06:04
IO24	Sondenweg 2, Reinkenhagen	<u>49:48</u>	99	<u>00:40</u>	07:05
IO25	Sondenweg 1, Reinkenhagen	<u>56:22</u>	107	<u>00:43</u>	07:46
IO26	Alte Dorfstr. 10, Reinkenhagen	<u>57:57</u>	106	<u>00:42</u>	<u>08:53</u>
IO27	Alte Dorfstr. 12, Reinkenhagen	<u>66:04</u>	114	<u>00:47</u>	<u>09:14</u>
IO28	Alte Dorfstr. 11, Reinkenhagen	<u>71:46</u>	120	<u>00:48</u>	<u>09:48</u>
IO29	Alte Dorfstr. 9, Reinkenhagen	<u>72:30</u>	124	<u>00:46</u>	<u>09:49</u>
IO30	Alte Dorfstr. 7a - 8, Reinkenhagen	<u>71:35</u>	124	<u>00:45</u>	<u>09:39</u>
IO31	Alte Dorfstr. 6, Reinkenhagen	<u>70:27</u>	124	<u>00:44</u>	<u>09:28</u>
IO32	Alte Dorfstr. 5, Reinkenhagen	<u>70:19</u>	130	<u>00:43</u>	<u>09:33</u>
IO33	Alte Dorfstr. 4, Reinkenhagen	<u>70:39</u>	140	<u>00:44</u>	<u>10:08</u>
IO34	Hauptstr. 1, Reinkenhagen	<u>98:14</u>	168	<u>00:57</u>	<u>15:33</u>
IO35	Hauptstr. 2, Reinkenhagen	<u>56:11</u>	120	<u>00:42</u>	<u>08:47</u>
IO36	Hauptstr. 59, Reinkenhagen	<u>41:55</u>	100	<u>00:37</u>	06:44
IO37	Hauptstr. 58, Reinkenhagen	<u>48:08</u>	130	<u>00:35</u>	<u>09:10</u>
IO38	Hauptstr. 57, Reinkenhagen	<u>48:57</u>	132	<u>00:34</u>	<u>09:31</u>
IO39	Hauptstr. 56, Reinkenhagen	<u>52:57</u>	139	<u>00:33</u>	<u>11:17</u>
IO40	Hauptstr. 55a, Reinkenhagen	<u>50:46</u>	136	<u>00:32</u>	<u>11:15</u>
IO41	Reinkenhagen, Mannhäger Straße 9	<u>50:12</u>	136	<u>00:31</u>	<u>11:28</u>
IO42	Reinkenhagen, Mannhäger Straße 8	<u>48:50</u>	136	<u>00:31</u>	<u>11:17</u>
IO43	Reinkenhagen, Mannhäger Straße 5	<u>48:25</u>	134	<u>00:31</u>	<u>11:15</u>
IO44	Reinkenhagen, Mannhäger Straße 4	<u>47:23</u>	137	00:30	<u>11:13</u>
IO45	Reinkenhagen, Mannhäger Straße 3	<u>46:16</u>	134	00:30	<u>11:00</u>
IO46	Altenhagen 4	08:00	28	00:22	02:14
IO47	Altenhagen 3	11:34	35	00:25	03:20
IO48	Altenhagen 6	07:43	29	00:21	02:11
IO49	Altenhagen 2	08:40	32	00:22	02:30
IO50	Altenhagen 1	07:48	30	00:20	02:14
IO51	Gutshaus Groß Behnkenhagen	00:00	0	00:00	00:00
IO52	Dorfstr. 21, Groß Behnkenhagen	00:00	0	00:00	00:00

Tabelle 6.2: Analyseergebnisse Zusatzbelastung

Gesamtbelastung					
Nr.	Immissionspunkte	Astron. max. mögl. Beschattungsdauer			Meteorologisch wahrscheinliche Beschattungsdauer
		Gesamtdauer in Std/ Jahr	Anzahl der Tage mit Schatten pro Jahr	Max. Schattendauer, in Std/ Tag	Std. / Jahr
IO1	Landstr. 19, Engelswacht	<u>157:52</u>	186	<u>01:34</u>	<u>22:11</u>
IO2	Landstr. 21, Engelswacht	<u>168:10</u>	209	<u>01:33</u>	<u>25:52</u>
IO3	Landstr. 1, Engelswacht,	<u>157:30</u>	210	<u>01:06</u>	<u>24:23</u>
IO4	Kleine Straße 12, Reinkenhagen	<u>50:28</u>	155	<u>00:37</u>	<u>10:23</u>
IO5	An den Weiden 8, Miltzow	<u>74:12</u>	226	<u>00:41</u>	<u>15:36</u>
IO6	An den Weiden 9, Miltzow	<u>76:20</u>	220	<u>00:44</u>	<u>16:25</u>
IO7	An den Weiden 11, Miltzow	<u>76:33</u>	215	<u>00:44</u>	<u>16:39</u>
IO8	An den Weiden 1, Reinkenhagen,	<u>86:39</u>	233	<u>00:49</u>	<u>19:23</u>
IO9	Engelswachter Straße 12, Reinkenhagen	<u>96:41</u>	246	<u>00:51</u>	<u>22:28</u>
IO10	Engelswachter Str. 11, Reinkenhagen	<u>93:36</u>	241	<u>00:50</u>	<u>21:54</u>
IO11	Engelswachter Str. 10, Reinkenhagen	<u>92:09</u>	239	<u>00:49</u>	<u>21:43</u>
IO12	Engelswachter Str. 9, Reinkenhagen	<u>88:11</u>	238	<u>00:48</u>	<u>21:03</u>
IO13	Engelswachter Str. 8, Reinkenhagen	<u>103:34</u>	250	<u>00:45</u>	<u>25:29</u>
IO14	Engelswachter Str. 5, Reinkenhagen	<u>105:24</u>	253	<u>00:48</u>	<u>25:58</u>
IO15	Engelswachter Str. 4a, Reinkenhagen	<u>111:57</u>	260	<u>00:52</u>	<u>27:27</u>
IO16	Engelswachter Str. 3, Reinkenhagen	<u>112:28</u>	265	<u>00:50</u>	<u>25:57</u>
IO17	Schwarzer Weg 6b, Reinkenhagen	<u>105:43</u>	260	<u>00:40</u>	<u>22:48</u>
IO18	Schwarzer Weg 6a, Reinkenhagen	<u>102:54</u>	253	<u>00:46</u>	<u>21:25</u>
IO19	Schreberweg 15, Reinkenhagen	<u>133:41</u>	244	<u>01:00</u>	<u>26:58</u>
IO20	Schreberweg 11, Reinkenhagen	<u>99:23</u>	215	<u>00:57</u>	<u>18:34</u>
IO21	Sondenweg 10, Reinkenhagen	<u>82:24</u>	182	<u>00:51</u>	<u>17:19</u>
IO22	Sondenweg 9, Reinkenhagen	<u>88:27</u>	187	<u>00:48</u>	<u>17:20</u>
IO23	Sondenweg 4, Reinkenhagen	<u>106:44</u>	213	<u>00:52</u>	<u>20:40</u>
IO24	Sondenweg 2, Reinkenhagen	<u>131:38</u>	241	<u>01:03</u>	<u>24:40</u>
IO25	Sondenweg 1, Reinkenhagen	<u>143:46</u>	247	<u>01:25</u>	<u>25:11</u>
IO26	Alte Dorfstr. 10, Reinkenhagen	<u>129:51</u>	231	<u>01:02</u>	<u>23:43</u>
IO27	Alte Dorfstr. 12, Reinkenhagen	<u>152:21</u>	242	<u>01:34</u>	<u>25:21</u>
IO28	Alte Dorfstr. 11, Reinkenhagen	<u>164:22</u>	248	<u>01:38</u>	<u>26:22</u>
IO29	Alte Dorfstr. 9, Reinkenhagen	<u>168:40</u>	256	<u>01:30</u>	<u>27:11</u>
IO30	Alte Dorfstr. 7a - 8, Reinkenhagen	<u>162:54</u>	260	<u>01:23</u>	<u>26:19</u>
IO31	Alte Dorfstr. 6, Reinkenhagen	<u>151:58</u>	253	<u>01:17</u>	<u>24:05</u>
IO32	Alte Dorfstr. 5, Reinkenhagen	<u>142:02</u>	237	<u>01:10</u>	<u>22:11</u>
IO33	Alte Dorfstr. 4, Reinkenhagen	<u>141:36</u>	247	<u>01:08</u>	<u>22:34</u>
IO34	Hauptstr. 1, Reinkenhagen	<u>205:42</u>	240	<u>01:42</u>	<u>28:56</u>
IO35	Hauptstr. 2, Reinkenhagen	<u>128:35</u>	237	<u>01:06</u>	<u>20:34</u>
IO36	Hauptstr. 59, Reinkenhagen	<u>104:43</u>	223	<u>00:58</u>	<u>16:33</u>
IO37	Hauptstr. 58, Reinkenhagen	<u>105:05</u>	243	<u>00:56</u>	<u>17:42</u>
IO38	Hauptstr. 57, Reinkenhagen	<u>104:59</u>	248	<u>00:54</u>	<u>17:48</u>
IO39	Hauptstr. 56, Reinkenhagen	<u>108:11</u>	259	<u>00:50</u>	<u>19:05</u>
IO40	Hauptstr. 55a, Reinkenhagen	<u>107:39</u>	258	<u>00:47</u>	<u>18:34</u>
IO41	Reinkenhagen, Mannhäger Straße 9	<u>105:09</u>	263	<u>00:43</u>	<u>18:26</u>

IO42	Reinkenhagen, Mannhäger Straße 8	<u>105:39</u>	265	<u>00:42</u>	<u>18:27</u>
IO43	Reinkenhagen, Mannhäger Straße 5	<u>105:36</u>	265	<u>00:41</u>	<u>18:28</u>
IO44	Reinkenhagen, Mannhäger Straße 4	<u>105:07</u>	270	<u>00:38</u>	<u>18:24</u>
IO45	Reinkenhagen, Mannhäger Straße 3	<u>105:08</u>	269	<u>00:38</u>	<u>18:20</u>
IO46	Altenhagen 4	<u>88:16</u>	243	<u>00:39</u>	<u>17:45</u>
IO47	Altenhagen 3	<u>91:09</u>	182	<u>00:49</u>	<u>16:38</u>
IO48	Altenhagen 6	<u>88:00</u>	247	<u>00:38</u>	<u>17:35</u>
IO49	Altenhagen 2	<u>83:00</u>	225	<u>00:40</u>	<u>15:32</u>
IO50	Altenhagen 1	<u>77:53</u>	231	<u>00:38</u>	<u>14:51</u>
IO51	Gutshaus Groß Behnkenhagen	20:44	90	00:19	04:01
IO52	Dorfstr. 21, Groß Behnkenhagen	23:38	95	00:24	03:39

Tabelle 6.3: Analyseergebnisse Gesamtbelastung

Der Empfehlungswert für die astronomisch maximal mögliche Schattenwurfdauer von 30 Stunden pro Jahr und/oder 30 Minuten pro Tag wird bei der Gesamtbelastung an allen Immissionspunkten **außer** an **IO51 und IO52** überschritten.

Der Empfehlungswert von 8 Stunden für die meteorologisch wahrscheinliche Beschattungsdauer in Stunden / Jahr wird bei der Gesamtbelastung ebenfalls an allen Immissionsorten **außer** an **IO51 und IO52** überschritten.

7 Zusammenfassung

Für das Genehmigungsverfahren nach dem BImSchG [2] ist der Nachweis der Einhaltung der Empfehlungswerte für die Schattenwurfimmissionen zu führen.

Die durchgeführten Berechnungen kommen zu dem Ergebnis, dass bei der Gesamtbelastung der Empfehlungswert für die astronomisch maximal mögliche Schattenwurfdauer von 30 Stunden pro Jahr und/oder 30 Minuten pro Tag an allen Immissionspunkten außer an **IO51 und IO52** überschritten wird.

Auf Grund der bestehenden Vorbelastung und der dadurch ausgeschöpften Empfehlungswert dürfen die geplanten Anlagen **W3, W5 und W10** an folgenden Immissionspunkten keinen zusätzlichen Beitrag zur Schattenwurfbelastung verursachen: **IO1 bis IO50** (siehe auch Tabelle 6.1).

An den anderen betroffenen Immissionspunkten sollte die Rotorschattenwurfdauer durch den Einsatz eines Schattenwurfabschaltmoduls begrenzt werden. Dieses Modul schaltet die WEA ab, wenn an den relevanten Immissionsorten die vorgegebenen Empfehlungswerte erreicht sind. Da der Richtwert von 30 Stunden pro Kalenderjahr auf Grundlage der astronomisch möglichen Beschattung entwickelt wurde, ist für die Schattenwurfabschaltautomatik der Wert für die tatsächliche, meteorologische Schattendauer auf 8 Stunden pro Kalenderjahr zu berücksichtigen. Ferner ist der Tatsache Rechnung zu tragen, dass sich die Zeitpunkte für den Schattenwurf jedes Jahr leicht verschieben. Hier muss die Abschaltung auf dem realen Sonnenstand basieren.

Im Anhang befinden sich die Berechnungsausdrucke für die Vor-, Zusatz- und Gesamtbelastung. Die Kalender pro WEA und die Grafische Darstellung Kalender pro WEA, werden nur für die WEA aufgeführt, welche auch tatsächlich einen Beitrag zur Schattenwurfbelastung an den relevanten Immissionsorten leisten.

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

8 Abkürzungs- und Symbolverzeichnis

Abb.	Abbildung
Astron.	Astronomisch
Bez.	Bezeichnung
GK	Gauß - Krüger
Max.	Maximal
Met.	Meteorologisch
NN	Normalnull
Nr.	Nummer
UTM	Universal Transverse Mercator
WEA	Windenergieanlage

9 Literaturverzeichnis

- [1] *LAI; Länderausschuss für Immissionsschutz: Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen. WEA-Schattenwurf-Hinweise. Stand 13.03.2002*
- [2] *BImSchG Bundes-Immissionsschutzgesetz*
- [3] *MagicMaps Tour Explorer, TOP25 Karten*
- [4] *EEN GmbH; Ute Heitmann; E-Mail vom 30.01.2014; Auszüge aus diversen Gutachten; Koordinatentabelle der Anlagen am Standort; Staatliches Amt für Landwirtschaft und Umwelt Vorpommern; Janina Kleffling; 22.10.2013;*

Projekt:
151008_Miltzow_III-VII

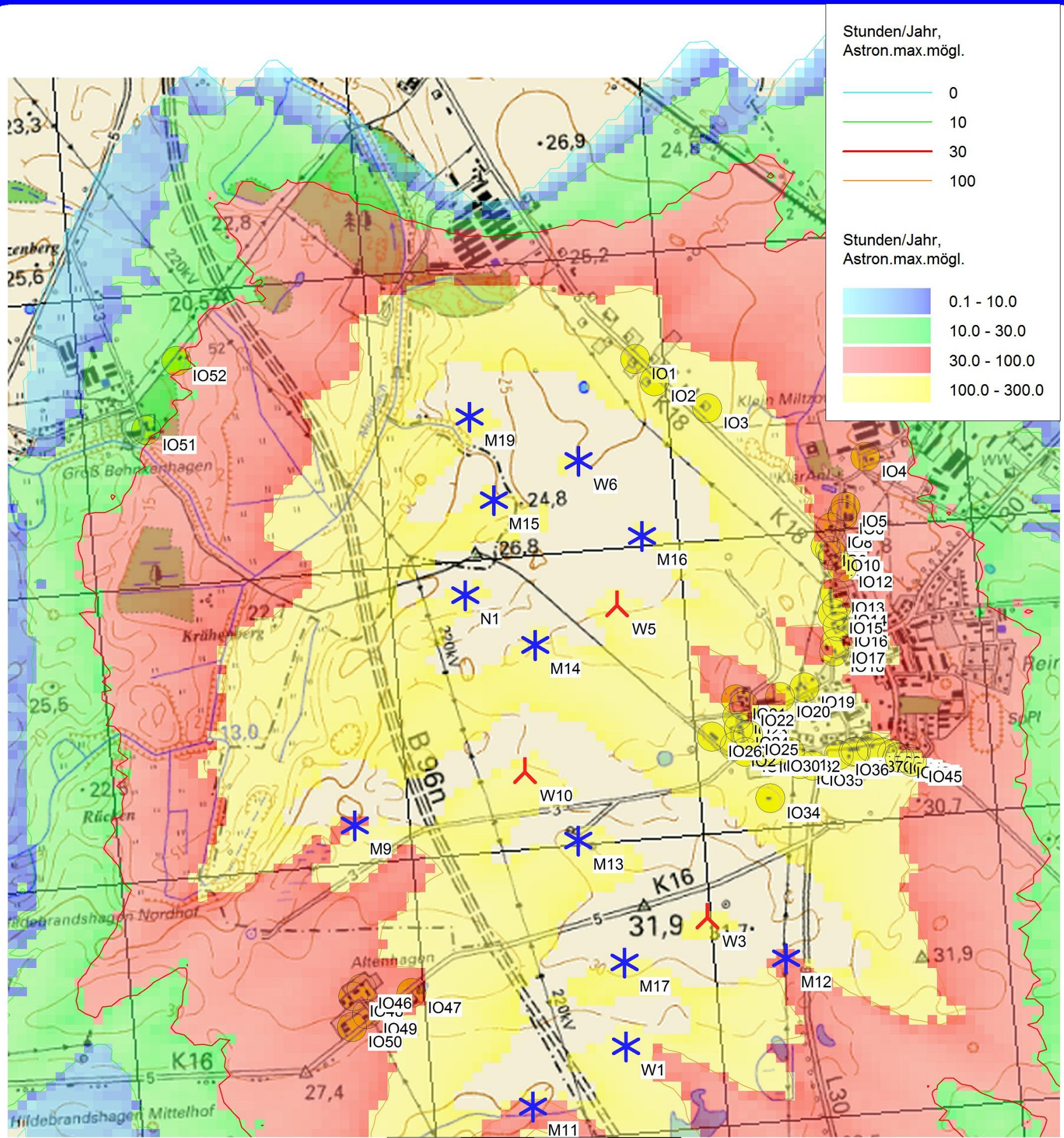
Ausdruck/Seite
12/10/2015 15:53 / 167

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

-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Karte

Berechnung: Gesamtbelastung



Karte: Karte_Mittel , Maßstab 1:20,000, Mitte: Germany UTM ETRS89 Zone: 33 Ost: 3,380,653 Nord: 6,007,077
 Neue WEA * Existierende WEA Schattenrezeptor
 Höhe der Schattenkarte: Höhenlinien: 131029_SRTM_Miltzow_25x25km.wpo (11)

WindPRO version 2.9.285 Sep 2014

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:18 / 1
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:18/2.9.285

SHADOW - Hauptergebnis

Berechnung: Vorbelastung

Voraussetzungen für Berechnung des Schattenwurfs

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

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

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

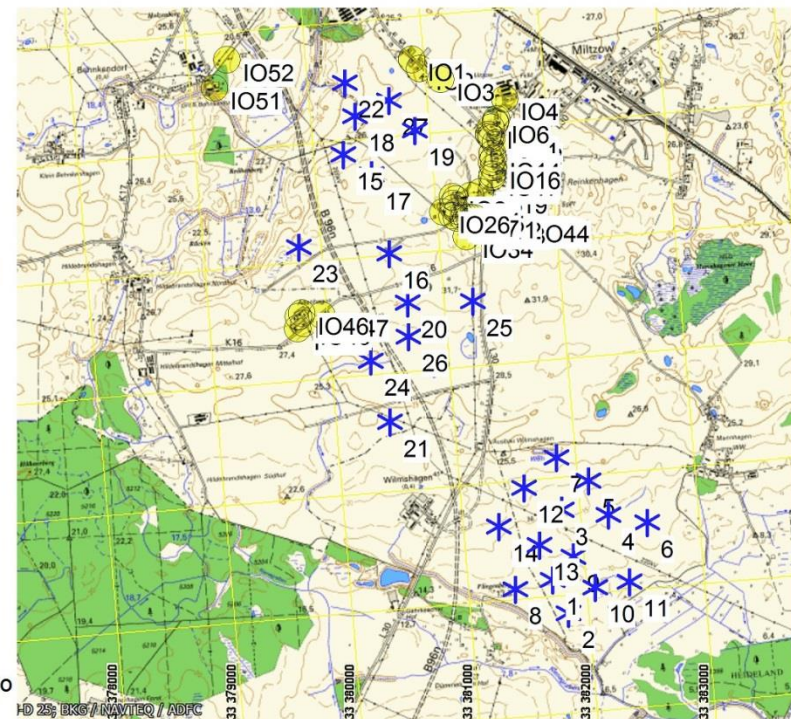
Betriebsstunden ermittelt aus WEA in Berechnung und Windverteilung:
WAsP_DEWI_Referenzpunkt2_138m

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
342 326 397 565 524 523 734 982 1,013 1,214 925 352 7,895
: Startwindgeschw. aus Leistungskennlinie

Eine WEA wird nicht berücksichtigt, wenn sie von keinem Teil der Rezeptorfläche aus sichtbar ist. Die Sichtbarkeitsberechnung basiert auf den folgenden Annahmen:

Verwendete Höhenlinien: Höhenlinien: 131029_SRTM_Miltzow_25x25km.wpo
Hindernisse in Berechnung verwendet

Augenhöhe: 1.5 m
Rasterauflösung: 10.0 m



Maßstab 1:75,000
* Existierende WEA Schattenrezeptor

WEA

Germany UTM ETRS89 Zone: 33			WEA-Typ		Schattendaten						
Ost	Nord	Z	Beschreibung	Aktuell	Hersteller	Typ	Nennleistung [kW]	Rotor-durchmesser [m]	Nabenhöhe [m]	Beschatt.-Bereich [m]	U/min [U/min]
		[m]									
1	3,381,716	6,003,135	10.0 Ma3	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
2	3,381,825	6,002,839	10.0 Ma4	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
3	3,381,841	6,003,718	12.8 Ma5	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
4	3,382,234	6,003,642	10.0 Ma6	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
5	3,382,091	6,003,945	15.8 Ma7	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
6	3,382,555	6,003,551	10.0 Ma8	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
7	3,381,835	6,004,165	20.0 Ma9	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
8	3,381,393	6,003,081	10.0 Ma10	Nein	GE WIND ENERGY	GE 1.5sl-1,500	1,500	77.0	100.0	2,500	18.0
9	3,381,906	6,003,313	10.0 Ma11	Ja	VESTAS	V112-3,000	3,000	112.0	94.0	1,711	12.8
10	3,382,068	6,003,040	10.0 Ma12	Ja	VESTAS	V112-3,000	3,000	112.0	119.0	1,709	12.8
11	3,382,362	6,003,062	10.0 Ma13	Ja	VESTAS	V112-3,000	3,000	112.0	119.0	1,709	12.8
12	3,381,539	6,003,932	17.9 MaR01	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	140.0	1,711	13.1
13	3,381,628	6,003,435	10.2 MaR02	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	140.0	1,711	13.1
14	3,381,299	6,003,623	14.1 MaW1	Ja	VESTAS	V126-3.3MW-3,300	3,300	126.0	137.0	1,715	12.0
15	3,380,256	6,006,880	21.8 N1	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
16	3,380,570	6,006,010	30.0 M13	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
17	3,380,480	6,006,690	23.5 M14	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
18	3,380,381	6,007,196	21.6 M15	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
19	3,380,876	6,007,030	24.9 M16	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
20	3,380,692	6,005,580	27.1 M17	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
21	3,380,456	6,004,584	20.8 M18	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
22	3,380,322	6,007,487	20.3 M19	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
23	3,379,812	6,006,127	23.2 M9	Ja	VESTAS	V112-3,000	3,000	112.0	119.0	1,709	12.8
24	3,380,338	6,005,115	25.6 M11	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	119.0	1,713	13.1
25	3,381,244	6,005,548	24.7 M12	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	94.0	1,714	13.1
26	3,380,673	6,005,294	25.4 W1	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	140.0	1,711	13.1
27	3,380,681	6,007,305	22.9 W6	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	119.0	1,713	13.1

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
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Berechnet:
12/10/2015 15:18/2.9.285

SHADOW - Hauptergebnis

Berechnung: Vorbelastung

Schattenrezeptor-Eingabe

Germany UTM ETRS89 Zone: 33

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe über Grund	Azimutwinkel (von Süd)	Neigung des Fensters	Ausrichtungsmodus
		[m]	[m]	[m]	[m]	[m]	[m]	[°]	[°]	
A	IO1	3,380,904	6,007,636	22.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
B	IO2	3,380,963	6,007,554	23.4	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
C	IO3	3,381,135	6,007,447	24.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
D	IO4	3,381,661	6,007,235	25.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
E	IO5	3,381,578	6,007,071	26.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
F	IO6	3,381,566	6,007,047	27.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
G	IO7	3,381,565	6,007,037	27.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
H	IO8	3,381,522	6,007,003	28.4	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
I	IO9	3,381,499	6,006,942	28.6	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
J	IO10	3,381,513	6,006,925	28.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
K	IO11	3,381,522	6,006,908	28.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
L	IO12	3,381,550	6,006,865	29.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
M	IO13	3,381,516	6,006,778	29.3	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
N	IO14	3,381,521	6,006,735	29.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
O	IO15	3,381,503	6,006,710	29.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
P	IO16	3,381,516	6,006,664	29.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
Q	IO17	3,381,503	6,006,607	29.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
R	IO18	3,381,497	6,006,580	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
S	IO19	3,381,386	6,006,466	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
T	IO20	3,381,300	6,006,440	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
U	IO21	3,381,149	6,006,445	29.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
V	IO22	3,381,174	6,006,421	29.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
W	IO23	3,381,148	6,006,387	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
X	IO24	3,381,150	6,006,347	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
Y	IO25	3,381,180	6,006,320	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
Z	IO26	3,381,056	6,006,325	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AA	IO27	3,381,130	6,006,285	29.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AB	IO28	3,381,166	6,006,263	29.6	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AC	IO29	3,381,223	6,006,257	29.3	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AD	IO30	3,381,249	6,006,258	29.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AE	IO31	3,381,275	6,006,259	29.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AF	IO32	3,381,318	6,006,250	28.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AG	IO33	3,381,348	6,006,206	28.4	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AH	IO34	3,381,237	6,006,098	28.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AI	IO35	3,381,392	6,006,197	28.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AJ	IO36	3,381,483	6,006,225	28.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AK	IO37	3,381,534	6,006,232	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AL	IO38	3,381,543	6,006,233	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AM	IO39	3,381,596	6,006,242	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AN	IO40	3,381,632	6,006,222	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AO	IO41	3,381,666	6,006,214	28.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AP	IO42	3,381,682	6,006,201	29.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AQ	IO43	3,381,690	6,006,198	29.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AR	IO44	3,381,722	6,006,191	29.3	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AS	IO45	3,381,731	6,006,181	29.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AT	IO46	3,379,788	6,005,568	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AU	IO47	3,379,957	6,005,538	29.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AV	IO48	3,379,757	6,005,543	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AW	IO49	3,379,799	6,005,479	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AX	IO50	3,379,744	6,005,439	29.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AY	IO51	3,379,216	6,007,536	20.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AZ	IO52	3,379,339	6,007,763	20.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"

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 DE-25840 Friedrichstadt

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 Berechnet:
 12/10/2015 15:18/2.9.285

SHADOW - Hauptergebnis

Berechnung: Vorbelastung

Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer		met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/a	Max.Schatten Stunden/Tag	Stunden/Jahr
		[Std/Jahr]	[Tage/Jahr]	[Std/Tag]	[Std/Jahr]
A	IO1	157:52	186	1:34	22:05
B	IO2	160:26	209	1:33	25:10
C	IO3	149:55	210	1:03	23:36
D	IO4	35:34	116	0:37	7:56
E	IO5	56:12	188	0:41	12:16
F	IO6	57:28	182	0:44	12:52
G	IO7	57:25	179	0:44	13:00
H	IO8	65:05	196	0:49	15:10
I	IO9	71:56	205	0:51	17:21
J	IO10	69:06	199	0:48	16:47
K	IO11	67:38	195	0:45	16:30
L	IO12	64:03	195	0:38	15:43
M	IO13	76:10	197	0:45	18:58
N	IO14	78:30	198	0:48	19:25
O	IO15	83:18	200	0:52	20:24
P	IO16	77:56	207	0:50	18:21
Q	IO17	61:35	200	0:40	13:34
R	IO18	54:23	192	0:32	11:16
S	IO19	58:51	198	0:33	11:17
T	IO20	50:00	172	0:40	9:55
U	IO21	56:07	134	0:51	13:11
V	IO22	57:43	149	0:48	12:58
W	IO23	68:50	167	0:47	15:25
X	IO24	83:45	194	0:43	18:17
Y	IO25	88:31	199	0:42	17:57
Z	IO26	73:30	165	0:42	15:31
AA	IO27	86:30	183	0:47	16:34
AB	IO28	92:36	192	0:50	16:57
AC	IO29	97:09	204	0:47	17:47
AD	IO30	95:14	209	0:45	17:21
AE	IO31	88:33	204	0:44	15:33
AF	IO32	84:59	189	0:45	14:12
AG	IO33	89:39	198	0:47	14:39
AH	IO34	119:39	174	1:24	15:18
AI	IO35	86:03	189	0:47	13:35
AJ	IO36	71:29	180	0:40	11:04
AK	IO37	63:31	180	0:39	9:40
AL	IO38	62:15	164	0:38	9:23
AM	IO39	59:36	162	0:37	8:46
AN	IO40	59:26	160	0:35	8:02
AO	IO41	56:34	161	0:35	7:37
AP	IO42	58:49	161	0:36	7:52
AQ	IO43	59:19	163	0:36	7:55
AR	IO44	60:14	163	0:37	7:58
AS	IO45	61:36	164	0:38	8:10
AT	IO46	80:16	229	0:37	15:33
AU	IO47	79:41	170	0:46	13:29
AV	IO48	80:17	234	0:36	15:26
AW	IO49	75:05	215	0:40	13:19
AX	IO50	71:20	223	0:38	13:00
AY	IO51	20:44	90	0:19	4:00
AZ	IO52	23:38	95	0:24	3:38

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12/10/2015 15:18/2.9.285

SHADOW - Hauptergebnis

Berechnung: Vorbelastung

Gesamtmenge der max. mögl. Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [Std/Jahr]	Erwartet [Std/Jahr]
1	Ma3	0:00	0:00
2	Ma4	0:00	0:00
3	Ma5	0:00	0:00
4	Ma6	0:00	0:00
5	Ma7	0:00	0:00
6	Ma8	0:00	0:00
7	Ma9	0:00	0:00
8	Ma10	0:00	0:00
9	Ma11	0:00	0:00
10	Ma12	0:00	0:00
11	Ma13	0:00	0:00
12	MaR01	0:00	0:00
13	MaR02	0:00	0:00
14	MaW1	0:00	0:00
15	N1	147:01	29:47
16	M13	161:02	31:35
17	M14	179:23	40:52
18	M15	116:09	24:47
19	M16	269:23	52:08
20	M17	148:04	20:45
21	M18	32:20	2:43
22	M19	103:18	24:47
23	M9	23:11	4:59
24	M11	149:51	19:35
25	M12	131:29	13:14
26	W1	140:19	18:28
27	W6	323:23	67:21

WindPRO version 2.9.285 Sep 2014

Projekt:
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SHADOW - Hauptergebnis

Berechnung: Zusatzbelastung

Voraussetzungen für Berechnung des Schattenwurfs

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

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

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

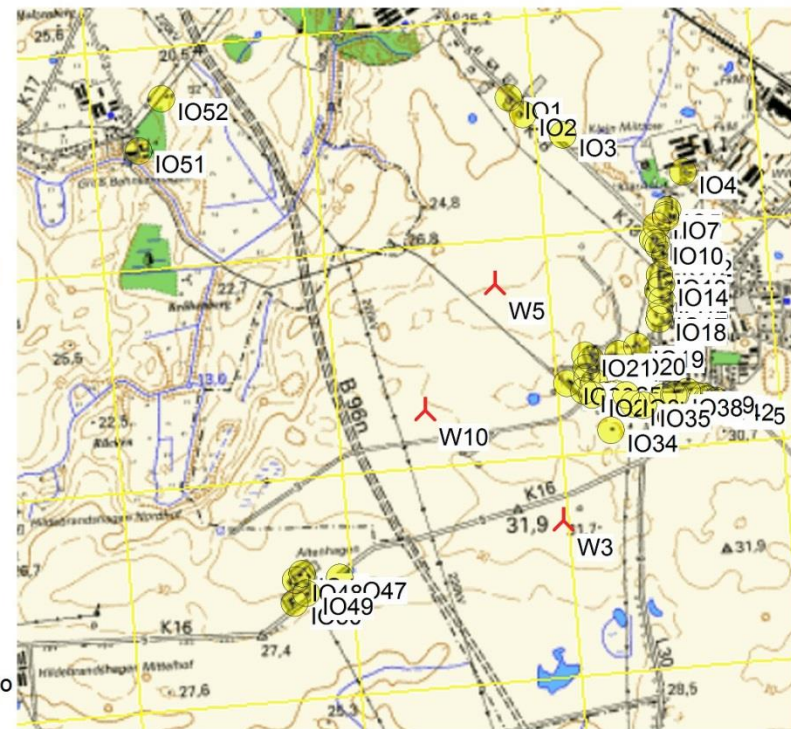
Betriebsstunden ermittelt aus WEA in Berechnung und Windverteilung:
WAsP_DEWI_Referenzpunkt2_138m

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
360 343 417 590 550 551 773 1,031 1,061 1,272 981 370 8,297
: Startwindgeschw. aus Leistungskennlinie

Eine WEA wird nicht berücksichtigt, wenn sie von keinem Teil der Rezeptorfläche aus sichtbar ist. Die Sichtbarkeitsberechnung basiert auf den folgenden Annahmen:

Verwendete Höhenlinien: Höhenlinien: 131029_SRTM_Miltzow_25x25km.wpo
Hindernisse in Berechnung verwendet

Augenhöhe: 1.5 m
Rasterauflösung: 10.0 m



Maßstab 1:40,000
Neue WEA Schattenrezeptor

WEA

Germany UTM ETRS89 Zone: 33				WEA-Typ			Schattendaten					
	Ost	Nord	Z	Beschreibung	Aktuell	Hersteller	Typ	Nennleistung [kW]	Rotor-durchmesser [m]	Nabenhöhe [m]	Beschatt.- Bereich [m]	U/min [U/min]
1	3,380,987	6,005,709	26.7	W3	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	119.0	1,713	13.1
2	3,380,771	6,006,801	25.0	W5	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	119.0	1,713	13.1
3	3,380,408	6,006,259	26.1	W10	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	119.0	1,713	13.1

Schattenrezeptor-Eingabe

Germany UTM ETRS89 Zone: 33												
Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe über Grund	Azimutwinkel (von Süd)	Neigung des Fensters	Ausrichtungsmodus		
					[m]	[m]	[m]	[°]	[°]			
A	IO1	3,380,904	6,007,636	22.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
B	IO2	3,380,963	6,007,554	23.4	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
C	IO3	3,381,135	6,007,447	24.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
D	IO4	3,381,661	6,007,235	25.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
E	IO5	3,381,578	6,007,071	26.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
F	IO6	3,381,566	6,007,047	27.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
G	IO7	3,381,565	6,007,037	27.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
H	IO8	3,381,522	6,007,003	28.4	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
I	IO9	3,381,499	6,006,942	28.6	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
J	IO10	3,381,513	6,006,925	28.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
K	IO11	3,381,522	6,006,908	28.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
L	IO12	3,381,550	6,006,865	29.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
M	IO13	3,381,516	6,006,778	29.3	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
N	IO14	3,381,521	6,006,735	29.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
O	IO15	3,381,503	6,006,710	29.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
P	IO16	3,381,516	6,006,664	29.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
Q	IO17	3,381,503	6,006,607	29.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
R	IO18	3,381,497	6,006,580	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
S	IO19	3,381,386	6,006,466	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
T	IO20	3,381,300	6,006,440	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
U	IO21	3,381,149	6,006,445	29.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		
V	IO22	3,381,174	6,006,421	29.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"		

(Fortsetzung nächste Seite)...

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Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:01/2.9.285

SHADOW - Hauptergebnis

Berechnung: Zusatzbelastung

...(Fortsetzung von letzter Seite)

Germany UTM ETRS89 Zone: 33

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe über Grund	Azimutwinkel (von Süd)	Neigung des Fensters	Ausrichtungsmodus
		[m]	[m]	[m]	[m]	[m]	[m]	[°]	[°]	
W IO23		3,381,148	6,006,387	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
X IO24		3,381,150	6,006,347	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
Y IO25		3,381,180	6,006,320	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
Z IO26		3,381,056	6,006,325	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AA IO27		3,381,130	6,006,285	29.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AB IO28		3,381,166	6,006,263	29.6	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AC IO29		3,381,223	6,006,257	29.3	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AD IO30		3,381,249	6,006,258	29.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AE IO31		3,381,275	6,006,259	29.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AF IO32		3,381,318	6,006,250	28.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AG IO33		3,381,348	6,006,206	28.4	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AH IO34		3,381,237	6,006,098	28.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AI IO35		3,381,392	6,006,197	28.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AJ IO36		3,381,483	6,006,225	28.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AK IO37		3,381,534	6,006,232	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AL IO38		3,381,543	6,006,233	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AM IO39		3,381,596	6,006,242	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AN IO40		3,381,632	6,006,222	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AO IO41		3,381,666	6,006,214	28.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AP IO42		3,381,682	6,006,201	29.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AQ IO43		3,381,690	6,006,198	29.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AR IO44		3,381,722	6,006,191	29.3	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AS IO45		3,381,731	6,006,181	29.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AT IO46		3,379,788	6,005,568	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AU IO47		3,379,957	6,005,538	29.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AV IO48		3,379,757	6,005,543	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AW IO49		3,379,799	6,005,479	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AX IO50		3,379,744	6,005,439	29.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AY IO51		3,379,216	6,007,536	20.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AZ IO52		3,379,339	6,007,763	20.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"

Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer		met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/a	Max. Schatten Stunden/Tag	Stunden/Jahr
		[Std/Jahr]	[Tage/Jahr]	[Std/Tag]	[Std/Jahr]
A IO1		0:00	0	0:00	0:00
B IO2		12:24	36	0:27	1:01
C IO3		40:29	74	0:37	4:09
D IO4		17:48	64	0:26	3:03
E IO5		21:43	68	0:30	4:08
F IO6		22:30	69	0:31	4:22
G IO7		22:38	68	0:31	4:26
H IO8		25:04	71	0:33	5:00
I IO9		27:17	74	0:34	5:44
J IO10		26:38	73	0:34	5:41
K IO11		26:09	73	0:34	5:41
L IO12		24:50	70	0:33	5:35
M IO13		28:17	75	0:34	6:53
N IO14		28:33	75	0:34	7:08
O IO15		30:41	80	0:35	7:46
P IO16		36:39	107	0:34	8:23
Q IO17		45:23	123	0:35	9:55
R IO18		50:07	132	0:35	10:50
S IO19		78:42	164	0:40	16:59
T IO20		52:12	125	0:32	9:35
U IO21		29:12	74	0:34	4:51

(Fortsetzung nächste Seite)...

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Berechnet:
12/10/2015 15:01/2.9.285

SHADOW - Hauptergebnis

Berechnung: Zusatzbelastung

...(Fortsetzung von letzter Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer		met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/a	Max.Schatten Stunden/Tag	Stunden/Jahr
		[Std./Jahr]	[Tage/Jahr]	[Std./Tag]	[Std./Jahr]
V	IO22	33:44	81	0:33	5:09
W	IO23	40:44	90	0:34	6:04
X	IO24	49:48	99	0:40	7:05
Y	IO25	56:22	107	0:43	7:46
Z	IO26	57:57	106	0:42	8:53
AA	IO27	66:04	114	0:47	9:14
AB	IO28	71:46	120	0:48	9:48
AC	IO29	72:30	124	0:46	9:49
AD	IO30	71:35	124	0:45	9:39
AE	IO31	70:27	124	0:44	9:28
AF	IO32	70:19	130	0:43	9:33
AG	IO33	70:39	140	0:44	10:08
AH	IO34	98:14	168	0:57	15:33
AI	IO35	56:11	120	0:42	8:47
AJ	IO36	41:55	100	0:37	6:44
AK	IO37	48:08	130	0:35	9:10
AL	IO38	48:57	132	0:34	9:31
AM	IO39	52:57	139	0:33	11:17
AN	IO40	50:46	136	0:32	11:15
AO	IO41	50:12	136	0:31	11:28
AP	IO42	48:50	136	0:31	11:17
AQ	IO43	48:25	134	0:31	11:15
AR	IO44	47:23	137	0:30	11:13
AS	IO45	46:16	134	0:30	11:00
AT	IO46	8:00	28	0:22	2:14
AU	IO47	11:34	35	0:25	3:20
AV	IO48	7:43	29	0:21	2:11
AW	IO49	8:40	32	0:22	2:30
AX	IO50	7:48	30	0:20	2:14
AY	IO51	0:00	0	0:00	0:00
AZ	IO52	0:00	0	0:00	0:00

Gesamtmenge der max. mögl. Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [Std./Jahr]	Erwartet [Std./Jahr]
1	W3	321:39	41:12
2	W5	258:40	58:11
3	W10	130:52	29:31

Projekt:
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Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Hauptergebnis

Berechnung: Gesamtbelastung

Voraussetzungen für Berechnung des Schattenwurfs

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

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

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

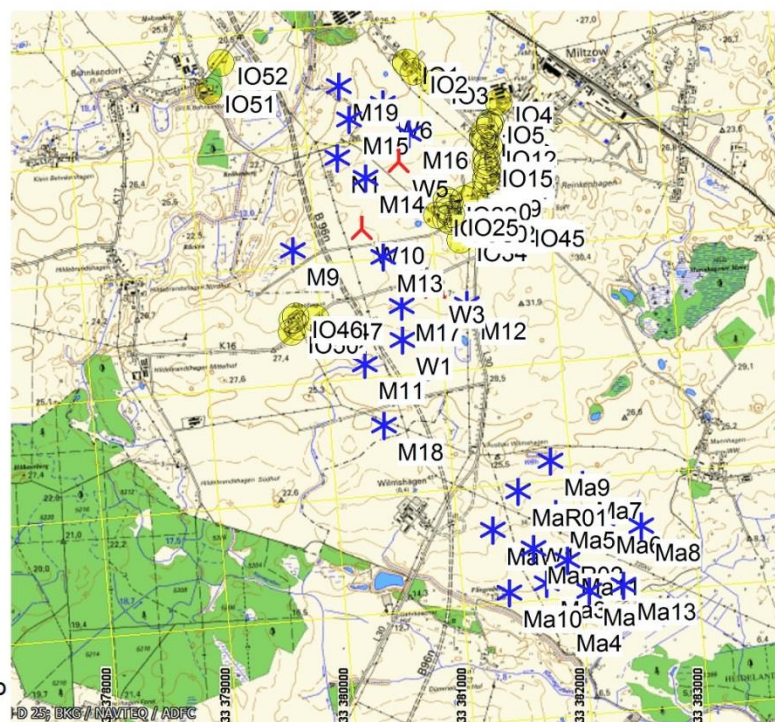
Betriebsstunden ermittelt aus WEA in Berechnung und Windverteilung:
WAsP_DEWI_Referenzpunkt2_138m

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

Eine WEA wird nicht berücksichtigt, wenn sie von keinem Teil der Rezeptorfläche aus sichtbar ist. Die Sichtbarkeitsberechnung basiert auf den folgenden Annahmen:

Verwendete Höhenlinien: Höhenlinien: 131029_SRTM_Miltzow_25x25km.wpo
Hindernisse in Berechnung verwendet

Augenhöhe: 1.5 m
Rasterauflösung: 10.0 m



Maßstab 1:75,000
▲ Neue WEA ★ Existierende WEA ● Schattenrezeptor

WEA

Germany UTM ETRS89 Zone: 33			Beschreibung	WEA-Typ		Typ	Nennleistung [kW]	Rotor-durchmesser [m]	Nabenhöhe [m]	Schattendaten	
Ost	Nord	Z		Aktuell	Hersteller					Beschatt.-Bereich [m]	U/min [U/min]
1	3,380,987	6,005,709	26.7 W3	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	119.0	1,713	13.1
2	3,380,771	6,006,801	25.0 W5	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	119.0	1,713	13.1
3	3,380,408	6,006,259	26.1 W10	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	119.0	1,713	13.1
4	3,381,716	6,003,135	10.0 Ma3	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
5	3,381,825	6,002,839	10.0 Ma4	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
6	3,381,841	6,003,718	12.8 Ma5	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
7	3,382,234	6,003,642	10.0 Ma6	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
8	3,382,091	6,003,945	15.8 Ma7	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
9	3,382,555	6,003,551	10.0 Ma8	Ja	VESTAS	V80-2.0MW-2,000	2,000	80.0	78.0	1,582	16.7
10	3,381,835	6,004,165	20.0 Ma9	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
11	3,381,393	6,003,081	10.0 Ma10	Nein	GE WIND ENERGY	GE 1.5sl-1,500	1,500	77.0	100.0	2,500	18.0
12	3,381,906	6,003,313	10.0 Ma11	Ja	VESTAS	V112-3,000	3,000	112.0	94.0	1,711	12.8
13	3,382,068	6,003,040	10.0 Ma12	Ja	VESTAS	V112-3,000	3,000	112.0	119.0	1,709	12.8
14	3,382,362	6,003,062	10.0 Ma13	Ja	VESTAS	V112-3,000	3,000	112.0	119.0	1,709	12.8
15	3,381,539	6,003,932	17.9 MaR01	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	140.0	1,711	13.1
16	3,381,628	6,003,435	10.2 MaR02	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	140.0	1,711	13.1
17	3,381,299	6,003,623	14.1 MaW1	Ja	VESTAS	V126-3.3MW-3,300	3,300	126.0	137.0	1,715	12.0
18	3,380,256	6,006,880	21.8 N1	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
19	3,380,570	6,006,010	30.0 M13	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
20	3,380,480	6,006,690	23.5 M14	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
21	3,380,381	6,007,196	21.6 M15	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
22	3,380,876	6,007,030	24.9 M16	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
23	3,380,692	6,005,580	27.1 M17	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
24	3,380,456	6,004,584	20.8 M18	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
25	3,380,322	6,007,487	20.3 M19	Ja	VESTAS	V90-2,000	2,000	90.0	105.0	1,506	14.9
26	3,379,812	6,006,127	23.2 M9	Ja	VESTAS	V112-3,000	3,000	112.0	119.0	1,709	12.8
27	3,380,338	6,005,115	25.6 M11	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	119.0	1,713	13.1
28	3,381,244	6,005,548	24.7 M12	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	94.0	1,714	13.1
29	3,380,673	6,005,294	25.4 W1	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	140.0	1,711	13.1
30	3,380,681	6,007,305	22.9 W6	Ja	VESTAS	V112-3.3 Gridstreame-3,300	3,300	112.0	119.0	1,713	13.1

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SHADOW - Hauptergebnis

Berechnung: Gesamtbelastung

Schattenrezeptor-Eingabe

Germany UTM ETRS89 Zone: 33

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe über Grund	Azimutwinkel (von Süd)	Neigung des Fensters	Ausrichtungsmodus
		[m]	[m]	[m]	[m]	[m]	[m]	[°]	[°]	
A	IO1	3,380,904	6,007,636	22.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
B	IO2	3,380,963	6,007,554	23.4	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
C	IO3	3,381,135	6,007,447	24.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
D	IO4	3,381,661	6,007,235	25.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
E	IO5	3,381,578	6,007,071	26.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
F	IO6	3,381,566	6,007,047	27.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
G	IO7	3,381,565	6,007,037	27.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
H	IO8	3,381,522	6,007,003	28.4	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
I	IO9	3,381,499	6,006,942	28.6	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
J	IO10	3,381,513	6,006,925	28.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
K	IO11	3,381,522	6,006,908	28.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
L	IO12	3,381,550	6,006,865	29.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
M	IO13	3,381,516	6,006,778	29.3	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
N	IO14	3,381,521	6,006,735	29.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
O	IO15	3,381,503	6,006,710	29.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
P	IO16	3,381,516	6,006,664	29.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
Q	IO17	3,381,503	6,006,607	29.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
R	IO18	3,381,497	6,006,580	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
S	IO19	3,381,386	6,006,466	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
T	IO20	3,381,300	6,006,440	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
U	IO21	3,381,149	6,006,445	29.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
V	IO22	3,381,174	6,006,421	29.7	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
W	IO23	3,381,148	6,006,387	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
X	IO24	3,381,150	6,006,347	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
Y	IO25	3,381,180	6,006,320	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
Z	IO26	3,381,056	6,006,325	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AA	IO27	3,381,130	6,006,285	29.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AB	IO28	3,381,166	6,006,263	29.6	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AC	IO29	3,381,223	6,006,257	29.3	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AD	IO30	3,381,249	6,006,258	29.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AE	IO31	3,381,275	6,006,259	29.1	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AF	IO32	3,381,318	6,006,250	28.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AG	IO33	3,381,348	6,006,206	28.4	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AH	IO34	3,381,237	6,006,098	28.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AI	IO35	3,381,392	6,006,197	28.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AJ	IO36	3,381,483	6,006,225	28.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AK	IO37	3,381,534	6,006,232	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AL	IO38	3,381,543	6,006,233	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AM	IO39	3,381,596	6,006,242	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AN	IO40	3,381,632	6,006,222	28.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AO	IO41	3,381,666	6,006,214	28.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AP	IO42	3,381,682	6,006,201	29.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AQ	IO43	3,381,690	6,006,198	29.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AR	IO44	3,381,722	6,006,191	29.3	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AS	IO45	3,381,731	6,006,181	29.2	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AT	IO46	3,379,788	6,005,568	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AU	IO47	3,379,957	6,005,538	29.8	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AV	IO48	3,379,757	6,005,543	30.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AW	IO49	3,379,799	6,005,479	29.9	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AX	IO50	3,379,744	6,005,439	29.5	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AY	IO51	3,379,216	6,007,536	20.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"
AZ	IO52	3,379,339	6,007,763	20.0	0.1	0.1	2.0	0.0	0.0	"Gewächshaus-Modus"

Projekt:
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 Lizenzierter Anwender:
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 Am Westersielzug 11
 DE-25840 Friedrichstadt

 -
 André Gefke / andre.gefke@i17-wind.de
 Berechnet:
 12/10/2015 15:41/2.9.285

SHADOW - Hauptergebnis

Berechnung: Gesamtbelastung

Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer		met. wahrsch. Beschattungsdauer	
		Stunden/Jahr	Schattentage/a	Max.Schatten Stunden/Tag	Stunden/Jahr
		[Std/Jahr]	[Tage/Jahr]	[Std/Tag]	[Std/Jahr]
A	IO1	157:52	186	1:34	22:11
B	IO2	168:10	209	1:33	25:52
C	IO3	157:30	210	1:06	24:23
D	IO4	50:28	155	0:37	10:23
E	IO5	74:12	226	0:41	15:36
F	IO6	76:20	220	0:44	16:25
G	IO7	76:33	215	0:44	16:39
H	IO8	86:39	233	0:49	19:23
I	IO9	96:41	246	0:51	22:28
J	IO10	93:36	241	0:50	21:54
K	IO11	92:09	239	0:49	21:43
L	IO12	88:11	238	0:48	21:03
M	IO13	103:34	250	0:45	25:29
N	IO14	105:24	253	0:48	25:58
O	IO15	111:57	260	0:52	27:27
P	IO16	112:28	265	0:50	25:57
Q	IO17	105:43	260	0:40	22:48
R	IO18	102:54	253	0:46	21:25
S	IO19	133:41	244	1:00	26:58
T	IO20	99:23	215	0:57	18:34
U	IO21	82:24	182	0:51	17:19
V	IO22	88:27	187	0:48	17:20
W	IO23	106:44	213	0:52	20:40
X	IO24	131:38	241	1:03	24:40
Y	IO25	143:46	247	1:25	25:11
Z	IO26	129:51	231	1:02	23:43
AA	IO27	152:21	242	1:34	25:21
AB	IO28	164:22	248	1:38	26:22
AC	IO29	168:40	256	1:30	27:11
AD	IO30	162:54	260	1:23	26:19
AE	IO31	151:58	253	1:17	24:05
AF	IO32	142:02	237	1:10	22:11
AG	IO33	141:36	247	1:08	22:34
AH	IO34	205:42	240	1:42	28:56
AI	IO35	128:35	237	1:06	20:34
AJ	IO36	104:43	223	0:58	16:33
AK	IO37	105:05	243	0:56	17:42
AL	IO38	104:59	248	0:54	17:48
AM	IO39	108:11	259	0:50	19:05
AN	IO40	107:39	258	0:47	18:34
AO	IO41	105:09	263	0:43	18:26
AP	IO42	105:39	265	0:42	18:27
AQ	IO43	105:36	265	0:41	18:28
AR	IO44	105:07	270	0:38	18:24
AS	IO45	105:08	269	0:38	18:20
AT	IO46	88:16	243	0:39	17:45
AU	IO47	91:09	182	0:49	16:38
AV	IO48	88:00	247	0:38	17:35
AW	IO49	83:00	225	0:40	15:32
AX	IO50	77:53	231	0:38	14:51
AY	IO51	20:44	90	0:19	4:01
AZ	IO52	23:38	95	0:24	3:39

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12/10/2015 15:41/2.9.285

SHADOW - Hauptergebnis

Berechnung: Gesamtbelastung

Gesamtmenge der max. mögl. Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [Std/Jahr]	Erwartet [Std/Jahr]
1	W3	321:39	39:47
2	W5	258:40	55:38
3	W10	130:52	28:14
4	Ma3	0:00	0:00
5	Ma4	0:00	0:00
6	Ma5	0:00	0:00
7	Ma6	0:00	0:00
8	Ma7	0:00	0:00
9	Ma8	0:00	0:00
10	Ma9	0:00	0:00
11	Ma10	0:00	0:00
12	Ma11	0:00	0:00
13	Ma12	0:00	0:00
14	Ma13	0:00	0:00
15	MaR01	0:00	0:00
16	MaR02	0:00	0:00
17	MaW1	0:00	0:00
18	N1	147:01	29:57
19	M13	161:02	31:45
20	M14	179:23	41:04
21	M15	116:09	24:59
22	M16	269:23	52:24
23	M17	148:04	20:28
24	M18	32:20	2:44
25	M19	103:18	24:55
26	M9	23:11	5:01
27	M11	149:51	19:38
28	M12	131:29	13:19
29	W1	140:19	18:28
30	W6	323:23	67:42

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12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: A - IO1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28	12:02 (22) 07:57	13:58 (30) 06:59	14:18 (30) 06:43	05:33	04:42
2	15:54	45 15:09 (18) 16:46	87 15:54 (21) 17:43	25 14:43 (30) 19:42	20:39	21:30
3	08:28	12:03 (22) 07:55	13:59 (30) 06:56	14:22 (30) 06:40	05:31	04:41
4	15:55	44 15:10 (18) 16:48	88 15:55 (21) 17:45	16 14:38 (30) 19:44	20:40	21:31
5	08:28	12:04 (22) 07:54	13:59 (30) 06:54	16 14:38 (30) 19:44	20:40	21:31
6	15:57	43 15:10 (18) 16:50	90 15:56 (21) 17:47	19 17:14 (25) 19:55	20:51	21:37
7	08:28	12:05 (22) 07:52	13:58 (30) 06:52	16 14:38 (30) 19:44	20:40	21:31
8	15:58	43 15:11 (18) 16:52	92 15:56 (21) 17:49	19 17:14 (25) 19:55	20:51	21:37
9	08:27	12:06 (22) 07:50	13:58 (30) 06:49	16 14:38 (30) 19:44	20:40	21:31
10	15:59	42 15:12 (18) 16:54	93 15:57 (21) 17:51	19 17:14 (25) 19:55	20:51	21:37
11	08:27	12:06 (22) 07:48	13:58 (30) 06:47	16 14:38 (30) 19:44	20:40	21:31
12	16:00	40 15:13 (18) 16:56	94 15:57 (21) 17:53	19 17:14 (25) 19:55	20:51	21:37
13	08:26	12:09 (22) 07:46	13:58 (30) 06:45	12 17:11 (25) 19:54	20:50	21:36
14	16:02	38 15:13 (18) 16:58	94 15:57 (21) 17:55	12 17:11 (25) 19:54	20:50	21:36
15	08:26	12:10 (22) 07:44	13:57 (30) 06:42	16 14:38 (30) 19:44	20:40	21:31
16	16:03	36 15:13 (18) 17:00	93 15:56 (21) 17:57	19 17:14 (25) 19:55	20:51	21:37
17	08:25	12:12 (22) 07:42	13:57 (30) 06:40	16 14:38 (30) 19:44	20:40	21:31
18	16:05	34 15:14 (18) 17:03	94 15:56 (21) 17:59	23 17:16 (25) 19:57	20:53	21:38
19	08:25	12:15 (22) 07:40	13:57 (30) 06:37	16 14:38 (30) 19:44	20:40	21:31
20	16:06	29 15:14 (18) 17:05	94 15:56 (21) 18:01	26 17:17 (25) 19:59	20:55	21:39
21	08:24	14:19 (30) 07:38	13:58 (30) 06:35	16 14:38 (30) 19:44	20:40	21:31
22	16:08	27 15:14 (18) 17:07	92 15:56 (21) 18:02	28 17:18 (25) 20:01	20:57	21:40
23	08:23	14:15 (30) 07:36	13:58 (30) 06:32	16 14:38 (30) 19:44	20:40	21:31
24	16:09	36 15:15 (18) 17:09	91 15:56 (21) 18:04	30 17:19 (25) 20:03	20:59	21:41
25	08:22	14:13 (30) 07:34	13:58 (30) 06:30	16 14:38 (30) 19:44	20:40	21:31
26	16:11	41 15:15 (18) 17:11	89 15:55 (21) 18:06	31 17:19 (25) 20:05	21:00	21:41
27	08:21	14:11 (30) 07:32	13:59 (30) 06:27	16 14:38 (30) 19:44	20:40	21:31
28	16:13	46 15:16 (18) 17:13	86 15:54 (21) 18:08	32 17:20 (25) 20:07	21:02	21:42
29	08:20	14:10 (30) 07:30	13:58 (30) 06:25	16 14:38 (30) 19:44	20:40	21:31
30	16:14	49 15:16 (18) 17:15	83 15:52 (21) 18:10	34 17:20 (25) 20:09	21:04	21:43
31	08:19	14:09 (30) 07:28	13:59 (30) 06:23	16 14:38 (30) 19:44	20:40	21:31
1	16:16	51 15:16 (18) 17:17	79 15:51 (21) 18:12	34 17:20 (25) 20:11	21:06	21:43
2	08:18	14:08 (30) 07:26	14:00 (30) 06:20	16 14:38 (30) 19:44	20:40	21:31
3	16:18	54 15:17 (18) 17:19	72 15:48 (21) 18:14	33 17:19 (25) 20:12	21:07	21:44
4	08:17	14:07 (30) 07:24	14:01 (30) 06:18	16 14:38 (30) 19:44	20:40	21:31
5	16:19	55 15:16 (18) 17:21	59 15:00 (30) 18:16	34 17:19 (25) 20:14	21:09	21:44
6	08:16	14:06 (30) 07:22	14:01 (30) 06:15	16 14:38 (30) 19:44	20:40	21:31
7	16:21	57 15:16 (18) 17:23	58 14:59 (30) 18:18	34 17:19 (25) 20:16	21:11	21:45
8	08:15	14:06 (30) 07:19	14:02 (30) 06:13	16 14:38 (30) 19:44	20:40	21:31
9	16:23	57 15:16 (18) 17:25	56 14:58 (30) 18:20	32 17:17 (25) 20:18	21:12	21:45
10	08:14	14:04 (30) 07:17	14:03 (30) 06:10	16 14:38 (30) 19:44	20:40	21:31
11	16:25	59 15:15 (18) 17:27	55 14:58 (30) 18:22	31 17:17 (25) 20:20	21:14	21:45
12	08:12	14:04 (30) 07:15	14:03 (30) 06:08	16 14:38 (30) 19:44	20:40	21:31
13	16:27	59 15:15 (18) 17:29	53 14:56 (30) 18:23	29 17:15 (25) 20:22	21:15	21:45
14	08:11	14:03 (30) 07:13	14:05 (30) 06:05	16 14:38 (30) 19:44	20:40	21:31
15	16:29	59 15:14 (18) 17:31	50 14:55 (30) 18:25	28 17:15 (25) 20:24	21:17	21:46
16	08:10	14:02 (30) 07:10	14:06 (30) 06:03	16 14:38 (30) 19:44	20:40	21:31
17	16:31	55 15:11 (18) 17:33	48 14:54 (30) 18:27	25 17:13 (25) 20:26	21:18	21:46
18	08:08	14:02 (30) 07:08	14:07 (30) 06:00	16 14:38 (30) 19:44	20:40	21:31
19	16:32	56 15:42 (21) 17:35	45 14:52 (30) 18:29	22 17:11 (25) 20:27	21:20	21:46
20	08:07	14:01 (30) 07:06	14:10 (30) 05:58	16 14:38 (30) 19:44	20:40	21:31
21	16:34	64 15:45 (21) 17:37	41 14:51 (30) 18:31	17 17:08 (25) 20:29	21:21	21:46
22	08:05	14:00 (30) 07:04	14:11 (30) 05:55	16 14:38 (30) 19:44	20:40	21:31
23	16:36	69 15:47 (21) 17:39	37 14:48 (30) 18:33	11 17:05 (25) 20:31	21:23	21:46
24	08:04	14:00 (30) 07:01	14:14 (30) 05:53	16 14:38 (30) 19:44	20:40	21:31
25	16:38	75 15:50 (21) 17:41	32 14:46 (30) 18:35	10 17:03 (25) 20:33	21:24	21:45
26	08:02	14:00 (30) 07:00	14:15 (30) 05:51	16 14:38 (30) 19:44	20:40	21:31
27	16:40	78 15:51 (21) 17:43	29 14:44 (30) 18:37	9 17:01 (25) 20:35	21:26	21:45
28	08:01	13:59 (30) 06:59	14:16 (30) 05:49	16 14:38 (30) 19:44	20:40	21:31
29	16:42	81 15:52 (21) 17:45	27 14:43 (30) 18:39	8 17:00 (25) 20:37	21:27	21:45
30	07:59	13:59 (30) 06:59	14:17 (30) 05:47	16 14:38 (30) 19:44	20:40	21:31
31	16:44	84 15:53 (21) 17:46	25 14:42 (30) 18:41	7 16:59 (25) 20:39	21:28	21:45
Sonnenscheinstunden	248	272	367	421	496	513
astr.max.mögl.Beschattung	1606	2045	606			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31			
Reduktion Betriebsdauer	0.91	0.91	0.91			
Reduktion Windrichtung	0.67	0.68	0.68			
Gesamte Reduktion	0.10	0.15	0.19			
Met.wahrsch.Beschattung	168	298	116			

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)

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: A - IO1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:38	05:19	06:14	07:08	17:28 (25) 07:07	13:27 (30) 08:03
2	21:45	21:09	20:01	18:46	30 17:58 (25) 16:35	15:26 (21) 15:50
3	04:39	05:20	06:16	07:10	17:29 (25) 07:09	13:27 (30) 08:05
4	21:44	21:07	19:59	18:44	28 17:57 (25) 16:33	15:26 (21) 15:49
5	04:40	05:22	06:17	07:12	17:28 (25) 07:11	13:27 (30) 08:06
6	21:44	21:05	19:56	18:41	27 17:55 (25) 16:31	15:26 (21) 15:48
7	04:40	05:24	06:19	07:14	17:30 (25) 07:13	13:28 (30) 08:08
8	21:43	21:03	19:54	18:39	24 17:54 (25) 16:29	15:27 (21) 15:47
9	04:41	05:25	06:21	07:15	17:31 (25) 07:15	13:28 (30) 08:09
10	21:43	21:01	19:51	18:37	21 17:52 (25) 16:27	15:27 (21) 15:47
11	04:42	05:27	06:23	07:17	17:33 (25) 07:17	13:28 (30) 08:11
12	21:42	20:59	19:49	18:34	16 17:49 (25) 16:25	15:26 (21) 15:46
13	04:43	05:29	06:25	07:19	17:38 (25) 07:19	13:28 (30) 08:12
14	21:41	20:57	19:46	18:32	6 17:44 (25) 16:23	15:26 (21) 15:46
15	04:44	05:31	06:26	07:21	17:41 (25) 07:21	13:28 (30) 08:13
16	21:41	20:55	19:44	18:29	16:21	91 15:26 (21) 15:45
17	04:45	05:33	06:28	07:23	17:43 (25) 07:23	13:29 (30) 08:14
18	21:40	20:53	19:41	18:27	16:20	88 13:32 (30) 08:15
19	04:46	05:34	06:30	07:25	17:45 (25) 07:25	13:29 (30) 08:16
20	21:39	20:51	19:39	18:24	16:18	86 15:24 (21) 15:45
21	04:48	05:36	06:32	07:27	15:02 (30) 07:27	13:31 (30) 08:17
22	21:38	20:49	19:36	18:22	5 15:07 (30) 16:16	84 15:25 (21) 15:44
23	04:49	05:38	06:34	07:29	17:48 (25) 07:29	13:31 (30) 08:18
24	21:37	20:47	19:34	18:20	20 15:14 (30) 16:14	81 15:24 (21) 15:44
25	04:50	05:40	06:35	07:30	17:50 (25) 07:30	13:32 (30) 08:19
26	21:36	20:45	19:31	18:17	29 15:18 (30) 16:13	78 15:23 (21) 15:44
27	04:51	05:41	06:37	07:32	17:52 (25) 07:33	13:32 (30) 08:20
28	21:35	20:43	19:29	18:15	34 15:20 (30) 16:11	75 15:22 (21) 15:44
29	04:52	05:43	06:39	07:34	17:54 (25) 07:35	13:33 (30) 08:21
30	21:34	20:40	19:26	18:12	39 15:22 (30) 16:09	69 15:20 (21) 15:44
31	04:54	05:45	06:41	07:36	17:56 (25) 07:36	13:34 (30) 08:22
1	21:33	20:38	19:24	18:10	43 15:24 (30) 16:08	64 15:18 (21) 15:44
2	04:55	05:47	06:43	07:38	17:58 (25) 07:38	13:35 (30) 08:23
3	21:32	20:36	19:21	18:08	46 15:25 (30) 16:06	56 15:15 (21) 15:44
4	04:57	05:49	06:44	07:37	17:59 (25) 07:40	13:36 (30) 08:24
5	21:30	20:34	19:19	18:05	49 15:26 (30) 16:05	55 14:45 (18) 15:44
6	04:58	05:50	06:46	07:42	18:01 (25) 07:42	13:38 (30) 08:24
7	21:29	20:32	19:16	18:03	51 15:27 (30) 16:03	59 14:49 (18) 15:45
8	04:59	05:52	06:48	07:44	18:03 (25) 07:44	13:39 (30) 08:25
9	21:28	20:29	19:14	18:01	54 15:28 (30) 16:02	59 14:50 (18) 15:45
10	05:01	05:54	06:50	07:46	18:05 (25) 07:46	13:40 (30) 08:26
11	21:26	20:27	19:11	18:00	55 15:28 (30) 16:01	59 14:51 (18) 15:45
12	05:02	05:56	06:52	07:48	18:07 (25) 07:48	13:42 (30) 08:26
13	21:25	20:25	19:09	17:58	57 15:29 (30) 16:00	57 14:52 (18) 15:46
14	05:04	05:58	06:53	07:50	18:09 (25) 07:50	13:43 (30) 08:27
15	21:24	20:22	19:06	17:54	58 15:29 (30) 16:00	57 14:53 (18) 15:46
16	05:06	05:59	06:55	07:52	18:11 (25) 07:52	13:45 (30) 08:27
17	21:22	20:20	19:04	17:52	66 16:15 (21) 15:57	55 14:54 (18) 15:47
18	05:07	06:01	06:57	07:53	18:13 (25) 07:53	13:46 (30) 08:27
19	21:20	20:18	19:01	17:50	76 16:19 (21) 15:56	55 14:55 (18) 15:48
20	05:09	06:03	06:59	07:55	18:15 (25) 07:55	13:47 (30) 08:28
21	21:19	20:15	18:59	17:48	81 16:21 (21) 15:54	51 14:54 (18) 15:48
22	05:10	06:05	07:01	07:57	18:17 (25) 07:57	13:49 (30) 08:28
23	21:17	20:13	18:56	17:46	84 16:22 (21) 15:53	49 14:55 (18) 15:49
24	05:12	06:07	07:03	07:59	18:19 (25) 07:59	13:51 (30) 08:28
25	21:16	20:11	18:54	17:44	88 16:24 (21) 15:52	46 14:56 (18) 15:50
26	05:14	06:08	07:04	07:01	90 16:25 (21) 15:51	42 14:56 (18) 15:51
27	21:14	20:08	18:51	17:41	92 16:26 (21) 15:51	37 14:57 (18) 15:52
28	05:15	06:10	07:06	07:03	94 16:27 (21) 15:51	37 14:57 (18) 15:52
29	21:12	20:06	18:49	17:39	96 16:28 (21) 15:51	37 14:57 (18) 15:52
30	05:17	06:12	07:05	07:05	98 16:29 (21) 15:51	37 14:57 (18) 15:52
31	21:10	20:03	18:47	17:37	100 16:30 (21) 15:51	37 14:57 (18) 15:52
Sonnenscheinstunden	515	461	383	328	257	231
astr.max.mögl.Beschattung			422	1362	2106	1325
Red.Sonnenscheinwahrsch.			0.40	0.33	0.21	0.14
Reduktion Betriebsdauer			0.91	0.91	0.91	0.91
Reduktion Windrichtung			0.68	0.67	0.68	0.64
Gesamte Reduktion			0.25	0.20	0.13	0.08
Met.wahrsch.Beschattung			104	273	268	105

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 7
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: B - IO2

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:28	12:24 (22) 07:57		15:25 (18) 06:59	14:47 (30) 06:43	18:13 (25) 05:33	04:42
15:54	57 14:15 (20) 15:46	13	15:38 (18) 17:43	66 15:53 (30) 19:42	28 18:41 (25) 20:39	21:30
2 08:28	12:25 (22) 07:55		15:27 (18) 06:56	14:47 (30) 06:40	18:13 (25) 05:31	04:41
15:55	53 13:18 (2) 16:48	10	15:37 (18) 17:45	65 15:52 (30) 19:44	27 18:40 (25) 20:40	21:31
3 08:28	12:25 (22) 07:54		15:26 (18) 06:54	14:47 (30) 06:38	18:14 (25) 05:29	04:40
15:57	52 13:17 (2) 16:50		17:47	65 15:52 (30) 19:46	25 18:39 (25) 20:42	21:32
4 08:28	12:26 (22) 07:52		15:25 (18) 06:52	14:47 (30) 06:35	18:15 (25) 05:26	04:40
15:58	51 13:17 (2) 16:52		17:49	64 15:51 (30) 19:48	21 18:36 (25) 20:44	21:33
5 08:27	12:26 (22) 07:50		15:13 (30) 06:49	14:48 (30) 06:33	18:17 (25) 05:24	04:39
15:59	50 13:16 (2) 16:54	15	15:28 (30) 17:51	63 15:51 (30) 19:50	18 18:35 (25) 20:46	21:34
6 08:27	12:27 (22) 07:48		15:09 (30) 06:47	14:48 (30) 06:31	18:19 (25) 05:22	04:38
16:00	49 13:16 (2) 16:56	24	15:33 (30) 17:53	62 15:50 (30) 19:52	12 18:31 (25) 20:48	21:35
7 08:26	12:28 (22) 07:46		15:06 (30) 06:45	14:49 (30) 06:28	18:20 (25) 05:20	04:37
16:02	47 13:15 (2) 16:58	30	15:36 (30) 17:55	60 15:49 (30) 19:54	10 18:28 (25) 20:50	21:36
8 08:26	12:28 (22) 07:44		15:03 (30) 06:42	14:49 (30) 06:26	18:21 (25) 05:18	04:37
16:03	43 13:12 (2) 17:00	41	16:15 (21) 17:57	59 15:48 (30) 19:55	9 18:25 (25) 20:51	21:37
9 08:25	12:29 (22) 07:42		15:01 (30) 06:40	14:50 (30) 06:23	18:22 (25) 05:17	04:36
16:05	36 13:05 (22) 17:03	52	16:18 (21) 17:59	58 15:48 (30) 19:57	7 18:19 (25) 20:53	21:38
10 08:24	12:30 (22) 07:40		14:59 (30) 06:37	14:51 (30) 06:21	18:23 (25) 05:15	04:36
16:06	35 13:05 (22) 17:05	61	16:21 (21) 18:01	55 15:46 (30) 19:59	5 18:17 (25) 20:55	21:39
11 08:24	12:30 (22) 07:38		14:58 (30) 06:35	14:52 (30) 06:18	18:24 (25) 05:13	04:35
16:08	35 13:05 (22) 17:07	66	16:22 (21) 18:02	53 15:45 (30) 20:01	4 18:14 (25) 20:57	21:40
12 08:23	12:31 (22) 07:36		14:57 (30) 06:32	14:54 (30) 06:16	18:25 (25) 05:11	04:35
16:09	42 13:03 (18) 17:09	72	16:24 (21) 18:04	50 15:44 (30) 20:03	3 18:10 (25) 20:59	21:41
13 08:22	12:32 (22) 07:34		14:56 (30) 06:30	14:53 (30) 06:09	18:26 (25) 05:09	04:34
16:11	44 15:32 (18) 17:11	76	16:25 (21) 18:06	47 15:42 (30) 20:05	2 18:05 (25) 21:00	21:41
14 08:21	12:33 (22) 07:32		14:55 (30) 06:27	14:57 (30) 06:11	18:27 (25) 05:07	04:34
16:13	45 15:33 (18) 17:13	79	16:26 (21) 18:08	44 15:41 (30) 20:07	1 18:00 (25) 21:02	21:42
15 08:20	12:35 (22) 07:30		14:53 (30) 06:25	14:58 (30) 06:09	18:28 (25) 05:06	04:34
16:14	45 15:35 (18) 17:15	84	16:26 (21) 18:10	41 15:39 (30) 20:09	0 18:00 (25) 21:04	21:43
16 08:19	12:36 (22) 07:28		14:52 (30) 06:23	15:01 (30) 06:06	18:29 (25) 05:04	04:34
16:16	44 15:36 (18) 17:17	87	16:27 (21) 18:12	36 15:37 (30) 20:11	0 18:00 (25) 21:06	21:43
17 08:18	12:38 (22) 07:26		14:52 (30) 06:20	15:03 (30) 06:04	18:30 (25) 05:02	04:33
16:18	43 15:37 (18) 17:19	88	16:27 (21) 18:14	30 15:33 (30) 20:12	0 18:00 (25) 21:07	21:44
18 08:17	12:39 (22) 07:24		14:51 (30) 06:18	15:06 (30) 06:02	18:31 (25) 05:01	04:33
16:19	42 15:38 (18) 17:21	90	16:27 (21) 18:16	32 17:35 (25) 20:14	0 18:00 (25) 21:09	21:44
19 08:16	12:41 (22) 07:22		14:50 (30) 06:15	15:12 (30) 06:59	18:32 (25) 04:59	04:33
16:21	41 15:39 (18) 17:23	92	16:27 (21) 18:18	28 17:39 (25) 20:16	0 18:00 (25) 21:11	21:45
20 08:15	12:43 (22) 07:19		14:50 (30) 06:13	15:15 (30) 06:57	18:33 (25) 04:58	04:34
16:23	38 15:40 (18) 17:25	91	16:27 (21) 18:20	20 17:40 (25) 20:18	0 18:00 (25) 21:12	21:45
21 08:14	12:46 (22) 07:17		14:49 (30) 06:10	17:18 (25) 05:55	18:34 (25) 04:56	04:34
16:25	33 15:40 (18) 17:27	93	16:27 (21) 18:22	24 17:42 (25) 20:20	0 18:00 (25) 21:14	21:45
22 08:12	15:19 (18) 07:15		14:48 (30) 06:08	17:16 (25) 05:52	18:35 (25) 04:55	04:34
16:27	22 15:41 (18) 17:29	93	16:26 (21) 18:23	26 17:42 (25) 20:22	0 18:00 (25) 21:15	21:45
23 08:11	15:19 (18) 07:13		14:48 (30) 06:05	17:15 (25) 05:50	18:36 (25) 04:53	04:34
16:29	22 15:41 (18) 17:31	91	16:25 (21) 18:25	28 17:43 (25) 20:24	0 18:00 (25) 21:17	21:46
24 08:10	15:19 (18) 07:10		14:48 (30) 06:03	17:14 (25) 05:48	18:37 (25) 04:52	04:34
16:31	22 15:41 (18) 17:33	91	16:25 (21) 18:27	29 17:43 (25) 20:26	0 18:00 (25) 21:18	21:46
25 08:08	15:20 (18) 07:08		14:47 (30) 06:00	17:14 (25) 05:46	18:38 (25) 04:50	04:35
16:32	22 15:42 (18) 17:35	89	16:23 (21) 18:29	30 17:44 (25) 20:27	0 18:00 (25) 21:20	21:46
26 08:07	15:20 (18) 07:06		14:47 (30) 05:58	17:12 (25) 05:43	18:39 (25) 04:49	04:35
16:34	22 15:42 (18) 17:37	87	16:22 (21) 18:31	32 17:44 (25) 20:29	0 18:00 (25) 21:21	21:46
27 08:05	15:20 (18) 07:04		14:47 (30) 05:55	17:12 (25) 05:41	18:40 (25) 04:48	04:36
16:36	21 15:41 (18) 17:39	82	16:19 (21) 18:33	32 17:44 (25) 20:31	0 18:00 (25) 21:23	21:46
28 08:04	15:21 (18) 07:01		14:47 (30) 05:53	17:12 (25) 05:39	18:41 (25) 04:47	04:36
16:38	21 15:42 (18) 17:41	78	16:17 (21) 18:35	31 17:43 (25) 20:33	0 18:00 (25) 21:24	21:45
29 08:02	15:22 (18) 07:00		14:46 (30) 05:50	17:11 (25) 05:37	18:42 (25) 04:45	04:37
16:40	19 15:41 (18) 17:43	77	16:16 (21) 18:37	31 18:43 (25) 20:35	0 18:00 (25) 21:26	21:45
30 08:01	15:23 (18) 06:58		14:46 (30) 05:48	17:10 (25) 05:35	18:43 (25) 04:44	04:37
16:42	18 15:41 (18) 17:45	76	16:15 (21) 18:39	31 18:43 (25) 20:37	0 18:00 (25) 21:27	21:45
31 07:59	15:24 (18) 06:56		14:45 (30) 05:45	17:09 (25) 05:33	18:44 (25) 04:43	04:37
16:44	16 15:40 (18) 17:47	75	16:14 (21) 18:41	30 18:42 (25) 20:39	0 18:00 (25) 21:28	21:45
Sonnenscheinstunden	248	272	367	421	496	513
astr.max.mögl.Beschattung	1130	1775	1322	131	41	1
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.41	0.41
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
Reduktion Windrichtung	0.63	0.69	0.69	0.68	0.68	0.68
Gesamte Reduktion	0.10	0.15	0.19	0.25	0.25	0.25
Met.wahrsch.Beschattung	111	262	254	33	33	33

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 8
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: B - IO2

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:38 05:19 06:14			07:08	15:33 (30) 07:07	14:29 (30) 08:03
2	21:45 21:09 20:01			18:46	50 16:23 (30) 16:35	60 15:50 (21) 15:50
3	04:39 05:20 06:16			07:10	15:32 (30) 07:09	14:31 (30) 08:05
4	21:44 21:07 19:59			18:44	52 16:24 (30) 16:33	51 15:48 (21) 15:49
5	04:40 05:22 06:17			07:12	15:29 (30) 07:11	14:33 (30) 08:06
6	21:44 21:05 19:56			18:41	55 16:24 (30) 16:31	37 15:43 (21) 15:48
7	04:40 05:24 06:19			07:14	15:28 (30) 07:13	14:36 (30) 08:08
8	21:43 21:03 19:54			18:39	56 16:24 (30) 16:29	29 15:05 (30) 15:47
9	04:41 05:25 06:21			07:15	15:26 (30) 07:15	14:39 (30) 08:09
10	21:43 21:01 19:51			18:37	59 16:25 (30) 16:27	23 15:02 (30) 15:47
11	04:42 05:27 06:23		18:15 (25) 07:17	15:25 (30) 07:17	14:43 (30) 08:10	12:13 (22)
12	21:42 20:59 19:49	12	18:27 (25) 18:34	60 16:25 (30) 16:25	14 14:57 (30) 15:46	48 13:01 (2)
13	04:43 05:29 06:25		18:12 (25) 07:19	15:24 (30) 07:19		08:12
14	21:41 20:57 19:46	18	18:30 (25) 18:32	61 16:25 (30) 16:23		15:46
15	04:44 05:31 06:26		18:10 (25) 07:21	15:23 (30) 07:21		08:13
16	21:41 20:55 19:44	21	18:31 (25) 18:29	63 16:26 (30) 16:21		15:45
17	04:45 05:33 06:28		18:08 (25) 07:23	15:23 (30) 07:23		14:58 (18) 08:14
18	21:40 20:53 19:41	24	18:32 (25) 18:27	63 16:26 (30) 16:20	10	15:08 (18) 15:45
19	04:46 05:34 06:30		18:06 (25) 07:25	15:22 (30) 07:25		14:56 (18) 08:16
20	21:39 20:51 19:39	27	18:33 (25) 18:24	64 16:26 (30) 16:18	13	15:09 (18) 15:45
21	04:48 05:36 06:32		18:05 (25) 07:27	15:21 (30) 07:27		14:55 (18) 08:17
22	21:38 20:49 19:36	28	18:33 (25) 18:22	65 16:26 (30) 16:16	17	15:12 (18) 15:44
23	04:49 05:38 06:34		18:04 (25) 07:29	15:21 (30) 07:29		14:54 (18) 08:18
24	21:37 20:47 19:34	30	18:34 (25) 18:20	65 16:26 (30) 16:14	19	15:13 (18) 15:44
25	04:50 05:40 06:35		18:03 (25) 07:30	15:20 (30) 07:31		14:54 (18) 08:19
26	21:36 20:45 19:31	30	18:33 (25) 18:17	72 16:47 (21) 16:13	19	15:13 (18) 15:44
27	04:51 05:41 06:37		18:02 (25) 07:32	15:20 (30) 07:33		14:53 (18) 08:20
28	21:35 20:43 19:29	31	18:33 (25) 18:15	80 16:51 (21) 16:11	21	15:14 (18) 15:44
29	04:52 05:43 06:39		18:02 (25) 07:34	15:20 (30) 07:35		14:53 (18) 08:21
30	21:34 20:40 19:26	31	18:33 (25) 18:12	84 16:53 (21) 16:09	21	15:14 (18) 15:44
31	04:54 05:45 06:41		18:02 (25) 07:36	15:20 (30) 07:37		14:53 (18) 08:22
1	21:33 20:38 19:24	31	18:33 (25) 18:10	88 16:55 (21) 16:08	22	15:15 (18) 15:44
2	04:55 05:47 06:43		18:01 (25) 07:38	15:19 (30) 07:38		14:53 (18) 08:23
3	21:32 20:36 19:21	31	18:32 (25) 18:08	91 16:56 (21) 16:06	22	15:15 (18) 15:44
4	04:57 05:49 06:44		18:01 (25) 07:40	15:19 (30) 07:40		14:53 (18) 08:24
5	21:30 20:34 19:19	31	18:32 (25) 18:05	91 16:56 (21) 16:05	22	15:15 (18) 15:44
6	04:58 05:50 06:46		18:01 (25) 07:42	15:19 (30) 07:42		14:54 (18) 08:24
7	21:29 20:32 19:16	30	18:31 (25) 18:03	93 16:57 (21) 16:03	22	15:16 (18) 15:45
8	04:59 05:52 06:48		18:02 (25) 07:44	15:20 (30) 07:44		14:54 (18) 08:25
9	21:28 20:29 19:14	28	18:30 (25) 18:01	92 16:57 (21) 16:02	22	15:16 (18) 15:45
10	05:01 05:54 06:50		18:01 (25) 07:46	15:20 (30) 07:46		12:22 (22) 08:26
11	21:26 20:27 19:11	27	18:28 (25) 17:59	92 16:57 (21) 16:01	33	15:16 (18) 15:45
12	05:02 05:56 06:52		18:02 (25) 07:48	15:20 (30) 07:48		12:19 (22) 08:26
13	21:25 20:25 19:09	25	18:27 (25) 17:56	92 16:57 (21) 15:59	38	15:16 (18) 15:46
14	05:04 05:58 06:53		18:04 (25) 07:50	15:20 (30) 07:50		12:18 (22) 08:27
15	21:24 20:22 19:06	21	18:25 (25) 17:54	91 16:57 (21) 15:58	41	15:16 (18) 15:46
16	05:06 05:59 06:55		16:01 (30) 07:52	15:21 (30) 07:51		12:17 (22) 08:27
17	21:22 20:20 19:04	20	18:23 (25) 17:52	89 16:57 (21) 15:57	42	15:16 (18) 15:47
18	05:07 06:01 06:57		15:51 (30) 06:53	14:21 (30) 07:53		12:15 (22) 08:27
19	21:20 20:18 19:01	33	18:20 (25) 16:50	87 15:56 (21) 15:56	44	15:15 (18) 15:48
20	05:09 06:03 06:59		15:47 (30) 06:55	14:22 (30) 07:55		12:14 (22) 08:28
21	21:19 20:15 18:59	28	16:15 (30) 16:48	85 15:56 (21) 15:54	44	15:14 (18) 15:48
22	05:10 06:05 07:01		15:43 (30) 06:57	14:23 (30) 07:57		12:14 (22) 08:28
23	21:17 20:13 18:56	34	16:17 (30) 16:45	82 15:55 (21) 15:53	45	15:14 (18) 15:49
24	05:12 06:07 07:03		15:40 (30) 06:59	14:25 (30) 07:58		12:13 (22) 08:28
25	21:16 20:11 18:54	39	16:19 (30) 16:43	79 15:55 (21) 15:52	45	15:13 (18) 15:50
26	05:14 06:08 07:04		15:37 (30) 07:01	14:26 (30) 08:00		12:13 (22) 08:28
27	21:14 20:08 18:51	43	16:20 (30) 16:41	74 15:54 (21) 15:51	44	15:13 (18) 15:51
28	05:15 06:10 07:06		15:35 (30) 07:03	14:27 (30) 08:02		12:13 (22) 08:28
29	21:12 20:06 18:49	47	16:22 (30) 16:39	70 15:53 (21) 15:51	42	15:12 (18) 15:52
30	05:17 06:12 07:05		15:05 (30) 07:05	14:28 (30) 08:00		12:13 (22) 08:28
31	21:10 20:03 18:45		16:37	65 15:52 (21) 15:50		15:53
Sonnenscheinstunden	515	461	383	328	257	231
astr.max.mögl.Beschattung			720	2310	862	1840
Red.Sonnenscheinwahrsch.			0.40	0.33	0.21	0.14
Reduktion Betriebsdauer			0.91	0.91	0.91	0.91
Reduktion Windrichtung			0.68	0.69	0.66	0.62
Gesamte Reduktion			0.25	0.20	0.12	0.08
Met.wahrsch.Beschattung			177	469	106	140

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 9

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: C - IO3

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1 08:28		13:52 (2) 07:57	14:06 (22) 06:59		17:21 (30) 05:33	04:42		
15:54	56	15:10 (20) 15:46	14:46 (22) 17:43	19	17:08 (21) 19:42	60	19:10 (25) 20:39	21:30
2 08:28		13:52 (2) 07:55	14:07 (22) 06:56		16:47 (21) 06:40		17:21 (30) 05:31	04:41
15:55	58	15:11 (20) 16:48	14:09 (22) 06:54	22	17:09 (21) 19:44	59	19:10 (25) 20:40	21:31
3 08:28		13:52 (2) 07:54	14:09 (22) 06:54		16:46 (21) 06:38		17:23 (30) 05:28	04:40
15:57	59	15:11 (20) 16:50	14:12 (22) 06:47	24	17:10 (21) 19:46	57	19:11 (25) 20:42	21:32
4 08:27		13:53 (2) 07:52	14:10 (22) 06:52		16:45 (21) 06:35		17:25 (30) 05:26	04:40
15:58	60	15:12 (20) 16:52	14:11 (22) 06:49	25	17:10 (21) 19:48	52	19:10 (25) 20:44	21:33
5 08:27		13:53 (2) 07:50	14:11 (22) 06:49		16:44 (30) 06:33		17:27 (30) 05:24	04:39
15:59	60	15:12 (20) 16:54	14:12 (22) 06:40	26	17:10 (21) 19:50	49	19:11 (25) 20:46	21:34
6 08:27		13:54 (2) 07:48	14:12 (22) 06:40		16:36 (30) 06:31		17:30 (30) 05:22	04:38
16:00	62	15:14 (20) 16:56	14:12 (22) 06:37	34	17:10 (21) 19:52	41	19:10 (25) 20:48	21:35
7 08:26		13:54 (2) 07:46	14:14 (22) 06:45		16:33 (30) 06:28		18:45 (25) 05:20	04:37
16:02	63	15:14 (20) 16:58	14:15 (22) 06:42	37	17:10 (21) 19:54	25	19:10 (25) 20:50	21:36
8 08:26		13:55 (2) 07:44	14:15 (22) 06:42		16:30 (30) 06:26		18:45 (25) 05:18	04:37
16:03	62	15:14 (20) 17:00	14:18 (22) 06:40	39	17:09 (21) 19:55	25	19:10 (25) 20:51	21:37
9 08:25		13:55 (2) 07:42	14:18 (22) 06:40		16:28 (30) 06:23		18:45 (25) 05:17	04:36
16:05	64	15:15 (20) 17:03	14:21 (22) 06:37	41	17:09 (21) 19:57	23	19:08 (25) 20:53	21:38
10 08:24		13:55 (2) 07:40	14:21 (22) 06:37		16:26 (30) 06:21		18:46 (25) 05:15	04:36
16:06	65	15:15 (20) 17:05	16:04 (18) 18:00	41	17:07 (21) 19:59	22	19:08 (25) 20:55	21:39
11 08:24		13:56 (2) 07:38	16:04 (18) 18:00		16:25 (30) 06:18		18:46 (25) 05:13	04:35
16:08	64	15:16 (20) 17:07	16:04 (18) 18:02	42	17:07 (21) 20:01	20	19:06 (25) 20:57	21:40
12 08:23		13:56 (2) 07:36	16:04 (18) 18:02		16:23 (30) 06:16		18:47 (25) 05:11	04:35
16:09	65	15:16 (20) 17:09	16:05 (18) 18:04	43	17:06 (30) 20:03	18	19:05 (25) 20:59	21:41
13 08:22		13:57 (2) 07:34	16:05 (18) 18:03		16:22 (30) 06:14		18:50 (25) 05:09	04:34
16:11	65	15:16 (20) 17:11	16:06 (18) 18:06	45	17:07 (30) 20:05	13	19:03 (25) 21:00	21:41
14 08:21		13:58 (2) 07:32	16:06 (18) 18:06		16:20 (30) 06:11		18:52 (25) 05:07	04:34
16:13	65	15:17 (20) 17:13	16:06 (18) 18:08	47	17:07 (30) 20:07	7	18:59 (25) 21:02	21:42
15 08:20		13:58 (2) 07:30	16:07 (18) 18:05		16:20 (30) 06:09		18:59 (25) 05:06	04:34
16:14	66	15:17 (20) 17:15	16:07 (18) 18:10	48	17:08 (30) 20:09		21:04 21:43	
16 08:19		13:59 (2) 07:28	16:09 (18) 18:23		16:18 (30) 06:06		19:05 (25) 05:04	04:34
16:16	65	15:18 (20) 17:17	16:10 (18) 18:12	50	17:08 (30) 20:11		21:05 21:43	
17 08:18		14:00 (2) 07:26	16:10 (18) 18:12		16:18 (30) 06:04		19:06 (25) 05:02	04:33
16:18	64	15:18 (20) 17:19	16:11 (18) 18:14	51	17:09 (30) 20:12		21:07 21:44	
18 08:17		14:00 (2) 07:24	16:11 (18) 18:14		16:17 (30) 06:02		19:07 (25) 05:01	04:33
16:19	63	15:17 (20) 17:21	16:12 (18) 18:16	51	17:08 (30) 20:14		21:09 21:44	
19 08:16		14:02 (2) 07:22	16:12 (18) 18:16		16:17 (30) 05:59		19:08 (25) 05:00	04:33
16:21	61	15:17 (20) 17:23	16:13 (18) 18:18	52	17:09 (30) 20:16		21:10 21:45	
20 08:15		14:02 (2) 07:19	16:13 (18) 18:18		16:16 (30) 05:57		19:09 (25) 05:00	04:34
16:23	61	15:18 (20) 17:25	16:14 (18) 18:20	52	17:08 (30) 20:18		21:12 21:45	
21 08:14		14:02 (22) 07:17	16:14 (18) 18:20		16:16 (30) 05:55		19:10 (25) 05:00	04:34
16:25	60	15:17 (20) 17:27	16:15 (18) 18:22	52	17:08 (30) 20:20		21:14 21:45	
22 08:12		14:03 (22) 07:15	16:15 (18) 18:22		16:16 (30) 05:52		19:11 (25) 05:00	04:34
16:27	58	15:17 (20) 17:29	16:16 (18) 18:23	52	17:08 (30) 20:22		21:15 21:45	
23 08:11		14:02 (22) 07:13	16:16 (18) 18:25		16:16 (30) 05:50		19:12 (25) 05:00	04:34
16:29	56	15:15 (20) 17:31	16:17 (18) 18:25	52	17:08 (30) 20:24		21:17 21:46	
24 08:10		14:02 (22) 07:10	16:17 (18) 18:25		16:15 (30) 05:48		19:13 (25) 05:00	04:34
16:31	52	15:13 (20) 17:33	16:18 (18) 18:27	52	17:07 (30) 20:26		21:18 21:46	
25 08:08		14:03 (22) 07:08	16:18 (18) 18:27		16:16 (30) 05:46		19:14 (25) 05:00	04:35
16:32	44	14:47 (22) 17:35	16:19 (18) 18:29	51	17:07 (30) 20:27		21:20 21:46	
26 08:07		14:03 (22) 07:06	16:19 (18) 18:29		16:16 (30) 05:43		19:15 (25) 05:00	04:35
16:34	44	14:47 (22) 17:37	16:20 (18) 18:31	50	17:06 (30) 20:29		21:21 21:46	
27 08:05		14:03 (22) 07:04	16:20 (18) 18:31		16:17 (30) 05:41		19:16 (25) 05:00	04:36
16:36	43	14:46 (22) 17:39	16:21 (18) 18:33	48	17:05 (30) 20:31		21:23 21:46	
28 08:04		14:04 (22) 07:01	16:21 (18) 18:33		16:16 (30) 05:39		19:17 (25) 05:00	04:36
16:38	43	14:47 (22) 17:41	16:22 (18) 18:35	48	17:04 (30) 20:33		21:24 21:45	
29 08:02		14:05 (22) 07:00	16:22 (18) 18:35		17:18 (30) 05:37		19:18 (25) 05:00	04:37
16:40	42	14:47 (22) 17:43	16:23 (18) 18:37	52	19:04 (25) 20:35		21:26 21:45	
30 08:01		14:05 (22) 07:00	16:23 (18) 18:37		17:19 (30) 05:35		19:19 (25) 05:00	04:37
16:42	42	14:47 (22) 17:45	16:24 (18) 18:39	58	19:07 (25) 20:37		21:27 21:45	
31 07:59		14:06 (22) 07:00	16:24 (18) 18:39		17:19 (30) 05:35		19:20 (25) 05:00	04:37
16:44	40	14:46 (22) 17:47	16:25 (18) 18:41	59	19:08 (25) 20:39		21:28 21:45	
Sonnenscheinstunden	248	272	367	421	496	513		
astr.max.mögl.Beschattung	1772	571	1363	471				
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41				
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91				
Reduktion Windrichtung	0.67	0.88	0.68	0.68				
Gesamte Reduktion	0.11	0.15	0.19	0.25				
Met.wahrsch.Beschattung	187	84	263	118				

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)

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 10

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

Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: C - IO3

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1.017 1.220 930 354 7.936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:38 05:19		06:14	18:46 (25) 07:08	17:02 (30) 07:07	13:50 (22) 08:03
2	21:45 21:09		20:01	19:06 (25) 18:46	17:46 (30) 16:35	15:53 (18) 15:50
3	04:39 05:20		06:16	18:44 (25) 07:10	17:03 (30) 07:09	13:47 (22) 08:05
4	21:44 21:07		19:59	19:06 (25) 18:44	17:45 (21) 16:33	15:53 (18) 15:49
5	04:40 05:22		06:17	18:43 (25) 07:12	17:03 (30) 07:11	13:44 (22) 08:06
6	21:44 21:05		19:56	19:06 (25) 18:41	17:45 (21) 16:31	15:53 (18) 15:48
7	04:40 05:24		06:19	18:42 (25) 07:14	17:05 (30) 07:13	13:43 (22) 08:08
8	21:43 21:03		19:54	19:07 (25) 18:39	17:46 (21) 16:29	15:53 (18) 15:47
9	04:41 05:25		06:21	18:41 (25) 07:15	17:06 (30) 07:15	13:42 (22) 08:09
10	21:43 21:01		19:51	19:06 (25) 18:37	17:46 (21) 16:27	15:52 (18) 15:47
11	04:42 05:27		06:23	17:27 (30) 07:17	17:08 (30) 07:17	13:40 (22) 08:10
12	21:42 20:59		19:49	19:06 (25) 18:34	17:46 (21) 16:25	15:52 (18) 15:46
13	04:43 05:29		06:25	17:23 (30) 07:19	17:11 (30) 07:19	13:39 (22) 08:12
14	21:41 20:57		19:46	19:06 (25) 18:32	17:46 (21) 16:23	15:50 (18) 15:46
15	04:44 05:31		06:26	17:20 (30) 07:21	17:15 (30) 07:21	13:38 (22) 08:13
16	21:41 20:55		19:44	19:06 (25) 18:29	17:46 (21) 16:21	15:49 (18) 15:45
17	04:45 05:33		06:28	17:17 (30) 07:23	17:42 (21) 16:14	13:38 (22) 08:14
18	21:40 20:53		19:41	19:04 (25) 18:27	17:45 (21) 16:20	15:48 (18) 15:45
19	04:46 05:34		06:30	17:15 (30) 07:25	17:20 (21) 07:25	13:37 (22) 08:16
20	21:39 20:51		19:39	19:03 (25) 18:24	17:44 (21) 16:18	14:17 (22) 15:45
21	04:48 05:36		06:32	17:13 (30) 07:27	17:21 (21) 07:27	13:37 (22) 08:17
22	21:38 20:49		19:36	19:02 (25) 18:22	17:44 (21) 16:16	14:18 (22) 15:44
23	04:49 05:38		06:34	17:11 (30) 07:28	17:21 (21) 07:29	13:37 (22) 08:18
24	21:37 20:47		19:34	19:01 (25) 18:20	17:42 (21) 16:14	14:19 (22) 15:44
25	04:50 05:40		06:35	17:09 (30) 07:30	17:22 (21) 07:31	13:37 (22) 08:19
26	21:36 20:45		19:31	19:58 (25) 18:17	19:14 (21) 16:13	14:19 (22) 15:44
27	04:51 05:41		06:37	17:08 (30) 07:32	17:24 (21) 07:33	13:36 (22) 08:20
28	21:35 20:43		19:29	18:55 (25) 18:15	17:39 (21) 16:11	14:19 (22) 15:44
29	04:52 05:43		06:39	17:07 (30) 07:34	17:26 (21) 07:35	13:36 (22) 08:21
30	21:34 20:40		19:26	17:54 (30) 18:12	17:36 (21) 16:09	14:19 (22) 15:44
31	04:54 05:45		06:41	17:06 (30) 07:36	17:37	13:36 (22) 08:22
1	21:33 20:38		19:24	19:03 (25) 18:10	17:43 (21) 16:08	14:20 (22) 15:44
2	04:55 05:47		06:43	17:04 (30) 07:38	17:38	13:36 (22) 08:23
3	21:32 20:36		19:21	17:54 (30) 18:08	17:40	14:20 (22) 15:44
4	04:57 05:49		06:44	17:04 (30) 07:40	17:40	13:36 (22) 08:24
5	21:30 20:34		19:19	17:54 (30) 18:05	17:40	14:20 (22) 15:44
6	04:58 05:50		06:46	17:03 (30) 07:42	17:42	13:37 (22) 08:24
7	21:29 20:32		19:16	17:54 (30) 18:03	17:43	14:50 (20) 15:45
8	04:59 05:52		06:48	17:03 (30) 07:44	17:44	13:36 (22) 08:25
9	21:28 20:29		19:14	17:54 (30) 18:01	17:44	14:52 (20) 15:45
10	05:01 05:54		06:50	17:01 (30) 07:46	17:46	13:38 (22) 08:26
11	21:26 20:27		19:11	17:53 (30) 17:59	17:46	14:53 (20) 15:45
12	05:02 05:56		06:52	17:01 (30) 07:48	17:48	13:38 (22) 08:26
13	21:25 20:25		19:09	17:53 (30) 17:56	17:48	14:54 (20) 15:46
14	05:04 05:58		06:53	17:01 (30) 07:50	17:50	13:39 (22) 08:27
15	21:24 20:22		19:06	17:53 (30) 17:54	17:50	14:55 (20) 15:46
16	04:56 05:59		06:55	17:01 (30) 07:52	17:51	13:39 (22) 08:27
17	21:22 20:20		19:04	17:53 (30) 17:52	17:52	14:55 (20) 15:47
18	05:07 06:01		06:57	17:01 (30) 06:53	17:53	13:37 (22) 08:27
19	21:20 20:18		19:01	17:52 (30) 16:50	17:56	14:55 (20) 15:48
20	04:59 06:03		06:59	17:00 (30) 06:55	17:58	13:37 (22) 08:28
21	21:19 20:15		18:59	17:51 (30) 16:48	17:59	14:56 (20) 15:48
22	05:10 06:05		07:01	17:00 (30) 06:57	17:59	13:37 (22) 08:28
23	21:17 20:13		18:56	17:50 (30) 16:45	17:59	14:56 (20) 15:49
24	05:12 06:07		07:03	17:00 (30) 06:59	17:59	13:38 (22) 08:28
25	21:16 20:11		18:54	17:49 (30) 16:43	17:59	14:57 (20) 15:50
26	05:14 06:08		18:53 (25) 07:04	17:01 (30) 07:01	17:59	13:38 (22) 08:28
27	21:14 20:08	7	19:00 (25) 18:51	17:48 (30) 16:41	17:59	14:57 (20) 15:51
28	05:15 06:10		18:49 (25) 07:06	17:02 (30) 07:03	17:59	13:38 (22) 08:28
29	21:12 20:06	14	19:03 (25) 18:49	17:47 (30) 16:39	17:59	14:58 (20) 15:52
30	05:17 06:12		18:47 (25)	17:05	17:59	15:33 (18)
31	21:10 20:03	18	19:05 (25)	16:37	17:59	15:53 (18)
Sonnenscheinstunden	515	461	383	328	257	231
astr.max.mögl.Beschattung		39	1401	548	1552	1733
Red.Sonnenscheinwahrsch.		0.48	0.40	0.33	0.21	0.14
Reduktion Betriebsdauer		0.91	0.91	0.91	0.91	0.91
Reduktion Windrichtung		0.67	0.68	0.69	0.67	0.67
Gesamte Reduktion		0.29	0.25	0.20	0.13	0.08
Met.wahrsch.Beschattung		11	346	112	197	145

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 11

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: D - IO4

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1 08:28	07:57	15	15:49 (3) 06:59	18	16:25 (2) 06:43	17	18:56 (30) 05:33	04:42
15:54	16:46	16:04 (3) 17:43	18	16:43 (2) 19:42	17	19:13 (30) 20:39	21:29	
2 08:28	07:55	15	15:50 (3) 06:56	18	16:27 (2) 06:40	17	18:53 (30) 05:31	04:41
15:55	16:48	13	16:03 (3) 17:45	15	17:17 (18) 19:44	21	19:14 (30) 20:40	21:31
3 08:28	07:54	13	15:52 (3) 06:54	15	16:31 (2) 06:38	18	18:52 (30) 05:28	04:40
15:57	16:50	11	16:03 (3) 17:47	12	17:20 (18) 19:46	23	19:15 (30) 20:42	21:32
4 08:27	07:52	11	15:54 (3) 06:52	12	17:07 (22) 06:35	18	18:51 (30) 05:26	04:39
15:58	16:52	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
5 08:27	07:50	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
15:59	16:54	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
6 08:27	07:48	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
16:00	16:56	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
7 08:26	07:46	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
16:02	16:58	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
8 08:26	07:44	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
16:03	17:00	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
9 08:25	07:42	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
16:05	17:02	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
10 08:24	07:40	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
16:06	17:05	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
11 08:24	07:38	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
16:08	17:07	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
12 08:23	07:36	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
16:09	17:09	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
13 08:22	07:34	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
16:11	17:11	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
14 08:21	07:32	7	16:01 (3) 17:49	14	17:21 (18) 19:48	24	19:15 (30) 20:44	21:33
16:12	17:13	11	16:44 (20) 18:08	24	17:19 (22) 20:07	30	19:34 (25) 21:02	21:42
15 08:20	07:30	11	16:44 (20) 18:08	24	17:19 (22) 20:07	30	19:34 (25) 21:02	21:42
16:14	17:15	17	16:45 (20) 18:10	23	17:19 (22) 20:09	25	19:34 (25) 21:04	21:43
16 08:19	07:28	17	16:45 (20) 18:10	23	17:19 (22) 20:09	25	19:34 (25) 21:04	21:43
16:16	17:17	21	16:47 (20) 18:12	21	17:17 (22) 20:10	14	19:32 (25) 21:05	21:43
17 08:18	07:26	21	16:47 (20) 18:12	21	17:17 (22) 20:10	14	19:32 (25) 21:05	21:43
16:18	17:19	25	16:50 (20) 18:14	19	17:16 (22) 20:12	6	19:29 (25) 21:07	21:44
18 08:17	07:24	25	16:50 (20) 18:14	19	17:16 (22) 20:12	6	19:29 (25) 21:07	21:44
16:19	17:21	28	16:52 (20) 18:16	16	17:14 (22) 20:14		21:09	21:44
19 08:16	07:22	28	16:52 (20) 18:16	16	17:14 (22) 20:14		21:09	21:44
16:21	17:23	29	16:52 (20) 18:16	11	17:12 (22) 20:16		21:10	21:45
20 08:15	07:19	29	16:52 (20) 18:16	11	17:12 (22) 20:16		21:10	21:45
16:23	17:25	30	16:52 (20) 18:22	6	17:55 (21) 20:20		21:14	21:45
21 08:14	07:17	30	16:52 (20) 18:22	6	17:55 (21) 20:20		21:14	21:45
16:25	17:27	30	16:52 (20) 18:22	6	17:55 (21) 20:20		21:14	21:45
22 08:12	07:15	30	16:52 (20) 18:22	6	17:55 (21) 20:20		21:14	21:45
16:27	17:29	29	16:50 (20) 18:23	10	17:56 (21) 20:22		21:15	21:45
23 08:11	07:13	29	16:50 (20) 18:23	10	17:56 (21) 20:22		21:15	21:45
16:29	17:31	28	16:48 (20) 18:25	13	17:59 (21) 20:24		21:17	21:45
24 08:10	07:10	28	16:48 (20) 18:25	13	17:59 (21) 20:24		21:17	21:45
16:30	17:33	26	16:48 (20) 18:27	15	18:00 (21) 20:26		21:18	21:46
25 08:08	07:08	26	16:48 (20) 18:27	15	18:00 (21) 20:26		21:18	21:46
16:32	17:35	26	16:47 (20) 18:29	16	18:01 (21) 20:27		21:20	21:46
26 08:07	07:06	26	16:47 (20) 18:29	16	18:01 (21) 20:27		21:20	21:46
16:34	17:37	24	16:46 (20) 18:31	16	18:00 (21) 20:29		21:21	21:46
27 08:05	07:03	24	16:46 (20) 18:31	16	18:00 (21) 20:29		21:21	21:46
16:36	17:39	23	16:45 (20) 18:33	14	17:59 (21) 20:31		21:23	21:45
28 08:04	07:01	23	16:45 (20) 18:33	14	17:59 (21) 20:31		21:23	21:45
16:38	17:41	20	16:44 (20) 18:35	12	17:57 (21) 20:33		21:24	21:45
29 08:02	06:59	20	16:44 (20) 18:35	12	17:57 (21) 20:33		21:24	21:45
16:40	17:41	17	16:43 (20) 18:37	9	18:56 (21) 20:35		21:26	21:45
30 08:00	06:57	17	16:43 (20) 18:37	9	18:56 (21) 20:35		21:26	21:45
16:42	17:43	16	16:42 (20) 18:39	6	19:01 (30) 05:35		04:44	04:37
31 07:59	06:45	16	16:42 (20) 18:39	6	19:01 (30) 05:35		04:44	04:37
16:44	17:44	16	16:44 (20) 18:41	13	19:11 (30) 05:37		04:43	04:37
Sonnenscheinstunden	248	272	367	421	496	513		
astr.max.mögl.Beschattung	125	413	528	442				
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41				
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91				
Reduktion Windrichtung	0.69	0.70	0.68	0.66				
Gesamte Reduktion	0.11	0.15	0.19	0.25				
Met.wahrsch.Beschattung	14	63	102	110				

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 12

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: D - IO4

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:38 05:19		06:14	18:49 (30) 07:08	17:35 (22) 07:07	08:03
	21:45 21:09		20:01	36 19:33 (25) 18:46	25 18:00 (22) 16:35	15:50
2	04:39 05:20		06:16	18:47 (30) 07:10	17:35 (22) 07:09	08:05
	21:44 21:07		19:59	35 19:30 (25) 18:44	25 18:00 (22) 16:33	15:49
3	04:40 05:22		06:17	18:47 (30) 07:12	17:34 (22) 07:11	08:06
	21:44 21:05		19:56	32 19:28 (25) 18:41	25 17:59 (22) 16:31	15:48
4	04:40 05:24		06:19	18:46 (30) 07:14	17:34 (22) 07:13	08:08
	21:43 21:03		19:54	29 19:25 (25) 18:39	25 17:59 (18) 16:29	15:47
5	04:41 05:25		06:21	18:45 (30) 07:15	17:34 (22) 07:15	08:09
	21:43 21:01		19:51	26 19:11 (30) 18:37	26 18:00 (18) 16:27	15:47
6	04:42 05:27		06:23	18:45 (30) 07:17	17:35 (22) 07:17	08:10
	21:42 20:59		19:49	26 19:11 (30) 18:34	26 18:01 (18) 16:25	15:46
7	04:43 05:29		06:25	18:45 (30) 07:19	17:36 (22) 07:19	15:24 (3) 08:12
	21:41 20:57		19:46	26 19:11 (30) 18:32	25 18:01 (18) 16:23	7 15:31 (3) 15:46
8	04:44 05:31		06:26	18:46 (30) 07:21	17:37 (22) 07:21	15:22 (3) 08:13
	21:41 20:55		19:44	24 19:10 (30) 18:29	23 18:00 (18) 16:21	11 15:33 (3) 15:45
9	04:45 05:32		06:28	18:46 (30) 07:23	17:40 (22) 07:23	15:20 (3) 08:14
	21:40 20:53		19:41	22 19:08 (30) 18:27	18 17:58 (18) 16:19	14 15:34 (3) 15:45
10	04:46 05:34		06:30	18:46 (30) 07:25	17:47 (18) 07:25	15:20 (3) 08:16
	21:39 20:51		19:39	21 19:07 (30) 18:24	8 17:55 (18) 16:18	15 15:35 (3) 15:45
11	04:47 05:36		06:32	18:48 (30) 07:27	17:03 (2) 07:27	15:20 (3) 08:17
	21:38 20:49		19:36	18 19:06 (30) 18:22	14 17:53 (18) 16:16	16 15:36 (3) 15:44
12	04:49 05:38		06:34	18:50 (30) 07:28	17:00 (2) 07:29	15:20 (3) 08:18
	21:37 20:47		19:34	14 19:04 (30) 18:20	15 17:15 (2) 16:14	16 15:36 (3) 15:44
13	04:50 05:40		06:35	18:52 (30) 07:30	16:58 (2) 07:30	15:20 (3) 08:19
	21:36 20:45		19:31	7 18:59 (30) 18:17	18 17:16 (2) 16:13	16 15:36 (3) 15:44
14	04:51 05:41		06:37	18:38 (21) 07:32	16:56 (2) 07:33	15:20 (3) 08:20
	21:35 20:43		19:29	8 18:46 (21) 18:15	22 17:18 (2) 16:11	16 15:36 (3) 15:44
15	04:52 05:43		06:39	18:36 (21) 07:34	16:55 (2) 07:35	15:20 (3) 08:21
	21:34 20:40		19:26	12 18:48 (21) 18:12	23 17:18 (2) 16:09	15 15:35 (3) 15:44
16	04:54 05:45		06:41	18:34 (21) 07:36	16:54 (2) 07:37	15:20 (3) 08:22
	21:33 20:38		19:24	15 18:49 (21) 18:10	25 17:19 (2) 16:08	14 15:34 (3) 15:44
17	04:55 05:47		06:43	18:33 (21) 07:38	16:53 (2) 07:38	15:21 (3) 08:23
	21:32 20:36		19:21	15 18:48 (21) 18:08	26 17:19 (2) 16:06	11 15:32 (3) 15:44
18	04:57 05:49		06:44	18:32 (21) 07:40	16:53 (2) 07:40	15:21 (3) 08:23
	21:30 20:34		19:19	16 18:48 (21) 18:05	27 17:20 (20) 16:05	9 15:30 (3) 15:44
19	04:58 05:50		06:46	18:32 (21) 07:42	16:53 (2) 07:42	15:22 (3) 08:24
	21:29 20:32		19:16	16 18:48 (21) 18:03	28 17:21 (20) 16:03	6 15:28 (3) 15:45
20	04:59 05:52		06:48	18:32 (21) 07:44	16:52 (2) 07:44	15:25 (3) 08:25
	21:28 20:29		19:14	14 18:46 (21) 18:01	30 17:22 (20) 16:02	3 15:28 (3) 15:45
21	05:01 05:54		06:50	18:32 (21) 07:46	16:53 (2) 07:46	08:25
	21:26 20:27		19:11	10 18:42 (21) 17:59	29 17:22 (20) 16:01	15:45
22	05:02 05:56		06:52	18:33 (21) 07:48	16:53 (2) 07:48	08:26
	21:25 20:25		19:09	7 18:40 (21) 17:56	29 17:22 (20) 15:59	15:46
23	05:04 05:58		06:53	18:35 (21) 07:50	16:53 (2) 07:50	08:27
	21:23 20:22		19:06	3 18:38 (21) 17:54	29 17:22 (20) 15:58	15:46
24	05:05 05:59		06:55	17:46 (22) 07:51	16:54 (2) 07:51	08:27
	21:22 20:20		19:04	8 17:54 (22) 17:52	27 17:21 (20) 15:57	15:47
25	05:07 06:01		06:57	17:43 (22) 06:53	15:55 (2) 07:53	08:27
	21:20 20:18		19:01	14 17:57 (22) 16:50	24 16:19 (20) 15:56	15:48
26	05:09 06:03		06:59	17:40 (22) 06:55	15:56 (2) 07:55	08:28
	21:19 20:15	6	19:32 (25)	18:59 18 17:58 (22) 16:47	20 16:16 (20) 15:54	15:48
27	05:10 06:05		07:01	17:38 (22) 06:57	15:58 (2) 07:56	08:28
	21:17 20:13	16	19:34 (25)	18:56 21 17:59 (22) 16:45	16 16:14 (20) 15:53	15:49
28	05:12 06:07		07:02	17:37 (22) 06:59	16:01 (2) 07:58	08:28
	21:16 20:11	25	19:35 (25)	18:54 22 17:59 (22) 16:43	8 16:12 (20) 15:52	15:50
29	05:14 06:08		07:04	17:36 (22) 07:01	08:00	08:28
	21:14 20:08	31	19:35 (25)	18:51 24 18:00 (22) 16:41	15:51	15:51
30	05:15 06:10		07:06	17:35 (22) 07:03	08:01	08:28
	21:12 20:06	36	19:36 (25)	18:49 25 18:00 (22) 16:39	15:50	15:52
31	05:17 06:12		07:05	16:37		08:28
	21:10 20:03	37	19:35 (25)	16:37		15:53
Sonnenscheinstunden	515	461	383	328	257	231
astr.max.mögl.Beschattung		151	564	636	169	
Red.Sonnenscheinwahrsch.		0.48	0.40	0.33	0.21	
Reduktion Betriebsdauer		0.91	0.91	0.91	0.91	
Reduktion Windrichtung		0.66	0.67	0.69	0.69	
Gesamte Reduktion		0.29	0.25	0.21	0.13	
Met.wahrsch.Beschattung		44	138	132	22	

Tabellen-Layout: Die Daten für jeden Tag 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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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite:
12/10/2015 15:53 / 13

Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender
Berechnung: Gesamtbelastung Schattenrezeptor: E - IO5

Voraussetzungen für Berechnung des Schattenwurfs
Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1.017 1.220 930 354 7.936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28 15:54	15:08 (19) 07:57 15:16 (19) 16:46	15:58 (3) 06:59 16:14 (3) 17:43	16:46 (2) 06:43 17:10 (20) 19:42	18:23 (22) 05:33 19:16 (21) 20:39	19:19 (30) 04:42 19:52 (25) 21:29
2	08:28 15:55	15:09 (19) 07:55 15:18 (19) 16:48	15:58 (3) 06:56 16:16 (3) 17:45	16:44 (2) 06:40 17:09 (2) 19:44	18:22 (22) 05:31 19:17 (21) 20:40	19:19 (30) 04:41 19:42 (30) 21:31
3	08:28 15:57	15:08 (19) 07:54 15:18 (19) 16:50	15:59 (3) 06:54 16:17 (3) 17:47	16:43 (2) 06:38 17:10 (2) 19:46	18:23 (22) 05:28 19:19 (21) 20:42	19:20 (30) 04:40 19:41 (30) 21:32
4	08:27 15:58	15:09 (19) 07:52 15:20 (19) 16:52	15:59 (3) 06:52 16:17 (3) 17:49	16:42 (2) 06:35 17:10 (2) 19:48	18:23 (22) 05:26 19:21 (21) 20:44	19:21 (30) 04:40 19:39 (30) 21:33
5	08:27 15:59	15:09 (19) 07:50 15:21 (19) 16:54	15:59 (3) 06:49 16:18 (3) 17:51	16:42 (2) 06:33 17:11 (2) 19:50	18:24 (22) 05:24 19:22 (21) 20:46	19:23 (30) 04:39 19:37 (30) 21:34
6	08:27 16:00	15:09 (19) 07:48 15:22 (19) 16:56	15:59 (3) 06:47 16:17 (3) 17:53	16:40 (2) 06:30 17:10 (2) 19:52	18:25 (22) 05:22 19:22 (21) 20:48	19:25 (30) 04:38 19:35 (30) 21:35
7	08:26 16:02	15:10 (19) 07:46 15:24 (19) 16:58	15:59 (3) 06:45 16:16 (3) 17:55	16:41 (2) 06:28 17:11 (2) 19:54	18:27 (22) 05:20 19:21 (21) 20:50	19:21 (30) 04:37 19:39 (30) 21:36
8	08:26 16:03	15:10 (19) 07:44 15:25 (19) 17:00	16:00 (3) 06:42 16:16 (3) 17:57	16:40 (2) 06:26 17:10 (2) 19:55	18:30 (22) 05:18 19:21 (21) 20:51	19:21 (30) 04:37 19:37 (30) 21:37
9	08:25 16:05	15:10 (19) 07:42 15:25 (19) 17:02	16:01 (3) 06:40 16:15 (3) 17:59	16:40 (2) 06:23 17:10 (2) 19:57	18:30 (22) 05:17 19:22 (21) 20:53	19:21 (30) 04:36 19:35 (30) 21:38
10	08:24 16:06	15:10 (19) 07:40 15:25 (19) 17:05	16:03 (3) 06:37 16:13 (3) 18:00	16:40 (2) 06:21 17:09 (2) 19:59	19:06 (21) 05:15 19:18 (21) 20:55	19:21 (30) 04:36 19:35 (30) 21:39
11	08:24 16:08	15:10 (19) 07:38 15:25 (19) 17:07	16:06 (3) 06:35 16:11 (3) 18:02	16:41 (2) 06:18 17:36 (18) 20:01	19:08 (21) 05:13 19:15 (21) 20:57	19:21 (30) 04:35 19:35 (30) 21:40
12	08:23 16:09	15:11 (19) 07:36 15:26 (19) 17:09	16:03 (3) 06:32 16:04 (3) 18:04	16:41 (2) 06:16 17:37 (18) 20:03	19:05 (21) 05:11 19:08 (21) 20:59	19:21 (30) 04:35 19:35 (30) 21:41
13	08:22 16:11	15:11 (19) 07:34 15:26 (19) 17:11	16:03 (3) 06:30 16:06 (3) 18:06	16:42 (2) 06:14 17:40 (18) 20:05	19:05 (21) 05:09 19:06 (21) 21:00	19:21 (30) 04:34 19:35 (30) 21:41
14	08:21 16:13	15:12 (19) 07:32 15:26 (19) 17:13	16:02 (3) 06:27 16:08 (3) 18:08	16:43 (2) 06:11 17:41 (18) 20:07	19:05 (21) 05:07 19:08 (21) 21:02	19:21 (30) 04:34 19:35 (30) 21:42
15	08:20 16:14	15:13 (19) 07:30 15:26 (19) 17:15	16:02 (3) 06:25 16:10 (3) 18:10	16:45 (2) 06:09 17:43 (18) 20:09	19:06 (21) 05:06 19:28 (30) 21:04	19:21 (30) 04:34 19:35 (30) 21:43
16	08:19 16:16	15:14 (19) 07:28 15:26 (19) 17:17	16:02 (3) 06:23 16:12 (3) 18:12	16:47 (2) 06:06 17:42 (18) 20:10	19:28 (30) 21:05 19:28 (30) 21:05	19:21 (30) 04:34 19:35 (30) 21:43
17	08:18 16:18	15:16 (19) 07:26 15:26 (19) 17:19	16:20 (3) 06:20 16:14 (3) 18:14	16:48 (2) 06:04 17:28 (18) 20:04	19:25 (30) 05:02 19:40 (30) 21:07	19:21 (30) 04:33 19:35 (30) 21:44
18	08:17 16:19	15:16 (19) 07:24 15:25 (19) 17:21	16:18 (3) 06:18 16:15 (3) 18:16	16:48 (2) 06:02 17:40 (18) 20:14	19:23 (30) 05:01 19:42 (30) 21:09	19:21 (30) 04:33 19:35 (30) 21:44
19	08:16 16:21	15:19 (19) 07:22 15:24 (19) 17:23	16:15 (3) 06:15 16:18 (3) 18:18	17:30 (18) 05:59 17:38 (18) 20:16	19:22 (30) 04:59 19:43 (30) 21:10	19:21 (30) 04:33 19:35 (30) 21:45
20	08:15 16:23	15:19 (19) 07:19 17:25	16:13 (3) 06:13 18:20	17:38 (18) 05:57 20:18	19:21 (30) 04:58 19:50 (25) 21:12	19:21 (30) 04:34 19:35 (30) 21:45
21	08:14 16:25	17:25 17:17	16:13 (3) 06:11 18:22	17:39 (22) 05:55 17:41 (22) 20:20	19:20 (30) 04:56 19:52 (25) 21:14	19:21 (30) 04:34 19:35 (30) 21:45
22	08:12 16:27	17:15 17:29	16:08 (3) 06:08 18:23	17:32 (22) 05:52 17:46 (22) 20:22	19:18 (30) 04:55 19:52 (25) 21:15	19:21 (30) 04:34 19:35 (30) 21:45
23	08:11 16:29	17:13 17:31	16:58 (20) 06:05 17:03 (20) 18:25	17:46 (22) 05:50 17:48 (22) 20:24	19:52 (25) 21:14 19:54 (25) 21:17	19:21 (30) 04:34 19:35 (30) 21:45
24	08:10 16:31	17:11 17:33	5 16:56 (20) 06:03 17:05 (20) 18:27	17:28 (22) 05:48 17:49 (22) 20:26	19:17 (30) 04:52 19:56 (25) 21:18	19:21 (30) 04:34 19:35 (30) 21:46
25	08:08 16:32	17:08 17:35	9 16:54 (20) 06:00 17:07 (20) 18:29	17:27 (22) 05:46 17:51 (22) 20:27	19:17 (30) 04:50 19:58 (25) 21:20	19:21 (30) 04:35 19:35 (30) 21:46
26	08:07 16:34	17:06 17:37	13 16:53 (2) 05:58 17:09 (20) 18:31	17:25 (22) 05:43 17:51 (22) 20:29	19:17 (30) 04:49 19:58 (25) 21:21	19:21 (30) 04:35 19:35 (30) 21:46
27	08:05 16:36	17:03 17:39	16 16:49 (2) 05:55 17:09 (20) 18:33	17:24 (22) 05:41 17:52 (22) 20:31	19:17 (30) 04:48 19:58 (25) 21:23	19:21 (30) 04:36 19:35 (30) 21:45
28	08:04 16:38	17:39 16:03 (3) 07:01 16:06 (3) 17:41	20 16:47 (2) 05:53 17:10 (20) 18:35	17:23 (22) 05:39 17:51 (22) 20:33	19:17 (30) 04:47 19:57 (25) 21:24	19:21 (30) 04:36 19:35 (30) 21:45
29	08:02 16:40	17:35 16:07 (3) 17:41	23 16:47 (2) 05:53 17:10 (20) 18:35	17:23 (22) 05:39 17:51 (22) 20:33	19:17 (30) 04:47 19:57 (25) 21:24	19:21 (30) 04:36 19:35 (30) 21:45
30	08:00 16:42	17:33 16:00 (3) 17:41	23 16:47 (2) 05:53 17:10 (20) 18:35	17:23 (22) 05:39 17:51 (22) 20:33	19:17 (30) 04:47 19:57 (25) 21:24	19:21 (30) 04:36 19:35 (30) 21:45
31	07:59 16:44	17:31 16:00 (3) 17:41	23 16:47 (2) 05:53 17:10 (20) 18:35	17:23 (22) 05:39 17:51 (22) 20:33	19:17 (30) 04:47 19:57 (25) 21:24	19:21 (30) 04:36 19:35 (30) 21:45
Sonnenscheinstunden	248	272	367	421	496	512
astr.max.mögl.Beschattung	262	255	760	784	114	
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.68	0.69	0.68	0.65	0.63	
Gesamte Reduktion	0.11	0.15	0.20	0.24	0.29	
Met.wahrsch.Beschattung	28	39	149	191	33	

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 14
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersieglug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: E - IO5

Voraussetzungen für Berechnung des Schattenwurfs
Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember		
1	04:38	05:19	06:14	19:08 (21)	07:08	17:21 (2)	07:07	
2	21:45	21:09	20:01	7 19:15 (21)	18:46	34 18:18 (18)	16:35	
3	04:39	05:20	06:16	19:04 (21)	07:40	17:20 (2)	07:09	
4	21:44	21:07	19:59	12 19:16 (21)	18:44	32 18:15 (18)	16:33	
5	04:40	05:22	06:17	19:03 (21)	07:12	17:18 (2)	07:11	
6	21:44	21:05	19:56	14 19:17 (21)	18:41	29 18:12 (18)	16:31	
7	04:40	05:24	06:19	18:27 (22)	07:14	17:17 (2)	07:13	
8	21:43	21:03	19:54	26 19:18 (21)	18:39	30 17:47 (2)	16:29	
9	04:41	05:25	06:21	18:23 (22)	07:15	17:17 (2)	07:15	
10	21:43	21:01	19:51	33 19:18 (21)	18:37	30 17:47 (2)	16:27	
11	04:42	05:27	06:23	18:21 (22)	07:17	17:17 (2)	07:17	
12	21:42	20:59	3 19:42 (30)	19:49	38 19:18 (21)	18:34	30 17:47 (2)	16:25
13	04:43	05:29	19:34 (30)	06:25	18:19 (22)	07:19	17:16 (2)	07:19
14	21:41	20:57	11 19:45 (30)	19:46	40 19:17 (21)	18:32	30 17:46 (2)	16:23
15	04:44	05:31	19:32 (30)	06:26	18:18 (22)	07:21	17:16 (2)	07:21
16	21:41	20:55	15 19:47 (30)	19:44	40 19:16 (21)	18:29	30 17:46 (2)	16:21
17	04:45	05:32	19:30 (30)	06:28	18:16 (22)	07:23	17:17 (2)	07:23
18	21:40	20:53	19 19:49 (30)	19:41	40 19:13 (21)	18:27	28 17:45 (2)	16:19
19	04:46	05:34	19:28 (30)	06:30	18:16 (22)	07:25	17:17 (2)	07:25
20	21:39	20:51	22 19:50 (30)	19:39	36 19:10 (21)	18:24	27 17:44 (2)	16:18
21	04:48	05:36	19:28 (30)	06:32	18:15 (22)	07:27	17:18 (2)	07:27
22	21:38	20:49	23 19:51 (30)	19:36	33 19:08 (21)	18:22	25 17:43 (2)	16:16
23	04:49	05:38	19:27 (30)	06:34	18:15 (22)	07:28	17:18 (2)	07:29
24	21:37	20:47	31 20:01 (25)	19:34	28 18:43 (22)	18:20	25 17:43 (20)	16:14
25	04:50	05:40	19:25 (30)	06:35	18:13 (22)	07:30	17:26 (20)	07:37
26	21:36	20:45	36 20:02 (25)	19:31	29 18:42 (22)	18:17	24 17:43 (20)	16:13
27	04:51	05:41	19:25 (30)	06:37	18:13 (22)	07:32	17:21 (2)	07:33
28	21:35	20:43	39 20:04 (25)	19:29	29 18:42 (22)	18:15	22 17:43 (20)	16:11
29	04:52	05:43	19:25 (30)	06:39	18:13 (22)	07:34	17:23 (2)	07:35
30	21:34	20:40	40 20:05 (25)	19:26	29 18:42 (22)	18:12	19 17:42 (20)	16:09
31	04:54	05:45	19:24 (30)	06:41	18:14 (22)	07:36	17:26 (20)	07:37
1	21:33	20:38	40 20:04 (25)	19:24	27 18:41 (22)	18:10	15 17:41 (20)	16:08
2	04:55	05:47	19:24 (30)	06:43	18:13 (22)	07:38	17:27 (20)	07:38
3	21:32	20:36	41 20:05 (25)	19:21	26 18:39 (22)	18:08	11 17:38 (20)	16:06
4	04:57	05:49	19:24 (30)	06:44	18:14 (22)	07:40	17:28 (20)	07:40
5	21:30	20:34	40 20:04 (25)	19:19	24 18:38 (22)	18:05	8 17:36 (20)	16:05
6	04:58	05:50	19:23 (30)	06:46	18:15 (22)	07:42	17:31 (20)	07:42
7	21:29	20:32	39 20:02 (25)	19:16	22 18:37 (22)	18:03	2 17:33 (20)	16:03
8	04:59	05:52	19:23 (30)	06:48	18:16 (22)	07:44	17:44	
9	21:28	20:29	37 20:00 (25)	19:14	19 18:35 (22)	18:01	16:02	
10	05:01	05:54	19:24 (30)	06:50	18:17 (22)	07:46	07:46	
11	21:26	20:27	34 19:58 (25)	19:11	15 18:32 (22)	17:59	16:01	
12	05:02	05:56	19:24 (30)	06:52	18:21 (22)	07:48	07:48	
13	21:25	20:25	30 19:55 (25)	19:09	7 18:28 (22)	17:56	15:59	
14	05:04	05:58	19:24 (30)	06:53	07:50			
15	21:23	20:22	25 19:53 (25)	19:06	17:54			
16	05:05	05:59	19:25 (30)	06:55	18:15 (18)	07:51	07:51	
17	21:22	20:20	22 19:47 (30)	19:04	6 18:21 (18)	17:52	15:57	
18	05:07	06:01	19:27 (30)	06:57	18:12 (18)	06:53	07:53	
19	21:20	20:18	19 19:46 (30)	19:01	11 18:23 (18)	16:50	15:56	
20	05:09	06:03	19:28 (30)	06:59	18:10 (18)	06:55	07:55	
21	21:19	20:15	15 19:43 (30)	18:59	13 18:23 (18)	16:47	15:54	
22	05:10	06:05	19:31 (30)	07:01	17:30 (2)	06:57	07:56	
23	21:17	20:13	9 19:40 (30)	18:56	23 18:23 (18)	16:45	15:53	
24	05:12	06:07	07:03	17:27 (2)	06:59	07:58	14:52 (19)	08:28
25	21:16	20:11	18:54	31 18:24 (18)	16:43	15:52	14 15:06 (19)	15:50
26	05:14	06:08	07:04	17:24 (2)	07:01	08:00	14:53 (19)	08:28
27	21:14	20:08	18:51	35 18:23 (18)	16:41	15:51	14 15:07 (19)	15:51
28	05:15	06:10	07:06	17:22 (2)	07:03	08:01	14:53 (19)	08:28
29	21:12	20:06	18:49	36 18:20 (18)	16:39	15:51	15 15:08 (19)	15:52
30	05:17	06:12	07:05	16:37	6 15:41 (3)	15:53	7 15:14 (19)	
31	21:10	20:03	16:37	6 15:41 (3)	15:53	7 15:14 (19)		
Sonnenscheinstunden 514 461 383 328 257 217								
astr.max.mögl.Beschattung 590 457 284 217								
Red.Sonnenscheinwahrsch. 0.48 0.33 0.21 0.14								
Reduktion Betriebsdauer 0.91 0.91 0.91 0.91								
Reduktion Windrichtung 0.63 0.68 0.69 0.68								
Gesamte Reduktion 0.28 0.25 0.13 0.09								
Met.wahrsch.Beschattung 165 94 37 19								

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

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM)	Sonnenundergang (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:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 15
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: F - IO6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	15:10 (19) 07:57	16:01 (3) 06:59	16:53 (2) 06:43	18:28 (22) 05:33	19:22 (30) 04:42	
2	15:54	6 15:16 (19) 16:46	13 16:14 (3) 17:43	20 17:13 (20) 19:42	29 18:57 (22) 20:39	38 20:00 (25) 21:29	
3	08:28	15:10 (19) 07:55	16:00 (3) 06:56	16:50 (2) 06:40	18:27 (22) 05:31	19:22 (30) 04:41	
4	15:57	8 15:18 (19) 16:48	16 16:16 (3) 17:45	22 17:12 (20) 19:44	30 18:57 (22) 20:40	36 19:58 (25) 21:31	
5	08:27	15:10 (19) 07:54	16:01 (3) 06:54	16:49 (2) 06:38	18:27 (22) 05:28	19:23 (30) 04:40	
6	15:57	8 15:18 (19) 16:50	16:19 (3) 17:47	24 17:13 (20) 19:46	35 19:19 (21) 20:42	32 19:56 (25) 21:32	
7	08:27	15:10 (19) 07:52	16:00 (3) 06:52	16:47 (2) 06:35	18:27 (22) 05:26	19:23 (30) 04:40	
8	15:58	10 15:20 (19) 16:52	19 16:19 (3) 17:49	25 17:12 (2) 19:48	39 19:21 (21) 20:44	25 19:48 (30) 21:33	
9	08:27	15:10 (19) 07:50	16:01 (3) 06:49	16:46 (2) 06:33	18:27 (22) 05:24	19:24 (30) 04:39	
10	15:59	11 15:21 (19) 16:54	18 16:19 (3) 17:51	28 17:14 (2) 19:50	42 19:23 (21) 20:46	23 19:47 (30) 21:34	
11	08:27	15:10 (19) 07:48	16:01 (3) 06:47	16:45 (2) 06:30	18:27 (22) 05:22	19:24 (30) 04:38	
12	16:00	12 15:22 (19) 16:56	19 16:20 (3) 17:53	28 17:13 (2) 19:52	42 19:24 (21) 20:48	22 19:46 (30) 21:35	
13	08:26	15:11 (19) 07:46	16:00 (3) 06:45	16:45 (2) 06:28	18:28 (22) 05:20	19:25 (30) 04:37	
14	16:02	14 15:25 (19) 16:58	18 16:18 (3) 17:55	29 17:14 (2) 19:54	43 19:25 (21) 20:50	20 19:45 (30) 21:36	
15	08:26	15:11 (19) 07:44	16:01 (3) 06:42	16:44 (2) 06:26	18:29 (22) 05:18	19:26 (30) 04:37	
16	16:03	15 15:26 (19) 17:00	17 16:18 (3) 17:57	30 17:14 (2) 19:55	42 19:26 (21) 20:51	17 19:43 (30) 21:37	
17	08:25	15:11 (19) 07:42	16:02 (3) 06:40	16:44 (2) 06:23	18:28 (22) 05:17	19:29 (30) 21:38	
18	16:05	15 15:26 (19) 17:02	16 16:18 (3) 17:59	30 17:14 (2) 19:57	39 19:25 (21) 20:53	13 19:42 (30) 21:38	
19	08:24	15:11 (19) 07:40	16:03 (3) 06:37	16:43 (2) 06:21	18:31 (22) 05:15	19:32 (30) 04:36	
20	16:06	15 15:26 (19) 17:05	14 16:17 (3) 18:00	31 17:14 (2) 19:59	34 19:24 (21) 20:55	7 19:39 (30) 21:39	
21	08:24	15:11 (19) 07:38	16:04 (3) 06:35	16:43 (2) 06:18	18:32 (22) 05:13	19:33 (30) 21:40	
22	16:08	16 15:27 (19) 17:07	12 16:16 (3) 18:02	31 17:14 (2) 20:01	29 19:23 (21) 20:57	21:40	
23	08:23	15:12 (19) 07:36	16:07 (3) 06:32	16:43 (2) 06:16	18:37 (22) 05:11	19:34 (30) 21:41	
24	16:09	15 15:27 (19) 17:09	6 16:13 (3) 18:04	32 17:37 (19) 20:03	17 19:21 (21) 20:59	21:41	
25	08:22	15:12 (19) 07:34	16:08 (3) 06:30	16:42 (2) 06:14	18:37 (22) 05:09	19:34 (30) 21:42	
26	16:11	15 15:27 (19) 17:11	18:06	35 17:40 (18) 20:05	7 19:19 (21) 21:00	21:41	
27	08:21	15:13 (19) 07:32	16:09 (3) 06:27	16:44 (2) 06:11	18:38 (22) 05:07	19:35 (30) 21:43	
28	16:13	15 15:28 (19) 17:13	18:08	37 17:41 (18) 20:07	18:39 (22) 05:05	21:42	
29	08:20	15:14 (19) 07:30	16:10 (3) 06:25	16:45 (2) 06:09	18:39 (22) 05:04	19:36 (30) 21:43	
30	16:14	14 15:28 (19) 17:15	18:10	37 17:43 (18) 20:09	18:40 (22) 05:03	21:43	
31	08:19	15:15 (19) 07:28	16:11 (3) 06:23	16:45 (2) 06:06	18:40 (22) 05:02	19:37 (30) 21:44	
32	16:16	13 15:28 (19) 17:17	18:12	38 17:45 (18) 20:10	18:41 (22) 05:01	21:43	
33	08:18	15:16 (19) 07:26	16:12 (3) 06:20	16:47 (2) 06:04	18:41 (22) 05:00	19:38 (30) 21:44	
34	16:18	12 15:28 (19) 17:19	18:14	35 17:45 (18) 20:12	18:42 (22) 04:59	21:44	
35	08:17	15:16 (19) 07:24	16:13 (3) 06:18	16:49 (2) 06:02	18:42 (22) 04:58	19:39 (30) 21:45	
36	16:19	11 15:27 (19) 17:21	18:16	29 17:44 (18) 20:14	18:43 (22) 04:57	21:44	
37	08:16	15:18 (19) 07:22	16:14 (3) 06:15	16:54 (2) 05:59	18:43 (22) 04:56	19:40 (30) 21:45	
38	16:21	9 15:27 (19) 17:23	18:18	18 17:44 (18) 20:16	12 19:44 (30) 21:10	21:45	
39	08:15	15:20 (19) 07:19	16:15 (3) 06:13	16:53 (2) 05:57	18:44 (22) 04:55	19:41 (30) 21:46	
40	16:23	6 15:26 (19) 17:25	18:20	10 17:41 (18) 20:18	17 19:46 (30) 21:12	21:45	
41	08:14	15:22 (19) 07:17	16:16 (3) 06:10	16:54 (2) 05:55	18:45 (22) 04:54	19:42 (30) 21:46	
42	16:25	17:27	18:22	5 17:39 (18) 20:20	20 19:48 (30) 21:14	21:45	
43	08:12	15:23 (19) 07:15	16:17 (3) 06:08	16:55 (2) 05:52	18:46 (22) 04:53	19:43 (30) 21:46	
44	16:27	17:29	18:23	20:22	24 19:52 (25) 21:15	21:45	
45	08:11	15:24 (19) 07:13	16:18 (3) 06:05	16:56 (2) 05:50	18:47 (22) 04:52	19:44 (30) 21:47	
46	16:29	17:31	18:25	20:24	29 19:54 (25) 21:17	21:45	
47	08:10	15:25 (19) 07:10	16:19 (3) 06:03	17:43 (22) 05:48	19:24 (30) 04:52	19:45 (30) 21:48	
48	16:31	17:33	18:27	3 17:46 (22) 20:26	32 19:56 (25) 21:18	21:46	
49	08:08	15:26 (19) 07:08	16:20 (3) 06:00	17:38 (22) 05:46	19:23 (30) 04:50	19:46 (30) 21:49	
50	16:32	17:35	8 17:07 (20) 18:29	13 17:51 (22) 20:27	35 19:58 (25) 21:20	21:46	
51	08:07	15:27 (19) 07:06	16:21 (3) 05:58	17:34 (22) 05:43	19:23 (30) 04:49	19:47 (30) 21:50	
52	16:34	17:37	11 17:09 (20) 18:31	19 17:53 (22) 20:29	37 20:00 (25) 21:21	21:46	
53	08:05	15:28 (19) 07:03	16:22 (3) 05:55	17:33 (22) 05:41	19:22 (30) 04:48	19:48 (30) 21:51	
54	16:36	17:39	15 17:11 (20) 18:33	22 17:55 (22) 20:31	40 20:02 (25) 21:23	21:45	
55	08:04	15:29 (19) 07:01	16:23 (3) 05:53	17:31 (22) 05:39	19:22 (30) 04:47	19:49 (30) 21:52	
56	16:38	17:41	17 17:12 (20) 18:35	24 17:55 (22) 20:33	40 20:02 (25) 21:24	21:45	
57	08:02	16:05 (3)	16:24 (3) 05:50	18:30 (22) 05:37	19:22 (30) 04:45	19:50 (30) 21:53	
58	16:40	2 16:07 (3)	16:25 (3) 05:49	19:37 26 18:56 (22) 20:35	39 20:01 (25) 21:26	21:45	
59	08:00	16:03 (3)	16:26 (3) 05:48	18:29 (22) 05:35	19:22 (30) 04:44	19:51 (30) 21:54	
60	16:42	16:10 (3)	16:27 (3) 05:47	19:38 27 18:56 (22) 20:37	39 20:01 (25) 21:27	21:45	
61	07:59	16:01 (3)	16:28 (3) 05:46	18:28 (22)	19:23 (30) 04:43	19:52 (30) 21:55	
62	16:44	11 16:12 (3)	16:29 (3) 05:45	19:40 29 18:57 (22)	20:02 (25) 21:28	21:45	
63	Sonnenscheinstunden	248	272	367	421	496	512
64	astr.max.mögl.Beschattung	260	237	737	792	233	
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	
67	Reduktion Windrichtung	0.68	0.70	0.68	0.66	0.63	
68	Gesamte Reduktion	0.11	0.15	0.19	0.24	0.29	
69	Met.wahrsch.Beschattung	28	36	144	194	68	

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)

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:

151008_Miltzow_III-VII

Ausdruck/Seite

12/10/2015 15:53 / 16

Lizenzierter Anwender:

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

André Gefke / andre.gefke@i17-wind.de

Berechnet:

12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: F - IO6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Oct	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
344	328	399	568	526	526	738	987	1,017	1,220	930	354	7,936

: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember										
1	04:38	05:19	06:14	18:32 (22)	07:08	17:23 (2)	07:07	15:32 (3)	08:03	14:53 (19)						
2	21:45	21:09	20:01	28	19:22 (21)	18:46	33	18:18 (18)	16:35	15	15:47 (3)	15:50	16	15:09 (19)		
3	04:39	05:20	06:16	18:29 (22)	07:10	17:22 (2)	07:09	15:31 (3)	08:14	14:54 (19)						
2	21:44	21:07	19:59	34	19:22 (21)	18:44	30	17:52 (2)	16:33	16	15:47 (3)	15:49	15	15:09 (19)		
3	04:40	05:22	19:41 (30)	06:17	18:27 (22)	07:12	17:21 (2)	07:11	15:30 (3)	08:06	14:55 (19)					
2	21:44	21:05	9	19:50 (30)	19:56	39	19:23 (21)	18:41	30	17:51 (2)	16:31	18	15:48 (3)	15:48	15	15:10 (19)
4	04:40	05:24	19:38 (30)	06:19	18:26 (22)	07:14	17:21 (2)	07:13	15:30 (3)	08:08	14:55 (19)					
1	21:43	21:03	14	19:52 (30)	19:54	42	19:23 (21)	18:39	30	17:51 (2)	16:29	18	15:48 (3)	15:47	15	15:10 (19)
5	04:41	05:25	19:36 (30)	06:21	18:24 (22)	07:15	17:21 (2)	07:15	15:30 (3)	08:09	14:56 (19)					
1	21:43	21:01	18	19:54 (30)	19:51	44	19:22 (21)	18:37	30	17:51 (2)	16:27	19	15:49 (3)	15:47	14	15:10 (19)
6	04:42	05:27	19:35 (30)	06:23	18:23 (22)	07:17	17:21 (2)	07:17	15:30 (3)	08:10	14:56 (19)					
2	21:42	20:59	20	19:55 (30)	19:49	42	19:20 (21)	18:34	30	17:51 (2)	16:25	19	15:49 (3)	15:46	12	15:08 (19)
7	04:43	05:29	19:33 (30)	06:25	18:22 (22)	07:19	17:21 (2)	07:19	15:30 (3)	08:12	14:57 (19)					
1	21:41	20:57	23	19:56 (30)	19:46	42	19:18 (21)	18:32	29	17:50 (2)	16:23	19	15:49 (3)	15:46	11	15:08 (19)
8	04:44	05:31	19:33 (30)	06:26	18:22 (22)	07:21	17:21 (2)	07:21	15:30 (3)	08:13	14:57 (19)					
1	21:41	20:55	24	19:57 (30)	19:44	39	19:16 (21)	18:29	28	17:49 (2)	16:21	19	15:49 (3)	15:45	10	15:07 (19)
9	04:45	05:32	19:32 (30)	06:28	18:21 (22)	07:23	17:22 (2)	07:23	15:31 (3)	08:14	14:59 (19)					
1	21:40	20:53	26	19:58 (30)	19:41	35	19:13 (21)	18:27	26	17:48 (2)	16:19	15	15:48 (3)	15:45	9	15:08 (19)
10	04:46	05:34	19:31 (30)	06:30	18:20 (22)	07:25	17:23 (2)	07:25	15:32 (3)	08:16	14:59 (19)					
1	21:39	20:51	33	20:05 (25)	19:39	30	18:50 (22)	18:24	24	17:47 (2)	16:18	12	15:44 (3)	15:45	8	15:07 (19)
11	04:48	05:36	19:31 (30)	06:32	18:20 (22)	07:27	17:24 (2)	07:27	15:33 (3)	08:17	15:00 (19)					
1	21:38	20:49	36	20:07 (25)	19:36	30	18:50 (22)	18:22	23	17:47 (20)	16:16	10	15:43 (3)	15:44	6	15:06 (19)
12	04:49	05:38	19:31 (30)	06:34	18:20 (22)	07:28	17:25 (2)	07:29	15:35 (3)	08:18	15:00 (19)					
1	21:37	20:47	38	20:09 (25)	19:34	29	18:49 (22)	18:20	22	17:47 (20)	16:14	6	15:41 (3)	15:44	6	15:06 (19)
13	04:50	05:40	19:30 (30)	06:35	18:20 (22)	07:30	17:28 (2)	07:31	15:37 (3)	08:19	15:01 (19)					
1	21:36	20:45	38	20:08 (25)	19:31	28	18:48 (22)	18:17	18	17:46 (20)	16:13	2	15:39 (3)	15:44	4	15:05 (19)
14	04:51	05:41	19:30 (30)	06:37	18:20 (22)	07:32	17:29 (20)	07:33	15:38 (3)	08:20	15:02 (19)					
1	21:35	20:43	39	20:09 (25)	19:29	27	18:47 (22)	18:15	16	17:45 (20)	16:11	15:44	3	15:05 (19)		
15	04:52	05:43	19:30 (30)	06:39	18:21 (22)	07:34	17:29 (20)	07:35	15:39 (3)	08:21	15:02 (19)					
1	21:34	20:40	39	20:09 (25)	19:26	25	18:46 (22)	18:12	14	17:43 (20)	16:09	15:44	3	15:05 (19)		
16	04:54	05:45	19:29 (30)	06:41	18:22 (22)	07:36	17:30 (20)	07:37	15:40 (3)	08:22	15:03 (19)					
1	21:33	20:38	39	20:08 (25)	19:24	23	18:45 (22)	18:10	11	17:41 (20)	16:08	15:44	2	15:05 (19)		
17	04:55	05:47	19:29 (30)	06:43	18:23 (22)	07:38	17:32 (20)	07:38	15:41 (3)	08:23	15:04 (19)					
1	21:32	20:36	37	20:06 (25)	19:21	19	18:42 (22)	18:08	6	17:38 (20)	16:06	15:44	2	15:06 (19)		
18	04:57	05:49	19:30 (30)	06:44	18:25 (22)	07:40	17:34 (20)	07:40	15:42 (3)	08:23	15:05 (19)					
1	21:30	20:34	34	20:04 (25)	19:19	15	18:40 (22)	18:05	16:05	15:44	1	15:06 (19)				
19	04:58	05:50	19:30 (30)	06:46	18:28 (22)	07:42	17:35 (20)	07:42	15:43 (3)	08:24	15:06 (19)					
1	21:29	20:32	32	20:02 (25)	19:16	8	18:36 (22)	18:03	16:03	15:45	1	15:07 (19)				
20	04:59	05:52	19:30 (30)	06:48	18:29 (22)	07:44	17:36 (20)	07:44	15:44 (3)	08:25	15:07 (19)					
1	21:28	20:29	30	20:00 (25)	19:14	18:01	16:02	15:45	1	15:08 (19)						
21	05:01	05:54	19:31 (30)	06:50	18:31 (22)	07:46	17:37 (20)	07:46	15:45 (3)	08:25	15:08 (19)					
1	21:26	20:27	25	19:58 (25)	19:11	17:59	16:01	15:45	1	15:09 (19)						
22	05:02	05:56	19:32 (30)	06:52	18:32 (22)	07:48	17:38 (20)	07:48	15:46 (3)	08:26	15:09 (19)					
1	21:25	20:25	19	19:51 (30)	19:09	17:56	15:59	5	15:02 (19)	15:46	1	15:10 (19)				
23	05:04	05:58	19:33 (30)	06:53	18:33 (22)	07:50	17:39 (20)	07:50	15:47 (3)	08:27	15:10 (19)					
24	05:05	05:59	19:36 (30)	06:55	18:35 (22)	07:52	17:40 (20)	07:52	15:48 (3)	08:28	15:11 (19)					
25	05:07	06:01	11	19:47 (30)	19:04	12	18:27 (18)	17:52	15:57	11	15:04 (19)	15:47	15:08 (19)			
26	05:09	06:03	19:01	26	18:28 (18)	16:50	15:56	12	15:05 (19)	15:48	1	15:09 (19)				
27	05:10	06:05	19:01	26	18:28 (18)	16:50	15:56	12	15:05 (19)	15:48	1	15:09 (19)				
28	05:12	06:07	18:56	37	18:27 (18)	16:45	15:53	13	15:06 (19)	15:48	1	15:09 (19)				
29	05:14	06:08	18:54	38	18:25 (18)	16:43	15:52	13	15:06 (19)	15:48	1	15:09 (19)				
30	05:15	06:10	18:51	37	18:23 (18)	16:41	15:51	13	15:06 (19)	15:48	1	15:09 (19)				
31	05:17	06:12	18:49	36	18:20 (18)	16:39	15:50	13	15:06 (19)	15:48	1	15:09 (19)				
1	21:10	20:03	18	19:21 (21)	16:37	12	15:46 (3)	15:53	5	15:14 (19)						
Sonnenscheinstunden		514	461	383	328	257	231	171								
astr.max.mögl.Beschattung		627	807	419	297	214										
Red.Sonnenscheinwahrsch.		0.48	0.40	0.33	0.21	0.14										
Reduktion Betriebsdauer		0.91	0.91	0.91	0.91	0.91										
Reduktion Windrichtung		0.64	0.68	0.69	0.69	0.68										
Gesamte Reduktion		0.28	0.25	0.21	0.13	0.09										
Met.wahrsch.Beschattung		176	200	86	39	15										

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)

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 17
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: G - IO7

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

Januar		Februar		März		April		Mai		Juni						
1	08:28			16:02 (3)	06:59		16:57 (20)	06:43		18:31 (22)	05:33					
2	08:28	5	15:16 (19)	16:46	12	16:14 (3)	17:43	17	17:14 (20)	19:42	29	19:00 (22)	20:39	38	20:02 (25)	21:29
3	08:28	7	15:18 (19)	16:48	15	16:16 (3)	17:45	19	17:14 (20)	19:44	29	18:59 (22)	20:40	37	20:01 (25)	21:31
4	08:27	7	15:18 (19)	16:50	17	16:19 (3)	17:47	21	17:14 (20)	19:46	31	19:19 (21)	20:42	35	19:59 (25)	21:32
5	08:27	9	15:20 (19)	16:52	18	16:20 (3)	17:49	23	17:13 (2)	19:48	37	19:21 (21)	20:44	31	19:57 (25)	21:33
6	08:27	10	15:21 (19)	16:54	19	16:21 (3)	17:51	26	17:15 (2)	19:50	41	19:23 (21)	20:46	25	19:50 (25)	21:34
7	08:26	11	15:22 (19)	16:56	19	16:21 (3)	17:53	27	17:15 (2)	19:52	42	19:24 (21)	20:48	24	19:49 (25)	21:35
8	08:26	13	15:25 (19)	16:58	19	16:20 (3)	17:55	29	17:16 (2)	19:54	44	19:26 (21)	20:50	22	19:48 (25)	21:36
9	08:26	14	15:26 (19)	17:00	19	16:20 (3)	17:57	30	17:16 (2)	19:55	44	19:27 (21)	20:51	20	19:47 (25)	21:37
10	08:25	15	15:27 (19)	17:02	17	16:19 (3)	17:59	30	17:15 (2)	19:57	42	19:26 (21)	20:53	17	19:46 (25)	21:38
11	08:24	15	15:27 (19)	17:05	16	16:19 (3)	18:00	31	17:16 (2)	19:59	40	19:26 (21)	20:55	14	19:44 (25)	21:39
12	08:24	15	15:27 (19)	17:07	13	16:18 (3)	18:02	31	17:16 (2)	20:01	36	19:25 (21)	20:57	9	19:41 (25)	21:40
13	08:23	15	15:28 (19)	17:09	9	16:16 (3)	18:04	30	17:15 (2)	20:03	30	19:24 (21)	20:59			21:41
14	08:23	15	15:28 (19)	17:11		18:06	35	17:40 (18)	20:05	22	19:23 (21)	21:00				21:41
15	08:22	15	15:29 (19)	17:13		18:08	37	17:41 (18)	20:07	6	19:19 (21)	21:02				21:42
16	08:21	15	15:30 (19)	17:15		18:10	38	17:43 (18)	20:09			21:04				21:43
17	08:21	15	15:30 (19)	17:17		18:12	39	17:45 (18)	20:10			21:05				21:43
18	08:20	15	15:31 (19)	17:19		18:14	38	17:47 (18)	20:12			21:07				21:44
19	08:20	15	15:31 (19)	17:21		18:16	34	17:46 (18)	20:14			21:09				21:44
20	08:19	15	15:32 (19)	17:23		18:18	30	17:46 (18)	20:16			21:10				21:45
21	08:19	15	15:32 (19)	17:25		18:20	18	17:44 (18)	20:18	12	19:34 (30)	04:58				21:45
22	08:18	15	15:33 (19)	17:27		18:22	8	17:42 (18)	20:20	16	19:32 (30)	04:56				21:45
23	08:18	15	15:33 (19)	17:29		18:24		18:24	20:22	20	19:29 (30)	04:55				21:45
24	08:17	15	15:34 (19)	17:31		18:26		18:26	20:24	25	19:24 (30)	04:53				21:45
25	08:17	15	15:34 (19)	17:33		18:28		18:28	20:26	29	19:18 (30)	04:52				21:45
26	08:16	15	15:35 (19)	17:35	4	17:03 (20)	06:00		18:29	32	19:12 (30)	04:51				21:46
27	08:16	15	15:35 (19)	17:37	9	17:00 (20)	05:58		18:31	35	19:06 (30)	04:49				21:46
28	08:15	15	15:36 (19)	17:39	13	17:09 (20)	05:55		18:33	37	19:00 (30)	04:48				21:46
29	08:14	15	15:37 (19)	17:41	16	16:58 (20)	05:53		18:35	39	18:54 (30)	04:47				21:46
30	08:14	15	15:37 (19)	17:43		18:37			18:37	39	18:48 (30)	04:46				21:46
31	08:13	15	15:38 (19)	17:45		18:39			18:39	37	18:42 (30)	04:45				21:46
Sonnenscheinstunden	248		272		367		421		496		512					
astr.max.mögl.Beschattung	256		235		719		796		272							
Red.Sonnenscheinwahrsch.	0.17		0.24		0.31		0.41		0.51							
Reduktion Betriebsdauer	0.91		0.91		0.91		0.91		0.91							
Reduktion Windrichtung	0.68		0.70		0.68		0.66		0.63							
Gesamte Reduktion	0.11		0.15		0.19		0.25		0.29							
Met.wahrsch.Beschattung	28		36		140		196		80							

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 18
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: G - IO7

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	05:19	19:46 (30) 06:14	18:32 (22) 07:08	17:25 (2) 07:07	15:33 (3) 08:03	14:54 (19)
2	21:45	21:09	3 19:49 (30) 20:01	36 19:25 (21) 18:46	31 18:18 (18) 16:35	15 15:48 (3) 15:50	16 15:10 (19)
3	04:39	05:20	11 19:53 (30) 06:16	40 18:29 (22) 07:10	31 17:24 (2) 07:09	17 15:32 (3) 08:05	15 15:10 (19)
4	21:44	21:07	19:40 (30) 06:17	42 18:28 (22) 07:12	31 17:23 (2) 07:11	17 15:31 (3) 08:06	15 15:10 (19)
5	04:40	05:22	15 19:55 (30) 06:17	42 19:24 (21) 18:41	31 17:54 (2) 16:31	18 15:49 (3) 15:48	15 15:11 (19)
6	21:44	21:05	19:38 (30) 06:19	44 18:27 (22) 07:14	30 17:23 (2) 07:13	18 15:31 (3) 08:08	14 15:10 (19)
7	04:40	05:24	18 19:56 (30) 06:19	44 19:24 (21) 18:39	30 17:53 (2) 16:29	18 15:49 (3) 15:47	14 15:10 (19)
8	21:41	21:03	20 19:37 (30) 06:21	44 18:25 (22) 07:15	30 17:23 (2) 07:15	19 15:31 (3) 08:09	13 14:57 (19)
9	04:41	05:25	20 19:57 (30) 06:21	44 19:22 (21) 18:37	30 17:53 (2) 16:27	19 15:50 (3) 15:47	13 15:10 (19)
10	21:43	21:01	19:36 (30) 06:23	42 18:25 (22) 07:17	29 17:23 (2) 07:17	18 15:31 (3) 08:10	14 15:11 (19)
11	04:42	05:27	23 19:59 (30) 06:23	42 19:20 (21) 18:34	29 17:52 (2) 16:25	19 15:50 (3) 15:46	11 15:08 (19)
12	21:42	20:59	23 19:35 (30) 06:25	42 18:24 (22) 07:19	29 17:23 (2) 07:19	19 15:31 (3) 08:12	14 15:11 (19)
13	04:43	05:29	24 19:59 (30) 06:25	41 19:18 (21) 18:32	28 17:51 (2) 16:23	19 15:50 (3) 15:46	10 15:08 (19)
14	21:41	20:57	19:34 (30) 06:26	41 18:24 (22) 07:21	27 17:24 (2) 07:21	18 15:32 (3) 08:13	14 15:11 (19)
15	04:44	05:31	26 20:00 (30) 06:26	37 19:16 (21) 18:29	26 17:50 (2) 16:21	17 15:49 (3) 15:45	8 15:07 (19)
16	21:41	20:55	19:34 (30) 06:28	37 18:23 (22) 07:23	26 17:25 (2) 07:23	17 15:32 (3) 08:14	15 15:10 (19)
17	04:45	05:32	32 20:07 (25) 19:41	32 19:13 (21) 18:27	24 17:49 (2) 16:19	14 15:46 (3) 15:45	8 15:08 (19)
18	21:40	20:53	19:33 (30) 06:30	32 18:23 (22) 07:25	24 17:26 (2) 07:25	14 15:33 (3) 08:16	15 15:10 (19)
19	04:46	05:34	29 20:08 (25) 19:39	29 18:52 (22) 18:24	22 17:48 (2) 16:18	11 15:44 (3) 15:45	7 15:07 (19)
20	21:39	20:51	19:33 (30) 06:32	29 18:23 (22) 07:27	22 17:27 (2) 07:27	11 15:35 (3) 08:17	15 15:11 (19)
21	04:48	05:36	37 20:10 (25) 19:36	29 18:52 (22) 18:22	21 17:48 (20) 16:16	8 15:43 (3) 15:44	5 15:06 (19)
22	21:38	20:49	19:32 (30) 06:34	27 18:24 (22) 07:28	21 17:30 (2) 07:29	8 15:37 (3) 08:18	5 15:02 (19)
23	04:49	05:38	39 20:11 (25) 19:34	27 18:51 (22) 18:20	18 17:48 (20) 16:14	4 15:41 (3) 15:44	4 15:06 (19)
24	21:37	20:47	20:07 (25) 19:35	27 18:23 (22) 07:30	17 17:30 (20) 07:31	3 15:42 (3) 15:44	3 15:02 (19)
25	04:50	05:40	38 20:10 (25) 19:31	27 18:50 (22) 18:17	17 17:47 (20) 16:13	3 15:44 (3) 15:45	3 15:05 (19)
26	21:36	20:45	19:32 (30) 06:37	27 18:24 (22) 07:32	17 17:31 (20) 07:33	3 15:44 (3) 15:45	3 15:05 (19)
27	04:51	05:41	39 20:11 (25) 19:29	24 18:48 (22) 18:15	14 17:45 (20) 16:11	2 15:44 (3) 15:45	2 15:05 (19)
28	21:35	20:43	19:32 (30) 06:39	22 18:25 (22) 07:34	14 17:32 (20) 07:35	2 15:44 (3) 15:45	2 15:04 (19)
29	04:52	05:43	39 20:11 (25) 19:26	22 18:47 (22) 18:12	11 17:43 (20) 16:09	1 15:44 (3) 15:45	1 15:05 (19)
30	21:34	20:40	19:31 (30) 06:41	18 18:27 (22) 07:36	8 17:33 (20) 07:37	1 15:44 (3) 15:45	1 15:05 (19)
31	04:54	05:45	37 20:08 (25) 19:24	18 18:45 (22) 18:10	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
1	21:33	20:38	19:32 (30) 06:43	18 18:28 (22) 07:38	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
2	04:55	05:47	34 20:06 (25) 19:21	14 18:42 (22) 18:08	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
3	21:32	20:36	19:33 (30) 06:44	14 18:33 (22) 07:40	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
4	04:57	05:49	31 20:04 (25) 19:19	4 18:37 (22) 18:05	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
5	21:30	20:34	19:32 (30) 06:46	7 18:26 (18) 17:56	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
6	04:58	05:50	30 20:02 (25) 19:16	18 18:03 (22) 07:42	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
7	21:29	20:32	19:32 (30) 06:48	11 18:28 (18) 17:54	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
8	04:59	05:52	26 20:00 (25) 19:14	18 18:01 (22) 07:46	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
9	21:28	20:29	19:35 (30) 06:50	18 18:01 (22) 07:46	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
10	05:01	05:54	19 19:54 (30) 19:11	17 17:59 (18) 07:48	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
11	21:26	20:27	16 19:52 (30) 19:09	7 18:26 (18) 17:56	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
12	05:02	05:56	11 19:49 (30) 19:06	11 18:28 (18) 17:54	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
13	21:25	20:25	06:55	17:36 (2) 07:51	8 17:41 (20) 16:08	1 15:44 (3) 15:45	1 15:05 (19)
14	05:04	05:58	26 18:29 (18) 17:52	15:57	12 15:06 (19) 15:47	1 15:44 (3) 15:45	1 15:05 (19)
15	21:23	20:22	17:33 (2) 06:53	15:57	12 15:06 (19) 15:47	1 15:44 (3) 15:45	1 15:05 (19)
16	05:05	05:59	19:01	16:50	14 15:07 (19) 15:48	1 15:44 (3) 15:45	1 15:05 (19)
17	21:22	20:20	19:01	16:50	14 15:07 (19) 15:48	1 15:44 (3) 15:45	1 15:05 (19)
18	05:07	06:01	06:57	17:30 (2) 06:53	14 15:07 (19) 15:48	1 15:44 (3) 15:45	1 15:05 (19)
19	21:20	20:18	19:01	16:50	14 15:07 (19) 15:48	1 15:44 (3) 15:45	1 15:05 (19)
20	05:09	06:03	06:59	17:30 (2) 06:55	14 15:07 (19) 15:48	1 15:44 (3) 15:45	1 15:05 (19)
21	21:19	20:15	18:59	16:47	14 15:07 (19) 15:48	1 15:44 (3) 15:45	1 15:05 (19)
22	05:10	06:05	07:01	17:28 (2) 06:57	14 15:07 (19) 15:48	1 15:44 (3) 15:45	1 15:05 (19)
23	21:17	20:13	18:56	16:45	14 15:08 (19) 15:49	1 15:44 (3) 15:45	1 15:05 (19)
24	05:12	06:07	07:03	17:27 (2) 06:59	14 15:08 (19) 15:49	1 15:44 (3) 15:45	1 15:05 (19)
25	21:16	20:11	18:54	16:43	15 15:09 (19) 15:50	1 15:44 (3) 15:45	1 15:05 (19)
26	05:14	06:08	19:14 (21) 07:04	17:26 (2) 07:01	15 15:09 (19) 15:50	1 15:44 (3) 15:45	1 15:05 (19)
27	21:14	20:08	6 19:20 (21) 18:51	38 18:23 (18) 16:41	2 15:40 (3) 08:00	16 14:54 (19) 08:28	2 15:13 (19)
28	05:15	06:10	18:37 (22) 07:06	17:25 (2) 07:03	2 15:42 (3) 15:51	16 15:10 (19) 15:51	2 15:13 (19)
29	21:12	20:06	22 19:23 (21) 18:49	35 18:20 (18) 16:39	10 15:46 (3) 08:01	15 14:55 (19) 08:28	3 15:13 (19)
30	05:17	06:12	18:34 (22) 07:05	16:37	10 15:46 (3) 08:01	15 14:55 (19) 08:28	3 15:13 (19)
31	21:10	20:03	30 19:24 (21) 18:37	13 16:37	10 15:46 (3) 08:01	15 14:55 (19) 08:28	3 15:13 (19)
Sonnenscheinstunden	514	461	383	328	257	231	141
astr.max.mögl.Beschattung		661	818	396	299	141	
Red.Sonnenscheinwahrsch.		0.48	0.40	0.33	0.21	0.14	
Reduktion Betriebsdauer		0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung		0.64	0.68	0.68	0.69	0.68	
Gesamte Reduktion		0.28	0.25	0.21	0.13	0.09	
Met.wahrsch.Beschattung		186	203	81	39	12	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 19

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: H - IO8

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	15:09 (19) 07:57	16:03 (3) 06:59	17:01 (20) 06:43	18:44 (22) 05:33	19:34 (30) 04:42	
2	15:54	7 15:16 (19) 16:46	11 16:14 (3) 17:43	15 17:16 (20) 19:42	20 19:04 (22) 20:39	35 20:09 (25) 21:29	
3	08:28	15:10 (19) 07:55	16:02 (3) 06:56	16:59 (20) 06:40	18:42 (22) 05:31	19:33 (30) 04:41	
4	15:55	8 15:18 (19) 16:48	14 16:16 (3) 17:45	18 17:17 (20) 19:44	23 19:05 (22) 20:40	37 20:10 (25) 21:31	
5	08:28	15:09 (19) 07:54	16:02 (3) 06:54	16:59 (20) 06:38	18:40 (22) 05:28	19:33 (30) 04:40	
6	15:57	9 15:18 (19) 16:50	17 16:19 (3) 17:47	18 17:17 (20) 19:46	26 19:06 (22) 20:42	37 20:10 (25) 21:32	
7	08:27	15:10 (19) 07:52	16:02 (3) 06:52	16:58 (20) 06:35	18:39 (22) 05:26	19:32 (30) 04:40	
8	15:58	10 15:20 (19) 16:52	19 16:21 (3) 17:49	19 17:17 (20) 19:48	27 19:06 (22) 20:44	37 20:09 (25) 21:33	
9	08:27	15:09 (19) 07:50	16:02 (3) 06:49	16:57 (20) 06:33	18:38 (22) 05:24	19:32 (30) 04:39	
10	15:59	12 15:21 (19) 16:54	19 16:21 (3) 17:51	20 17:17 (20) 19:50	29 19:07 (22) 20:46	36 20:08 (25) 21:34	
11	08:27	15:09 (19) 07:48	16:02 (3) 06:47	16:54 (20) 06:30	18:36 (22) 05:22	19:32 (30) 04:38	
12	16:00	13 15:22 (19) 16:56	19 16:21 (3) 17:53	23 17:17 (20) 19:52	32 19:24 (21) 20:48	35 20:07 (25) 21:35	
13	08:26	15:10 (19) 07:46	16:01 (3) 06:45	16:53 (20) 06:28	18:36 (22) 05:20	19:31 (30) 04:37	
14	16:02	15 15:25 (19) 16:58	20 16:21 (3) 17:55	25 17:18 (20) 19:54	38 19:26 (21) 20:50	35 20:06 (25) 21:36	
15	08:26	15:10 (19) 07:44	16:01 (3) 06:42	16:51 (20) 06:26	18:36 (22) 05:18	19:31 (30) 04:37	
16	16:03	15 15:25 (19) 17:00	20 16:21 (3) 17:57	28 17:19 (20) 19:55	42 19:28 (21) 20:51	33 20:04 (25) 21:37	
17	08:25	15:10 (19) 07:42	16:02 (3) 06:40	16:50 (20) 06:23	18:35 (22) 05:17	19:32 (30) 04:36	
18	16:05	16 15:26 (19) 17:02	18 16:20 (3) 17:59	30 17:20 (20) 19:57	46 19:30 (21) 20:53	29 20:01 (25) 21:38	
19	08:24	15:10 (19) 07:40	16:03 (3) 06:37	16:49 (20) 06:21	18:35 (22) 05:15	19:32 (30) 04:36	
20	16:06	16 15:26 (19) 17:05	17 16:20 (3) 18:00	31 17:20 (20) 19:59	49 19:32 (21) 20:55	28 20:00 (25) 21:39	
21	08:24	15:11 (19) 07:38	16:04 (3) 06:35	16:49 (20) 06:18	18:35 (22) 05:13	19:33 (30) 04:35	
22	16:08	16 15:27 (19) 17:07	15 16:19 (3) 18:02	31 17:20 (20) 20:01	49 19:32 (21) 20:57	27 20:00 (25) 21:40	
23	08:23	15:11 (19) 07:36	16:05 (3) 06:32	16:48 (20) 06:16	18:35 (22) 05:11	19:34 (30) 04:35	
24	16:09	16 15:27 (19) 17:09	13 16:18 (3) 18:04	32 17:20 (20) 20:03	49 19:32 (21) 20:59	26 20:00 (25) 21:41	
25	08:22	15:11 (19) 07:34	16:07 (3) 06:30	16:47 (20) 06:14	18:36 (22) 05:09	19:34 (30) 04:34	
26	16:11	16 15:27 (19) 17:11	9 16:16 (3) 18:06	32 17:20 (20) 20:05	47 19:32 (21) 21:00	25 19:59 (30) 21:41	
27	08:21	15:12 (19) 07:32	16:07 (3) 06:27	16:47 (20) 06:11	18:35 (22) 05:07	19:34 (30) 04:34	
28	16:13	16 15:28 (19) 17:13	18:08	32 17:19 (20) 20:07	46 19:31 (21) 21:02	24 19:58 (30) 21:42	
29	08:20	15:13 (19) 07:30	16:05 (3) 06:25	16:47 (20) 06:09	18:36 (22) 05:06	19:36 (30) 04:34	
30	16:14	15 15:28 (19) 17:15	18:10	38 17:43 (18) 20:09	42 19:30 (21) 21:04	21 19:57 (30) 21:43	
31	08:19	15:14 (19) 07:28	16:06 (3) 06:23	16:47 (20) 06:06	18:37 (22) 05:04	19:36 (30) 04:34	
32	16:16	14 15:28 (19) 17:17	18:12	40 17:45 (18) 20:10	38 19:29 (21) 21:05	20 19:56 (30) 21:43	
33	08:18	15:15 (19) 07:26	16:06 (3) 06:20	16:48 (20) 06:04	18:38 (22) 05:02	19:38 (30) 04:33	
34	16:18	13 15:28 (19) 17:19	18:14	41 17:47 (18) 20:12	32 19:26 (21) 21:07	17 19:55 (30) 21:44	
35	08:17	15:15 (19) 07:24	16:06 (3) 06:18	16:48 (20) 06:02	18:40 (22) 05:01	19:39 (30) 04:33	
36	16:19	13 15:28 (19) 17:21	18:16	44 17:49 (18) 20:14	19 19:22 (21) 21:09	14 19:53 (30) 21:44	
37	08:16	15:16 (19) 07:22	16:05 (3) 06:15	16:49 (20) 05:59	18:42 (22) 04:59	19:42 (30) 04:33	
38	16:21	11 15:27 (19) 17:23	18:18	44 17:51 (18) 20:16	13 18:55 (22) 04:58	9 19:51 (30) 21:45	
39	08:15	15:18 (19) 07:19	16:07 (3) 06:13	16:48 (20) 05:57	18:47 (22) 04:56	19:43 (30) 04:34	
40	16:23	9 15:27 (19) 17:25	18:20	41 17:50 (18) 20:18	3 18:50 (22) 21:12	21:45	
41	08:14	15:20 (19) 07:17	16:06 (3) 06:10	16:51 (20) 05:55	18:48 (22) 04:56	19:44 (30) 04:34	
42	16:25	5 15:25 (19) 17:27	18:22	37 17:49 (18) 20:20	21:14	21:45	
43	08:12	15:21 (19) 07:15	16:08 (3) 06:08	16:52 (20) 05:52	18:49 (22) 04:55	19:45 (30) 04:34	
44	16:27	17:29	18:23	31 17:48 (18) 20:22	21:15	21:45	
45	08:11	15:22 (19) 07:13	16:09 (3) 06:05	16:55 (20) 05:50	18:50 (22) 04:53	19:46 (30) 04:34	
46	16:29	17:31	18:25	22 17:46 (18) 20:24	21:17	21:45	
47	08:10	15:23 (19) 07:11	16:03 (3) 06:03	17:39 (18) 05:48	18:51 (22) 04:52	19:47 (30) 04:34	
48	16:31	17:33	18:27	3 17:42 (18) 20:26	21:18	21:46	
49	08:08	15:24 (19) 07:08	16:00 (3) 06:00	16:56 (20) 05:46	19:42 (30) 04:50	19:48 (30) 04:35	
50	16:32	17:35	18:29	12 19:54 (30) 21:20	21:46	21:46	
51	08:07	15:25 (19) 07:06	16:01 (3) 05:58	16:57 (20) 05:43	19:39 (30) 04:49	19:49 (30) 04:35	
52	16:34	17:37	18:31	19 20:00 (25) 21:21	21:46	21:46	
53	08:05	15:26 (19) 07:03	16:02 (3) 05:55	16:58 (20) 05:41	19:38 (30) 04:48	19:50 (30) 04:36	
54	16:36	17:39	7 17:11 (20) 18:33	20:31	24 20:02 (25) 21:23	21:45	
55	08:04	15:27 (19) 07:01	16:03 (3) 05:53	16:59 (20) 05:39	19:36 (30) 04:47	19:51 (30) 04:36	
56	16:38	17:41	11 17:13 (20) 18:35	20:33	28 20:04 (25) 21:24	21:45	
57	08:02	15:28 (19) 07:00	16:04 (3) 05:50	16:59 (20) 05:37	19:35 (30) 04:45	19:52 (30) 04:37	
58	16:40	17:43	18:37	30 20:05 (25) 21:26	21:45	21:45	
59	08:00	15:29 (19) 06:58	16:05 (3) 05:48	16:59 (20) 05:35	19:34 (30) 04:44	19:53 (30) 04:37	
60	16:42	16:10 (3) 17:44	18:39	5 18:52 (22) 05:35	33 20:07 (25) 21:27	21:45	
61	07:59	16:04 (3) 17:38	18:33	16:45	18:46 (22) 04:43	19:46 (30) 04:34	
62	16:44	8 16:12 (3) 17:46	19:40	15 19:01 (22) 21:28	21:46	21:45	
63	Sonnenscheinstunden	248	272	367	421	496	512
64	astr.max.mögl.Beschattung	277	229	715	816	525	512
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.51
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.68	0.70	0.68	0.66	0.64	0.64
68	Gesamte Reduktion	0.11	0.15	0.19	0.25	0.29	0.29
69	Met.wahrsch.Beschattung	30	35	139	202	155	155

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 20
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: H - IO8

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember	
1	04:38	05:19	19:44 (30) 06:14	18:35 (22) 07:08	17:27 (2) 07:07	15:32 (3) 08:03	14:53 (19)
2	21:45	21:09	20:10 (30) 20:01	19:32 (21) 18:46	18:00 (2) 16:35	15:50 (3) 15:50	15:09 (19)
3	04:39	05:20	19:43 (30) 06:16	18:33 (22) 07:10	17:27 (2) 07:09	15:31 (3) 08:05	14:53 (19)
4	21:44	21:07	20:10 (30) 19:59	19:30 (21) 18:44	17:59 (2) 16:33	15:50 (3) 15:49	15:09 (19)
5	04:40	05:22	19:43 (30) 06:17	18:33 (22) 07:12	17:27 (2) 07:11	15:31 (3) 08:06	14:54 (19)
6	21:44	21:05	20:11 (30) 19:56	19:28 (21) 18:41	17:58 (2) 16:31	15:50 (3) 15:48	15:10 (19)
7	04:40	05:24	19:42 (30) 06:19	18:33 (22) 07:14	17:27 (2) 07:13	15:31 (3) 08:08	14:54 (19)
8	21:43	21:03	20:12 (25) 19:54	19:25 (21) 18:39	17:57 (2) 16:29	15:50 (3) 15:47	15:10 (19)
9	04:41	05:25	19:42 (30) 06:21	18:32 (22) 07:15	17:27 (2) 07:15	15:31 (3) 08:09	14:55 (19)
10	21:43	21:01	20:15 (25) 19:51	19:22 (21) 18:37	17:56 (2) 16:27	15:51 (3) 15:47	15:10 (19)
11	04:42	05:27	19:42 (30) 06:23	18:33 (22) 07:17	17:28 (2) 07:17	15:31 (3) 08:10	14:55 (19)
12	21:42	20:59	20:17 (25) 19:49	19:20 (21) 18:34	17:55 (2) 16:25	15:51 (3) 15:46	14:59 (19)
13	04:43	05:29	19:41 (30) 06:25	18:33 (22) 07:19	17:29 (2) 07:19	15:32 (3) 08:12	14:56 (19)
14	21:41	20:57	20:17 (25) 19:46	19:02 (22) 18:32	17:53 (2) 16:23	15:50 (3) 15:46	12:15:08 (19)
15	04:44	05:31	19:41 (30) 06:26	18:34 (22) 07:21	17:31 (2) 07:21	15:32 (3) 08:13	14:57 (19)
16	21:41	20:55	20:18 (25) 19:44	19:01 (22) 18:29	17:52 (2) 16:21	15:49 (3) 15:45	10:15:07 (19)
17	04:45	05:32	19:42 (30) 06:28	18:34 (22) 07:23	17:33 (2) 07:23	15:33 (3) 08:14	14:58 (19)
18	21:40	20:53	20:19 (25) 19:41	18:59 (22) 18:27	17:52 (2) 16:19	15:46 (3) 15:45	10:15:08 (19)
19	04:46	05:34	19:41 (30) 06:30	18:35 (22) 07:25	17:33 (2) 07:25	15:34 (3) 08:16	14:59 (19)
20	21:39	20:51	20:18 (25) 19:39	18:58 (22) 18:24	17:52 (2) 16:18	15:44 (3) 15:45	8:15:07 (19)
21	04:48	05:36	19:42 (30) 06:32	18:36 (22) 07:27	17:33 (2) 07:27	15:36 (3) 08:17	14:59 (19)
22	21:38	20:49	20:18 (25) 19:36	18:56 (22) 18:22	17:51 (2) 16:16	15:43 (3) 15:44	7:15:06 (19)
23	04:49	05:38	19:42 (30) 06:34	18:38 (22) 07:28	17:34 (2) 07:29	15:38 (3) 08:18	15:00 (19)
24	21:37	20:47	20:17 (25) 19:34	18:54 (22) 18:20	17:50 (2) 16:14	15:41 (3) 15:44	6:15:06 (19)
25	04:50	05:40	19:42 (30) 06:35	18:41 (22) 07:30	17:34 (2) 07:31	15:42 (3) 08:19	15:00 (19)
26	21:36	20:45	20:14 (25) 19:31	18:49 (22) 18:17	17:48 (2) 16:13	15:44	5:15:05 (19)
27	04:51	05:41	19:43 (30) 06:37	18:42 (22) 07:32	17:36 (2) 07:33	15:44	2:15:01 (19)
28	21:35	20:43	20:12 (25) 19:29	18:15	17:45 (2) 16:11	15:44	4:15:05 (19)
29	04:52	05:43	19:44 (30) 06:39	18:43 (22) 07:34	17:38 (2) 07:35	15:44	1:15:02 (19)
30	21:34	20:40	20:11 (25) 19:26	18:12	17:43 (2) 16:09	15:44	3:15:05 (19)
31	04:54	05:45	19:45 (30) 06:41	18:43 (22) 07:36	17:37	15:44	08:22
1	21:33	20:38	20:08 (25) 19:24	18:10	17:36	15:44	2:15:03 (19)
2	04:55	05:47	19:47 (30) 06:43	18:44 (22) 07:38	17:38	15:44	08:23
3	21:32	20:36	20:03 (30) 19:21	18:08	17:36	15:44	2:15:06 (19)
4	04:57	05:49	19:49 (30) 06:44	18:46 (22) 07:40	17:40	15:44	08:23
5	21:30	20:34	20:00 (30) 19:19	18:05	17:36	15:44	1:15:06 (19)
6	04:58	05:50	19:48 (30) 06:46	18:47 (22) 07:42	17:42	15:44	08:24
7	21:29	20:32	19:16	18:03	17:36	15:45	15:45
8	04:59	05:52	19:48 (30) 06:48	18:48 (22) 07:44	17:44	15:45	08:25
9	21:28	20:29	19:14	18:02	17:36	15:45	15:45
10	05:01	05:54	19:49 (30) 06:50	18:49 (22) 07:46	17:46	15:45	08:25
11	21:26	20:27	19:11	18:01	17:36	15:45	15:45
12	05:02	05:56	19:49 (30) 06:52	18:50 (22) 07:48	17:48	15:45	08:26
13	21:25	20:25	19:09	18:00	17:36	15:45	15:45
14	05:04	05:58	18:50 (22) 06:53	18:34 (18) 17:56	15:59	9:15:03 (19) 15:46	
15	21:23	20:22	18:55 (22) 19:06	18:34 (18) 17:54	15:58	10:15:04 (19) 15:46	
16	05:05	19:53 (30) 06:59	18:46 (22) 06:55	17:33 (2) 07:51	15:57	13:15:05 (19) 15:47	
17	21:22	6 19:59 (30) 20:20	14 19:00 (22) 19:04	42 18:34 (18) 17:52	15:57	13:15:05 (19) 15:47	
18	05:07	19:51 (30) 06:01	18:43 (22) 06:57	17:32 (2) 06:53	15:57	13:15:05 (19) 15:47	
19	21:20	12 20:03 (30) 20:18	23 19:27 (21) 19:01	43 18:33 (18) 16:50	15:56	14:15:06 (19) 15:48	
20	05:09	19:49 (30) 06:03	18:40 (22) 06:59	17:30 (2) 06:55	15:55	14:15:06 (19) 15:48	
21	21:19	15 20:04 (30) 20:15	32 19:29 (21) 18:59	43 18:30 (18) 16:47	15:54	14:15:06 (19) 15:48	
22	05:10	19:48 (30) 06:05	18:39 (22) 07:01	17:29 (2) 06:57	15:54	14:15:06 (19) 15:48	
23	21:17	18 20:06 (30) 20:13	39 19:31 (21) 18:56	40 18:27 (18) 16:45	15:53	14:15:07 (19) 15:49	
24	05:12	19:46 (30) 06:07	18:38 (22) 07:03	17:28 (2) 06:59	15:52	14:15:07 (19) 15:49	
25	21:16	21 20:07 (30) 20:11	43 19:32 (21) 18:54	38 18:25 (18) 16:43	15:52	14:15:07 (19) 15:50	
26	05:14	19:46 (30) 06:08	18:36 (22) 07:04	17:28 (2) 07:01	15:51	14:15:07 (19) 15:50	
27	21:14	22 20:08 (30) 20:08	44 19:31 (21) 18:51	34 18:23 (18) 16:41	15:51	14:15:07 (19) 15:51	
28	05:15	19:44 (30) 06:10	18:35 (22) 07:06	17:28 (2) 07:03	15:51	14:15:07 (19) 15:51	
29	21:12	24 20:09 (30) 20:06	48 19:32 (21) 18:49	32 18:00 (2) 16:39	15:51	14:15:07 (19) 15:51	
30	05:17	19:44 (30) 06:12	18:35 (22) 07:05	17:28 (2) 07:05	15:51	14:15:07 (19) 15:51	
31	21:10	25 20:09 (30) 20:03	48 19:32 (21) 18:48	32 18:00 (2) 16:39	15:51	14:15:07 (19) 15:51	
Sonnenscheinstunden	514	461	383	328	257	231	184
astr.max.mögl.Beschattung	143	831	801	367	311	184	0.14
Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14	0.14
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Reduktion Windrichtung	0.64	0.65	0.67	0.68	0.69	0.68	0.68
Gesamte Reduktion	0.26	0.29	0.25	0.20	0.13	0.09	0.09
Met.wahrsch.Beschattung	37	237	198	75	41	16	16

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 21
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: I - IO9

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	07:57	06:59	06:43	05:33	19:03 (22)	04:42	19:56 (30)
1	15:54	16:46	17:43	19:42	20:39	4	19:07 (22)	21:29
2	08:28	15:17 (19) 07:55	16:12 (3) 06:56	16:11 (3) 06:54	17:14 (20) 06:38	19:03 (22)	21:29	11
2	15:55	15:18 (19) 16:48	16:16 (3) 17:45	16:10 (3) 06:52	17:10 (20) 06:35	19:07 (22)	21:29	19:59 (30)
3	08:28	15:16 (19) 07:54	16:11 (3) 06:54	17:14 (20) 06:38	19:03 (22)	21:29	8	20:07 (30)
3	15:57	2 15:18 (19) 16:50	8 16:19 (3) 17:47	6 17:20 (20) 19:46	19:03 (22)	21:29		
4	08:27	15:16 (19) 07:52	16:10 (3) 06:52	17:10 (20) 06:35	19:03 (22)	21:29		
4	15:58	4 15:20 (19) 16:52	11 16:21 (3) 17:49	11 17:21 (20) 19:48	19:03 (22)	21:29		
5	08:27	15:15 (19) 07:50	16:09 (3) 06:49	17:09 (20) 06:33	19:03 (22)	21:29		
5	15:59	6 15:21 (19) 16:54	14 16:23 (3) 17:51	15 17:24 (20) 19:50	19:03 (22)	21:29		
6	08:27	15:15 (19) 07:48	16:08 (3) 06:47	17:07 (20) 06:30	19:03 (22)	21:29		
6	16:00	7 15:22 (19) 16:56	18 16:26 (3) 17:53	18 17:25 (20) 19:52	19:03 (22)	21:29		
7	08:26	15:15 (19) 07:46	16:07 (3) 06:45	17:07 (20) 06:28	19:03 (22)	21:29		
7	16:02	10 15:25 (19) 16:58	19 16:26 (3) 17:55	18 17:25 (20) 19:54	19:03 (22)	21:29		
8	08:26	15:15 (19) 07:44	16:06 (3) 06:42	17:06 (20) 06:26	19:03 (22)	21:29		
8	16:03	11 15:26 (19) 17:00	21 16:27 (3) 17:57	19 17:25 (20) 19:55	19:03 (22)	21:29		
9	08:25	15:15 (19) 07:42	16:06 (3) 06:40	17:06 (20) 06:23	19:03 (22)	21:29		
9	16:05	12 15:27 (19) 17:03	21 16:27 (3) 17:59	19 17:25 (20) 19:57	19:03 (22)	21:29		
10	08:24	15:15 (19) 07:40	16:07 (3) 06:37	17:05 (20) 06:21	19:03 (22)	21:29		
10	16:06	14 15:29 (19) 17:05	20 16:27 (3) 18:00	20 17:25 (20) 19:59	19:03 (22)	21:29		
11	08:24	15:15 (19) 07:38	16:07 (3) 06:35	17:06 (20) 06:18	19:03 (22)	21:29		
11	16:08	15 15:30 (19) 17:07	20 16:27 (3) 18:02	20 17:26 (2) 20:01	19:03 (22)	21:29		
12	08:23	15:15 (19) 07:36	16:08 (3) 06:32	17:05 (2) 06:16	19:03 (22)	21:29		
12	16:09	16 15:31 (19) 17:09	19 16:27 (3) 18:04	22 17:27 (2) 20:03	19:03 (22)	21:29		
13	08:22	15:15 (19) 07:34	16:08 (3) 06:30	17:03 (2) 06:14	19:03 (22)	21:29		
13	16:11	17 15:32 (19) 17:11	19 16:27 (3) 18:06	26 17:29 (2) 20:05	19:03 (22)	21:29		
14	08:21	15:16 (19) 07:32	16:09 (3) 06:27	17:01 (2) 06:11	19:03 (22)	21:29		
14	16:13	16 15:32 (19) 17:13	17 16:26 (3) 18:08	29 17:30 (2) 20:07	19:03 (22)	21:29		
15	08:20	15:16 (19) 07:30	16:10 (3) 06:25	17:01 (2) 06:09	19:03 (22)	21:29		
15	16:14	17 15:33 (19) 17:15	14 16:24 (3) 18:10	30 17:31 (2) 20:09	19:03 (22)	21:29		
16	08:19	15:17 (19) 07:28	16:12 (3) 06:23	16:59 (2) 06:06	19:03 (22)	21:29		
16	16:16	16 15:33 (19) 17:17	10 16:22 (3) 18:12	32 17:31 (2) 20:10	19:03 (22)	21:29		
17	08:18	15:17 (19) 07:26	06:20	16:59 (2) 06:04	19:03 (22)	21:29		
17	16:18	17 15:34 (19) 17:19	18:14	33 17:32 (2) 20:12	19:03 (22)	21:29		
18	08:17	15:17 (19) 07:24	06:18	16:58 (2) 06:02	19:03 (22)	21:29		
18	16:19	16 15:33 (19) 17:21	18:16	33 17:31 (2) 20:14	19:03 (22)	21:29		
19	08:16	15:18 (19) 07:22	06:15	16:58 (2) 05:59	19:03 (22)	21:29		
19	16:21	16 15:34 (19) 17:23	18:18	39 17:51 (18) 20:16	19:03 (22)	21:29		
20	08:15	15:19 (19) 07:19	06:13	16:57 (2) 05:57	19:03 (22)	21:29		
20	16:23	15 15:34 (19) 17:25	18:20	43 17:53 (18) 20:18	19:03 (22)	21:29		
21	08:14	15:20 (19) 07:17	06:10	16:57 (2) 05:55	19:03 (22)	21:29		
21	16:25	13 15:33 (19) 17:27	18:22	46 17:55 (18) 20:20	19:03 (22)	21:29		
22	08:12	15:21 (19) 07:15	06:08	16:57 (2) 05:52	19:03 (22)	21:29		
22	16:27	12 15:33 (19) 17:29	18:23	48 17:56 (18) 20:22	19:03 (22)	21:29		
23	08:11	15:22 (19) 07:13	06:05	16:57 (2) 05:50	19:03 (22)	21:29		
23	16:29	10 15:32 (19) 17:31	18:25	50 17:58 (18) 20:24	19:03 (22)	21:29		
24	08:10	15:24 (19) 07:10	06:03	16:57 (2) 05:48	19:03 (22)	21:29		
24	16:31	6 15:30 (19) 17:33	18:27	48 17:57 (18) 20:26	19:03 (22)	21:29		
25	08:08	07:08	06:00	16:58 (2) 05:46	19:03 (22)	21:29		
25	16:32	17:35	18:29	46 17:57 (18) 20:27	19:03 (22)	21:29		
26	08:07	07:06	05:58	16:58 (2) 05:43	19:03 (22)	21:29		
26	16:34	17:37	18:31	42 17:55 (18) 20:29	19:03 (22)	21:29		
27	08:05	07:03	05:55	16:59 (2) 05:41	19:03 (22)	21:29		
27	16:36	17:39	18:33	37 17:54 (18) 20:31	19:03 (22)	21:29		
28	08:04	07:01	05:53	17:00 (2) 05:39	19:03 (22)	21:29		
28	16:38	17:41	18:35	29 17:51 (18) 20:33	19:03 (22)	21:29		
29	08:02		06:50	18:02 (2) 05:37	19:03 (22)	21:29		
29	16:40		19:37	19 18:21 (2) 20:35	19:03 (22)	21:29		
30	08:00		06:48	18:05 (2) 05:35	19:03 (22)	21:29		
30	16:42		19:39	14 18:19 (2) 20:37	19:03 (22)	21:29		
31	07:59		06:45		19:03 (22)	21:29		
31	16:44		19:40		19:03 (22)	21:29		
Sonnenscheinstunden	248	272	367	421	496	512		
astr.max.mögl.Beschattung	269	235	812	773	774	19		
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45		
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91		
Reduktion Windrichtung	0.68	0.70	0.68	0.65	0.64	0.64		
Gesamte Reduktion	0.11	0.15	0.19	0.24	0.29	0.28		
Met.wahrsch.Beschattung	29	36	158	189	228	5		

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 22
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersieglug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: I - IO9

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	05:19	19:57 (30) 06:14	18:56 (22) 07:08	17:44 (2) 07:07	15:36 (3) 08:03	
2	21:45	21:09	31 20:28 (25) 20:01	25 19:33 (21) 18:46	24 18:08 (2) 16:35	21 15:37 (3) 15:50	
3	04:39	05:20	19:56 (30) 06:16	18:56 (22) 07:10	17:45 (20) 07:09	15:36 (3) 08:05	
4	21:44	21:07	32 20:28 (25) 19:59	21 19:17 (22) 18:44	21 18:06 (2) 16:33	21 15:37 (3) 15:49	
5	04:40	05:22	19:57 (30) 06:17	18:59 (22) 07:12	17:43 (20) 07:11	15:36 (3) 08:06	
6	21:44	21:05	32 20:29 (25) 19:56	16 19:15 (22) 18:41	19 18:02 (2) 16:31	20 15:36 (3) 15:48	
7	04:40	05:24	19:57 (30) 06:19	19 19:02 (22) 07:14	17:43 (20) 07:13	15:36 (3) 08:08	
8	21:43	21:03	32 20:29 (25) 19:54	9 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
9	04:41	05:25	19:58 (30) 06:21	10 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
10	21:43	21:01	31 20:29 (25) 19:51	10 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
11	04:42	05:27	19:59 (30) 06:23	11 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
12	21:42	20:59	29 20:28 (25) 19:49	12 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
13	04:43	05:29	19:59 (30) 06:25	13 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
14	21:41	20:57	27 20:26 (25) 19:46	14 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
15	04:44	05:31	20:00 (30) 06:26	15 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
16	21:41	20:55	24 20:24 (25) 19:44	16 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
17	04:45	05:32	20:02 (30) 06:28	17 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
18	21:40	20:53	21 20:23 (25) 19:41	18 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
19	04:46	20:07 (30) 05:34	20:03 (30) 06:30	19 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
20	21:39	6 20:13 (30) 20:51	17 20:20 (25) 19:39	20 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
21	04:48	20:05 (30) 05:36	20:07 (30) 06:32	21 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
22	21:38	10 20:15 (30) 20:49	9 20:18 (25) 19:36	22 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
23	04:49	20:04 (30) 05:38	19:09 (22) 06:34	23 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
24	21:37	12 20:16 (30) 20:47	8 19:17 (22) 19:34	24 19:11 (22) 18:39	19 18:02 (2) 16:29	20 15:36 (3) 15:47	
25	04:50	20:03 (30) 05:40	19:05 (22) 06:35	17:56 (2) 07:30	16:14	15:44	
26	21:36	15 20:18 (30) 20:45	15 19:20 (22) 19:31	13 18:09 (2) 18:17	16:13	15:44	
27	04:51	20:02 (30) 05:41	19:03 (22) 06:37	17:53 (2) 07:32	16:13	15:44	
28	21:35	17 20:19 (30) 20:43	19 19:22 (22) 19:29	18 18:11 (2) 18:15	16:11	15:44	
29	04:52	20:01 (30) 05:43	19:02 (22) 06:39	17:51 (2) 07:34	16:11	15:44	
30	21:34	18 20:19 (30) 20:40	22 19:24 (22) 19:26	26 18:40 (18) 18:12	16:09	15:44	
31	04:54	20:01 (30) 05:45	18:59 (22) 06:41	17:49 (2) 07:36	16:09	15:44	
32	21:33	20 20:21 (30) 20:38	25 19:24 (22) 19:24	36 18:43 (18) 18:10	16:08	15:44	
33	04:55	20:00 (30) 05:47	18:58 (22) 06:43	17:47 (2) 07:38	16:08	15:44	
34	21:32	22 20:22 (30) 20:36	27 19:25 (22) 19:21	41 18:43 (18) 18:08	16:06	15:44	
35	04:57	19:59 (30) 05:49	18:58 (22) 06:44	17:46 (2) 07:40	16:06	15:44	
36	21:30	23 20:22 (30) 20:34	28 19:26 (22) 19:19	44 18:44 (18) 18:05	16:05	15:44	
37	04:58	19:58 (30) 05:50	18:56 (22) 06:46	17:45 (2) 07:42	16:05	15:44	
38	21:29	24 20:22 (30) 20:32	30 19:26 (22) 19:16	48 18:45 (18) 18:03	16:03	15:44	
39	04:59	19:58 (30) 05:52	18:55 (22) 06:48	17:44 (2) 07:44	16:03	15:44	
40	21:28	26 20:24 (30) 20:29	40 19:41 (21) 19:14	49 18:45 (18) 18:01	16:02	15:44	
41	05:01	19:57 (30) 05:54	18:55 (22) 06:50	17:42 (2) 07:46	16:02	15:44	
42	21:26	27 20:24 (30) 20:27	45 19:43 (21) 19:11	49 18:42 (18) 17:59	16:01	15:44	
43	05:02	19:58 (30) 05:56	18:54 (22) 06:52	17:42 (2) 07:48	16:01	15:44	
44	21:25	27 20:25 (30) 20:25	47 19:43 (21) 19:09	47 18:40 (18) 17:56	15:59	15:44	
45	05:04	19:57 (30) 05:58	18:54 (22) 06:53	17:42 (2) 07:50	15:59	15:44	
46	21:23	28 20:25 (30) 20:22	49 19:44 (21) 19:06	44 18:38 (18) 17:54	15:58	15:44	
47	05:06	19:56 (30) 05:59	18:53 (22) 06:55	17:41 (2) 07:51	15:58	15:44	
48	21:22	29 20:25 (30) 20:20	50 19:44 (21) 19:04	40 18:35 (18) 17:52	15:57	15:44	
49	05:07	19:56 (30) 06:01	18:54 (22) 06:57	17:41 (2) 07:53	15:54 (3) 07:53	15:44 (19) 08:23	
50	21:20	30 20:26 (30) 20:18	51 19:45 (21) 19:01	36 18:33 (18) 16:50	5 15:49 (3) 15:56	17 15:11 (19) 15:48	
51	05:09	19:56 (30) 06:03	18:53 (22) 06:59	17:41 (2) 06:55	15:41 (3) 07:55	14:55 (19) 08:28	
52	21:19	29 20:25 (30) 20:15	51 19:44 (21) 18:59	33 18:14 (2) 16:47	11 15:52 (3) 15:54	16 15:11 (19) 15:48	
53	05:10	19:56 (30) 06:05	18:53 (22) 07:01	17:41 (2) 06:57	15:39 (3) 07:56	14:55 (19) 08:28	
54	21:17	30 20:26 (30) 20:13	49 19:43 (21) 18:56	32 18:13 (2) 16:45	15 15:54 (3) 15:53	17 15:12 (19) 15:49	
55	05:12	19:56 (30) 06:07	18:53 (22) 07:03	17:41 (2) 06:59	15:38 (3) 07:58	14:56 (19) 08:28	
56	21:16	30 20:26 (30) 20:11	47 19:42 (21) 18:54	31 18:12 (2) 16:43	17 15:55 (3) 15:52	16 15:12 (19) 15:50	
57	05:14	19:56 (30) 06:08	18:53 (22) 07:04	17:42 (2) 07:01	15:38 (3) 08:00	14:56 (19) 08:28	
58	21:14	30 20:26 (30) 20:08	43 19:39 (21) 18:51	29 18:11 (2) 16:41	18 15:56 (3) 15:51	17 15:13 (19) 15:51	
59	05:15	19:55 (30) 06:10	18:54 (22) 07:06	17:43 (2) 07:03	15:37 (3) 08:01	14:57 (19) 08:28	
60	21:12	30 20:25 (25) 20:06	38 19:37 (21) 18:49	27 18:10 (2) 16:39	15:57 (3) 15:51	16 15:13 (19) 15:52	
61	05:17	19:56 (30) 06:12	18:55 (22) 07:05	17:42 (2) 07:05	15:37 (3) 08:01	14:57 (19) 08:28	
62	21:10	31 20:27 (25) 20:03	33 19:35 (21) 18:47	26 18:09 (2) 16:37	20 15:37 (3) 15:51	16 15:13 (19) 15:53	
63	Sonnenscheinstunden	514	461	383	328	257	231
64	astr.max.mögl.Beschattung	514	1002	714	283	322	84
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.64	0.65	0.68	0.69	0.69	0.68
68	Gesamte Reduktion	0.26	0.29	0.25	0.21	0.13	0.09
69	Met.wahrsch.Beschattung	132	287	178	58	42	7

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 23

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: J - IO10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	07:57	06:59	06:43	18:11 (2) 05:33	19:01 (22) 04:42	19:57 (30)	
1	15:54	16:46	17:43	19:42	18:22 (2) 20:39	19:18 (22) 21:29	20:11 (30)	14
2	08:28	07:55	06:56	06:40	05:31	19:04 (22) 04:41	19:59 (30)	
2	15:55	16:48	17:45	19:44	20:40	20:11 (25) 21:31	20:11 (30)	12
3	08:28	07:54	06:54	06:38	05:28	20:00 (30) 04:40	20:01 (30)	
3	15:57	16:50	17:47	19:46	20:42	20:12 (25) 21:32	20:09 (30)	8
4	08:27	07:52	16:16 (3) 06:52	06:35	05:26	19:57 (30) 04:40	20:03 (30)	
4	15:58	16:52	16:21 (3) 17:49	19:48	20:44	20:14 (25) 21:33	20:06 (30)	3
5	08:27	07:50	16:14 (3) 06:49	17:15 (20) 06:33	05:24	19:55 (30) 04:39		
5	15:59	16:54	16:23 (3) 17:51	17:24 (20) 19:50	20:46	20:15 (25) 21:34		
6	08:27	15:21 (19) 07:48	16:13 (3) 06:47	17:13 (20) 06:30	05:22	19:53 (30) 04:38		
6	16:00	1 15:22 (19) 07:48	13 16:26 (3) 17:53	12 17:25 (20) 19:52	20:48	24 20:17 (25) 21:35		
7	08:26	15:21 (19) 07:46	16:11 (3) 06:45	17:12 (20) 06:28	05:20	19:52 (30) 04:37		
7	16:02	4 15:25 (19) 16:58	16 16:27 (3) 17:55	16 17:28 (20) 19:54	20:50	26 20:18 (25) 21:36		
8	08:26	15:21 (19) 07:44	16:11 (3) 06:42	17:10 (20) 06:26	05:18	19:50 (30) 04:37		
8	16:03	5 15:26 (19) 17:00	18 16:29 (3) 17:57	18 17:28 (20) 19:55	20:51	30 20:20 (25) 21:37		
9	08:25	15:20 (19) 07:42	16:10 (3) 06:40	17:10 (20) 06:23	05:17	19:50 (30) 04:36		
9	16:05	7 15:27 (19) 17:03	20 16:30 (3) 17:59	19 17:29 (20) 19:57	20:53	31 20:21 (25) 21:38		
10	08:24	15:20 (19) 07:40	16:10 (3) 06:37	17:09 (20) 06:21	05:15	19:50 (30) 04:36		
10	16:06	9 15:29 (19) 17:05	20 16:30 (3) 18:00	19 17:28 (20) 19:59	9 19:18 (22) 20:55	30 20:20 (25) 21:39		
11	08:24	15:19 (19) 07:38	16:10 (3) 06:35	17:09 (20) 06:18	05:14	19:49 (30) 04:35		
11	16:08	12 15:31 (19) 17:07	21 16:31 (3) 18:02	19 17:28 (20) 20:01	17 19:21 (22) 20:57	30 20:19 (25) 21:40		
12	08:23	15:19 (19) 07:36	16:11 (3) 06:32	17:09 (20) 06:16	05:13	19:49 (30) 04:35		
12	16:09	13 15:32 (19) 17:09	20 16:31 (3) 18:04	18 17:27 (20) 20:03	22 19:35 (21) 20:59	30 20:19 (25) 21:41		
13	08:22	15:19 (19) 07:34	16:11 (3) 06:30	17:09 (20) 06:14	05:12	19:49 (30) 04:34		
13	16:11	15 15:34 (19) 17:11	20 16:31 (3) 18:06	22 17:31 (2) 20:05	30 19:37 (21) 21:00	29 20:18 (25) 21:41		
14	08:21	15:20 (19) 07:32	16:12 (3) 06:27	17:09 (20) 06:11	05:11	19:48 (30) 04:34		
14	16:13	15 15:35 (19) 17:13	19 16:31 (3) 18:08	23 17:32 (2) 20:07	36 19:38 (21) 21:02	29 20:17 (25) 21:42		
15	08:20	15:20 (19) 07:30	16:12 (3) 06:25	17:08 (20) 06:09	05:10	19:48 (30) 04:34		
15	16:14	16 15:36 (19) 17:15	17 16:29 (3) 18:10	26 17:34 (2) 20:09	41 19:40 (21) 21:04	30 20:18 (25) 21:43		
16	08:19	15:20 (19) 07:28	16:13 (3) 06:23	17:06 (20) 06:06	05:09	19:48 (30) 04:34		
16	16:16	17 15:37 (19) 17:17	15 16:28 (3) 18:12	28 17:34 (2) 20:10	45 19:42 (21) 21:05	29 20:17 (25) 21:43		
17	08:18	15:21 (19) 07:26	16:15 (3) 06:20	17:05 (20) 06:04	05:08	19:49 (30) 04:34		
17	16:18	17 15:38 (19) 17:19	12 16:27 (3) 18:14	30 17:35 (2) 20:12	47 19:43 (21) 21:07	29 20:18 (25) 21:44		
18	08:17	15:21 (19) 07:24	16:18 (3) 06:18	17:04 (20) 06:02	05:07	19:48 (30) 04:33		
18	16:19	16 15:37 (19) 17:21	6 16:24 (3) 18:16	31 17:35 (2) 20:14	48 19:43 (21) 21:09	29 20:17 (25) 21:44		
19	08:16	15:21 (19) 07:22	06:15	17:04 (20) 05:59	05:06	19:49 (30) 04:33		
19	16:21	17 15:38 (19) 17:23	18 18:18	32 17:36 (2) 20:16	48 19:43 (21) 21:10	29 20:18 (25) 21:45		
20	08:15	15:22 (19) 07:19	06:13	17:02 (20) 05:57	05:05	19:48 (30) 04:34		
20	16:23	16 15:38 (19) 17:25	18 20	39 17:53 (18) 20:18	48 19:43 (21) 21:12	29 20:17 (25) 21:45		
21	08:14	15:22 (19) 07:17	06:10	17:02 (20) 05:55	05:04	19:49 (30) 04:34		
21	16:25	16 15:38 (19) 17:27	18:22	42 17:55 (18) 20:20	47 19:42 (21) 21:14	28 20:17 (25) 21:45		
22	08:12	15:24 (19) 07:15	06:08	17:02 (20) 05:52	05:03	19:50 (30) 04:34		
22	16:27	14 15:38 (19) 17:29	18:23	44 17:56 (18) 20:22	46 19:40 (21) 21:15	27 20:17 (25) 21:45		
23	08:11	15:24 (19) 07:13	06:05	17:02 (20) 05:50	05:02	19:51 (30) 04:34		
23	16:29	13 15:37 (19) 17:31	18:25	47 17:59 (18) 20:24	44 19:39 (21) 21:17	26 20:17 (25) 21:45		
24	08:10	15:25 (19) 07:10	06:03	17:01 (20) 05:48	05:01	19:50 (30) 04:34		
24	16:31	11 15:36 (19) 17:33	18:27	50 18:00 (18) 20:26	36 19:36 (21) 21:18	26 20:16 (25) 21:46		
25	08:08	15:27 (19) 07:08	06:00	17:02 (20) 05:46	05:00	19:51 (30) 04:35		
25	16:32	9 15:36 (19) 17:35	18:29	48 18:00 (18) 20:27	30 19:25 (22) 21:20	24 20:15 (30) 21:46		
26	08:07	15:30 (19) 07:06	05:58	17:02 (20) 05:43	04:59	19:52 (30) 04:35		
26	16:34	3 15:33 (19) 17:37	18:31	47 17:59 (18) 20:29	28 19:24 (22) 21:21	23 20:15 (30) 21:46		
27	08:05	15:33 (19) 07:03	05:55	17:03 (20) 05:41	04:58	19:53 (30) 04:36		
27	16:36	17:39	18:33	43 17:58 (18) 20:31	27 19:23 (22) 21:23	22 20:15 (30) 21:45		
28	08:04	17:01	05:53	17:03 (20) 05:39	04:57	19:54 (30) 04:36		
28	16:38	17:41	18:35	38 17:56 (18) 20:33	25 19:22 (22) 21:24	20 20:14 (30) 21:45		
29	08:02	17:41	06:50	18:04 (2) 06:37	04:56	19:54 (30) 04:37		
29	16:40	17:41	19:37	32 18:54 (18) 20:35	23 19:21 (22) 21:26	20 20:14 (30) 21:45		
30	08:00	17:41	06:48	18:06 (2) 06:35	04:55	19:55 (30) 04:37		
30	16:42	17:41	19:39	22 18:28 (2) 20:37	19 19:19 (22) 21:27	18 20:13 (30) 21:45		
31	07:59	17:41	06:45	18:08 (2) 06:34	04:54	19:56 (30) 04:38		
31	16:44	17:41	19:40	17 18:25 (2) 20:36	16 21:28	16 20:12 (30) 21:46		
Sonnenscheinstunden	248	272	367	421	496	512		
astr.max.mögl.Beschattung	246	231	791	727	763			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51			37
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91			0.91
Reduktion Windrichtung	0.68	0.70	0.68	0.65	0.64			0.64
Gesamte Reduktion	0.11	0.15	0.19	0.24	0.29			0.26
Met.wahrsch.Beschattung	27	35	154	177	225			10

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 24

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: J - IO10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember		
1	04:38	05:19	20:00 (30) 06:14	19:04 (22) 07:08	17:49 (20) 07:07	15:40 (3) 08:03	15:02 (19)	
2	21:45	21:09	30 20:30 (25) 20:01	17 19:21 (22) 18:46	20 18:09 (2) 16:35	16:00 (3) 15:50	11 15:13 (19)	
3	04:39	05:20	19:59 (30) 06:16	19:07 (22) 07:10	17:48 (20) 07:09	15:40 (3) 08:05	15:03 (19)	
4	21:44	21:07	31 20:30 (25) 19:59	9 19:16 (22) 18:44	19 18:07 (20) 16:33	20 16:00 (3) 15:49	9 15:12 (19)	
5	04:40	05:22	20:00 (30) 06:17	10 19:17 (22) 18:44	19 17:47 (20) 07:11	15:40 (3) 08:06	15:04 (19)	
6	21:44	21:05	31 20:31 (25) 19:56	11 18:41	19 18:06 (20) 16:31	19 15:59 (3) 15:48	7 15:11 (19)	
7	04:40	05:24	20:00 (30) 06:19	12 18:41	19 17:47 (20) 07:13	15:41 (3) 08:08	15:05 (19)	
8	21:43	21:03	30 20:30 (25) 19:54	13 18:39	19 18:06 (20) 16:29	15 15:56 (3) 15:47	5 15:10 (19)	
9	04:41	05:25	20:01 (30) 06:21	14 18:39	19 17:47 (20) 07:15	15:43 (3) 08:09	15:06 (19)	
10	21:43	21:01	29 20:30 (25) 19:51	15 18:37	18 18:05 (20) 16:27	12 15:55 (3) 15:47	4 15:10 (19)	
11	04:42	05:27	20:02 (30) 06:23	16 18:37	17 17:47 (20) 07:17	15:44 (3) 08:10	15:07 (19)	
12	21:42	20:59	26 20:28 (25) 19:49	17 18:34	17 18:04 (20) 16:25	9 15:53 (3) 15:46	2 15:09 (19)	
13	04:43	05:29	20:03 (30) 06:25	18 18:34	17 17:48 (20) 07:19	15:46 (3) 08:12		
14	21:41	20:57	23 20:26 (25) 19:46	19 18:32	14 18:02 (20) 16:23	5 15:51 (3) 15:46		
15	04:44	05:31	20:04 (30) 06:26	20 18:32	14 17:49 (20) 07:21		08:13	
16	21:41	20:55	20 20:24 (25) 19:44	21 18:29	11 18:00 (20) 16:21		15:45	
17	04:45	20:09 (30) 05:32	20:07 (30) 06:28	22 18:29	11 17:52 (20) 07:23		08:14	
18	21:40	20:16 (30) 20:53	16 20:23 (25) 19:41	23 18:27	6 17:58 (20) 16:19		15:45	
19	04:46	20:07 (30) 05:34	17 19:17 (22) 06:30	24 18:25		07:25	08:16	
20	21:39	20:18 (30) 20:51	11 20:20 (25) 19:39	25 18:24		16:18	15:45	
21	04:48	20:06 (30) 05:36	12 19:12 (22) 06:32	26 18:24 (2) 07:27		16:18	08:17	
22	21:38	20:19 (30) 20:49	12 19:24 (22) 19:36	27 18:14 (2) 18:22		16:16	15:44	
23	04:49	20:05 (30) 05:38	13 19:09 (22) 06:34	28 18:00 (2) 07:28		16:09	08:18	
24	21:37	20:20 (30) 20:47	18 19:27 (22) 19:34	29 18:17 (2) 18:20		16:14	15:44	
25	04:50	20:04 (30) 05:40	19 19:07 (22) 06:35	30 17:57 (2) 07:30		16:14	08:19	
26	21:36	20:21 (30) 20:45	20 19:27 (22) 19:31	31 18:18 (2) 18:17		16:13	15:44	
27	04:51	20:03 (30) 05:41	21 19:06 (22) 06:37		17:55 (2) 07:32		08:20	
28	21:35	20:22 (30) 20:43	22 19:29 (22) 19:29	1 18:43 (18) 18:15		16:11	15:44	
29	04:52	20:02 (30) 05:43	23 19:05 (22) 06:39	2 17:54 (2) 07:34		16:09	08:21	
30	21:34	20:22 (30) 20:40	24 19:30 (22) 19:26	3 18:46 (18) 18:12		16:09	15:44	
31	04:54	20:03 (30) 05:45	25 19:03 (22) 06:41	4 17:52 (2) 07:36		16:07	08:22	
32	21:33	20:24 (30) 20:42	26 19:20 (22) 19:24	5 18:47 (18) 18:10		16:08	15:44	
33	04:55	20:02 (30) 05:47	27 19:02 (22) 06:43	6 17:50 (2) 07:38		16:06	08:23	
34	21:32	20:24 (30) 20:36	28 19:31 (22) 19:21	7 18:47 (18) 18:08		16:06	15:44	
35	04:57	20:01 (30) 05:49	29 19:02 (22) 06:44	8 17:50 (2) 07:40		16:04	08:23	
36	21:30	20:25 (30) 20:34	30 19:32 (22) 19:19	9 18:47 (18) 18:05		16:05	15:44	
37	04:58	20:00 (30) 05:50	31 19:00 (22) 06:46	10 17:49 (2) 07:42		16:04	08:24	
38	21:29	20:25 (30) 20:32	39 19:43 (21) 19:16	11 18:47 (18) 18:03		16:03	15:45	
39	04:59	20:00 (30) 05:52	40 19:00 (22) 06:48	12 17:48 (2) 07:44		16:04	08:25	
40	21:28	20:26 (30) 20:29	41 19:45 (21) 19:14	13 18:48 (18) 18:01		16:02	15:45	
41	05:01	20:00 (30) 05:54	42 19:00 (22) 06:50	14 17:47 (2) 07:46		16:04	08:25	
42	21:26	20:26 (30) 20:27	43 19:46 (21) 19:11	15 18:42 (18) 17:59		16:01	15:45	
43	05:02	20:00 (30) 05:56	44 18:59 (22) 06:52	16 17:47 (2) 07:48		16:04	08:26	
44	21:25	20:27 (30) 20:25	45 19:46 (21) 19:09	17 18:40 (18) 17:56		16:04	15:46	
45	05:04	19:59 (30) 05:58	46 18:59 (22) 06:53	18 17:47 (2) 07:50		16:04	08:27	
46	21:23	20:27 (30) 20:22	47 19:46 (21) 19:06	19 18:38 (18) 17:54		16:05	15:46	
47	05:06	19:59 (30) 05:59	48 18:59 (22) 06:55	20 17:47 (2) 07:51	16 16:47 (3) 07:51	14:58 (19) 08:27		
48	21:22	20:27 (30) 20:20	49 19:47 (21) 19:04	21 18:20 (2) 17:52	7 16:54 (3) 15:57	16 16:14 (19) 15:47		
49	05:07	19:59 (30) 06:01	50 18:59 (22) 06:57	22 17:47 (2) 06:53	8 15:44 (3) 15:53	14:58 (19) 08:27		
50	21:20	20:28 (30) 20:18	51 19:47 (21) 19:01	23 18:19 (2) 16:50	13 15:57 (3) 15:56	17 15:15 (19) 15:48		
51	05:09	19:58 (30) 06:03	52 18:59 (22) 06:59	24 17:47 (2) 06:55	14 15:42 (3) 15:55	14:58 (19) 08:28		
52	21:19	20:28 (30) 20:15	53 19:46 (21) 18:59	25 18:17 (2) 16:47	16 15:58 (3) 15:54	17 15:15 (19) 15:48		
53	05:10	19:59 (30) 06:05	54 18:59 (22) 07:01	26 17:48 (2) 06:57	17 15:41 (3) 15:56	14:59 (19) 08:28		
54	21:17	20:28 (30) 20:13	55 19:44 (21) 18:56	27 18:16 (2) 16:45	18 15:59 (3) 15:53	16 15:15 (19) 15:49		
55	05:12	19:58 (30) 06:07	56 19:00 (22) 07:03	28 17:48 (2) 06:59	19 15:40 (3) 15:58	15:00 (19) 08:28		
56	21:16	20:28 (30) 20:11	57 19:42 (21) 18:54	29 18:15 (2) 16:43	20 15:59 (3) 15:52	15 15:15 (19) 15:50		
57	05:14	19:59 (30) 06:08	58 19:00 (22) 07:04	30 17:50 (2) 07:01	21 15:41 (3) 16:00	15:01 (19) 08:28		
58	21:14	20:28 (30) 20:08	59 19:39 (21) 18:51	31 18:13 (2) 16:41	22 16:00 (3) 15:51	14 15:15 (19) 15:51		
59	05:15	19:58 (30) 06:10	60 19:01 (22) 07:06	1 17:50 (20) 07:03	2 15:40 (3) 16:01	15:01 (19) 08:28		
60	21:12	20:28 (25) 20:06	1 19:37 (21) 18:49	2 18:11 (2) 16:39	3 16:00 (3) 15:51	13 15:14 (19) 15:52		
61	05:17	19:59 (30) 06:12	2 19:02 (22) 7:05	3 16:37	4 16:00 (3) 16:02	5 15:40 (3) 16:03	6 15:53 (19) 15:53	
62	21:10	20:29 (25) 20:03	22 19:35 (21) 7:06	23 16:37	24 16:00 (3) 16:03	25 15:40 (3) 16:04	26 15:53 (19) 15:53	
63	Sonnenscheinstunden	514	461	383	328	257	231	
64	astr.max.mögl.Beschattung	536	969	696	275	307		
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14	0.38
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.64	0.65	0.68	0.69	0.69	0.68	0.69
68	Gesamte Reduktion	0.26	0.29	0.25	0.21	0.13	0.09	0.09
69	Met.wahrsch.Beschattung	137	277	174	57	40	3	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 25
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: K - IO11

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni											
1	08:28	07:57	06:59	06:43	18:11 (2) 05:33	19:03 (22) 04:42	19:58 (30)										
1	15:54	16:46	17:43	19:42	20	18:31 (2) 20:39	22	19:25 (22) 21:29	17	20:15 (30)							
2	08:28	07:55	06:56	06:40	18:12 (2) 05:31	19:04 (22) 04:41	19:58 (30)										
3	15:55	16:48	17:45	19:44	16	18:28 (2) 20:40	20	19:24 (22) 21:31	16	20:16 (30)							
3	08:28	07:54	06:54	06:38	18:16 (2) 05:28	19:06 (22) 04:40	19:58 (30)										
4	15:57	16:50	17:47	19:46	9	18:25 (2) 20:42	17	20:12 (25) 21:32	14	20:15 (30)							
4	08:27	07:52	06:52	06:35	18:19 (2) 05:26	19:09 (22) 04:40	19:58 (30)										
5	15:58	16:52	17:49	19:48	20	18:24 (2) 20:41	21	20:14 (25) 21:33	11	20:13 (30)							
5	08:27	07:50	06:49	06:33	18:18 (2) 05:24	19:03 (22) 04:39	19:58 (30)										
6	15:59	16:54	17:51	19:50	18	18:22 (2) 20:39	15	20:15 (25) 21:34	9	20:12 (30)							
6	08:27	07:48	06:47	06:30	17:19 (20) 05:37	18:09 (22) 04:38	19:03 (22) 04:40	19:58 (30) 04:38	20:06 (30)								
6	16:00	16:56	17:53	19:52	6	17:25 (20) 05:52	20:48	19:17 (25) 21:35	5	20:11 (30)							
7	08:26	07:46	06:45	06:28	17:17 (20) 06:28	18:06 (22) 04:37	19:03 (22) 04:40	19:58 (30) 04:37	20:06 (30)								
7	16:02	16:58	17:55	19:54	11	17:28 (20) 05:54	20:50	19:28 (25) 21:36	11	20:13 (30)							
8	08:26	07:44	06:42	06:26	17:15 (20) 06:26	18:05 (22) 04:37	19:03 (22) 04:40	19:58 (30) 04:37	20:06 (30)								
8	16:03	17:00	17:57	19:55	20	18:21 (2) 20:38	25	20:20 (25) 21:37	17	20:15 (30)							
9	08:25	07:42	06:40	06:23	17:14 (20) 06:23	18:05 (22) 04:36	19:03 (22) 04:40	19:58 (30) 04:36	20:06 (30)								
9	16:05	16:57	17:54	19:52	17	17:31 (20) 05:57	20:53	19:22 (25) 21:38	17	20:15 (30)							
10	08:24	07:40	06:37	06:21	17:13 (20) 06:21	18:03 (22) 04:35	19:03 (22) 04:40	19:58 (30) 04:35	20:06 (30)								
10	16:06	16:59	17:05	19:59	18	17:31 (20) 05:59	20:55	19:22 (25) 21:39	18	20:15 (30)							
11	08:24	07:38	06:35	06:18	17:13 (20) 06:18	18:03 (22) 04:35	19:03 (22) 04:40	19:58 (30) 04:35	20:06 (30)								
11	16:08	16:51	17:07	19:54	20	18:24 (2) 20:41	20:57	19:22 (25) 21:40	20	20:15 (30)							
12	08:23	07:36	06:32	06:16	17:12 (20) 06:16	18:03 (22) 04:35	19:03 (22) 04:40	19:58 (30) 04:35	20:06 (30)								
12	16:09	16:52	17:09	19:56	19	17:31 (20) 06:03	21	20:22 (25) 21:41	19	20:15 (30)							
13	08:22	07:34	06:30	06:10	17:12 (20) 06:10	18:02 (22) 04:34	19:03 (22) 04:40	19:58 (30) 04:34	20:06 (30)								
13	16:11	16:54	17:11	19:58	19	17:31 (20) 06:05	19:26 (22) 21:00	20:21 (25) 21:41	19	20:15 (30)							
14	08:21	07:32	06:27	06:11	17:12 (20) 06:11	18:02 (22) 04:34	19:03 (22) 04:40	19:58 (30) 04:34	20:06 (30)								
14	16:13	16:56	17:13	19:59	20	17:32 (2) 20:07	27	19:38 (21) 21:02	29	20:20 (25) 21:42							
15	08:20	07:30	06:25	06:09	17:13 (20) 06:09	18:02 (22) 04:34	19:03 (22) 04:40	19:58 (30) 04:34	20:06 (30)								
15	16:14	16:57	17:15	19:59	32	19:40 (21) 21:04	28	20:20 (25) 21:43	32	20:15 (30)							
16	08:19	07:28	06:23	06:06	17:13 (20) 06:06	18:02 (22) 04:34	19:03 (22) 04:40	19:58 (30) 04:34	20:06 (30)								
16	16:16	16:59	17:17	19:59	17	16:32 (3) 18:12	23	17:36 (2) 19:10	38	19:42 (21) 21:05	29	20:20 (25) 21:42					
17	08:18	07:26	06:20	06:04	17:12 (20) 06:04	18:02 (22) 04:34	19:03 (22) 04:40	19:58 (30) 04:34	20:06 (30)								
17	16:18	17:01	17:19	19:59	16	16:32 (3) 18:14	26	17:38 (2) 20:12	42	19:44 (21) 21:07	29	20:21 (25) 21:44					
18	08:17	07:24	06:18	06:02	17:10 (20) 06:02	18:01 (22) 04:33	19:03 (22) 04:40	19:58 (30) 04:33	20:06 (30)								
18	16:19	17:02	17:21	19:59	12	16:30 (3) 18:16	28	17:38 (2) 20:14	44	19:45 (21) 21:09	29	20:20 (25) 21:44					
19	08:16	07:22	06:15	06:00	17:09 (20) 05:59	18:01 (22) 04:33	19:03 (22) 04:40	19:58 (30) 04:33	20:06 (30)								
19	16:21	17:04	17:23	19:59	7	16:27 (3) 18:18	30	17:39 (2) 20:16	44	19:45 (21) 21:10	28	20:20 (25) 21:45					
20	08:15	07:19	06:13	06:00	17:08 (20) 05:57	18:00 (22) 04:32	19:03 (22) 04:40	19:58 (30) 04:32	20:06 (30)								
20	16:23	17:06	17:25	19:59	18	18:20	31	17:39 (2) 20:18	45	19:45 (21) 21:12	29	20:20 (25) 21:45					
21	08:14	07:17	06:10	06:00	17:08 (20) 05:55	18:00 (22) 04:32	19:03 (22) 04:40	19:58 (30) 04:32	20:06 (30)								
21	16:25	17:08	17:27	19:59	16	16:41 (9) 17:27	18:22	36	17:55 (18) 20:20	45	19:45 (21) 21:14	28	20:20 (25) 21:45				
22	08:12	07:15	06:08	06:00	17:07 (20) 05:52	18:00 (22) 04:31	18:59 (22) 04:55	19:52 (30) 04:34	20:06 (30)								
22	16:27	17:10	17:29	19:59	16	16:42 (9) 17:29	18:23	40	17:56 (18) 20:22	44	19:43 (21) 21:15	28	20:20 (25) 21:45				
23	08:11	07:13	06:05	06:00	17:07 (20) 05:50	18:00 (22) 04:31	18:59 (22) 04:53	19:53 (30) 04:34	20:06 (30)								
23	16:29	17:12	17:31	19:59	15	16:41 (9) 17:31	18:25	44	17:59 (18) 20:24	44	19:43 (21) 21:17	27	20:20 (25) 21:45				
24	08:10	07:10	06:03	06:00	17:06 (20) 05:48	18:00 (22) 04:31	18:59 (22) 04:52	19:53 (30) 04:34	20:06 (30)								
24	16:31	17:14	17:33	19:59	14	16:41 (9) 17:33	18:27	47	18:00 (18) 20:26	42	19:41 (21) 21:18	26	20:19 (30) 21:46				
25	08:08	07:08	06:00	06:00	17:06 (20) 05:46	18:00 (22) 04:31	18:59 (22) 04:50	19:53 (30) 04:35	20:06 (30)								
25	16:32	17:15	17:35	19:59	13	16:41 (9) 17:35	18:29	49	18:02 (18) 20:27	38	19:39 (21) 21:20	26	20:19 (30) 21:46				
26	08:07	07:06	06:00	06:00	17:06 (20) 05:43	18:00 (22) 04:31	19:00 (22) 04:49	19:54 (30) 04:35	20:06 (30)								
26	16:34	17:17	17:37	19:59	10	16:39 (9) 17:37	18:31	48	18:02 (18) 20:29	30	19:30 (22) 21:21	25	20:19 (30) 21:46				
27	08:05	07:03	06:00	06:00	17:06 (20) 05:41	18:00 (22) 04:31	19:00 (22) 04:48	19:55 (30) 04:36	20:06 (30)								
27	16:36	17:19	17:39	19:59	7	16:36 (9) 17:39	18:33	47	18:01 (18) 20:31	29	19:29 (22) 21:23	23	20:18 (30) 21:45				
28	08:04	07:01	06:00	06:00	17:06 (20) 05:39	18:00 (22) 04:31	19:00 (22) 04:47	19:55 (30) 04:36	20:06 (30)								
28	16:38	17:21	17:41	19:59	16	16:38 (9) 17:41	18:35	45	18:00 (18) 20:33	28	19:28 (22) 21:24	23	20:18 (30) 21:45				
29	08:02	07:00	06:00	06:00	18:07 (2) 05:37	19:01 (22) 04:45	19:56 (30) 04:37	20:06 (30)									
29	16:40	17:23	17:43	19:59	19	16:39 (9) 17:43	18:37	40	18:59 (18) 20:35	27	19:28 (22) 21:26	21	20:17 (30) 21:45				
30	08:00	07:00	06:00	06:00	18:08 (2) 05:35	19:02 (22) 04:44	19:57 (30) 04:37	20:06 (30)									
30	16:42	17:25	17:45	19:59	19	16:39 (9) 17:45	18:39	34	18:57 (18) 20:37	25	19:27 (22) 21:27	20	20:17 (30) 21:45				
31	07:59	07:00	06:00	06:00	18:09 (2) 05:34	19:03 (22) 04:45	19:58 (30) 04:38	20:06 (30)									
31	16:44	17:27	17:47	19:59	24	16:40 (9) 17:47	18:42	38	18:58 (18) 20:38	25	19:28 (22) 21:28	20	20:18 (30) 21:45				
Sonnenscheinstunden	248	272	367	421	496	512											
astr.max.mögl.Beschattung	231	224	757	697	772	72											
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45											
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91											
Reduktion Windrichtung	0.68	0.70	0.68	0.65	0.64	0.63											
Gesamte Reduktion	0.11	0.15	0.19	0.24	0.29	0.26											
Met.wahrsch.Beschattung	25	34	147	169	227	19											

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 26
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersiezug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: K - IO11

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember		
1	04:38	05:19	20:03 (30) 06:14	07:08	17:52 (20) 07:07	15:43 (3) 08:03	15:06 (19)	
2	21:45	21:09	29 20:32 (25) 20:01	18:46	19 18:11 (20) 16:35	20 16:03 (3) 15:50	7 15:13 (19)	
3	04:39	05:20	20:03 (30) 06:16	07:10	16 17:51 (20) 07:09	15:44 (3) 08:05	15:08 (19)	
4	21:44	21:07	29 20:32 (25) 19:59	18:44	20 18:11 (20) 16:33	17 16:01 (3) 15:49	4 15:12 (19)	
5	04:40	05:22	20:04 (30) 06:17	07:12	17:50 (20) 07:11	15:44 (3) 08:06	15:10 (19)	
6	21:44	21:05	29 20:33 (25) 19:56	18:41	19 18:09 (20) 16:31	15 15:59 (3) 15:48	2 15:12 (19)	
7	04:40	05:24	20:04 (30) 06:19	07:14	17:51 (20) 07:13	15:45 (3) 08:08		
8	21:43	21:03	27 20:31 (25) 19:54	18:39	18 18:09 (20) 16:29	11 15:56 (3) 15:47		
9	04:41	05:25	20:05 (30) 06:21	07:15	17:51 (20) 07:15	15:48 (3) 08:09		
10	21:43	21:01	25 20:30 (25) 19:51	18:37	16 16:07 (20) 16:27	7 15:59 (3) 15:47		
11	04:42	20:14 (30) 05:27	20:07 (30) 06:23	07:17	17:52 (20) 07:17	15:51 (3) 08:10		
12	21:42	2 20:16 (30) 20:59	21 20:28 (25) 19:49	18:34	13 18:05 (20) 16:25	2 15:53 (3) 15:46		
13	04:43	20:11 (30) 05:29	20:08 (30) 06:25	07:19	17:54 (20) 07:19	15:48 (3) 08:12		
14	21:41	8 20:19 (30) 20:57	18 20:26 (25) 19:46	18:32	8 18:02 (20) 16:23	15:45 (3) 15:46		
15	04:44	20:10 (30) 05:31	19:22 (22) 06:26	07:21	07:21	15:44 (3) 15:44		
16	21:41	10 20:20 (30) 20:55	16 20:24 (25) 19:44	18:29	16:21	15:43 (3) 15:45		
17	04:45	20:09 (30) 05:32	19:17 (22) 06:28	18:10 (2) 07:23	07:23	15:44 (3) 15:44		
18	21:40	13 20:22 (30) 20:53	16 20:23 (25) 19:41	8 18:18 (2) 18:27	16:19	15:45 (3) 15:45		
19	04:46	20:08 (30) 05:34	19:14 (22) 06:30	18:06 (2) 07:25	07:25	15:46 (3) 15:46		
20	21:39	15 20:23 (30) 20:51	17 19:31 (22) 19:39	15 18:21 (2) 18:24	16:18	15:45 (3) 15:45		
21	04:48	20:07 (30) 05:36	19:12 (22) 06:32	18:03 (2) 07:27	07:27	15:46 (3) 15:46		
22	21:38	17 20:24 (30) 20:49	21 19:33 (22) 19:36	21 18:24 (2) 18:22	16:16	15:44 (3) 15:44		
23	04:49	20:06 (30) 05:38	19:11 (22) 06:34	18:01 (2) 07:28	07:29	15:45 (3) 15:45		
24	21:37	18 20:24 (30) 20:47	23 19:34 (22) 19:34	24 18:25 (2) 18:20	16:14	15:44 (3) 15:44		
25	04:50	20:06 (30) 05:40	19:09 (22) 06:35	17:59 (2) 07:30	07:31	15:45 (3) 15:45		
26	21:36	19 20:25 (30) 20:45	25 19:34 (22) 19:31	32 18:47 (18) 18:17	16:13	15:44 (3) 15:44		
27	04:51	20:05 (30) 05:41	19:08 (22) 06:37	17:58 (2) 07:32	07:33	15:45 (3) 15:45		
28	21:35	21 20:26 (30) 20:43	27 19:35 (22) 19:29	39 18:49 (18) 18:15	16:11	15:44 (3) 15:44		
29	04:52	20:04 (30) 05:43	19:08 (22) 06:39	17:57 (2) 07:34	07:35	15:46 (3) 15:46		
30	21:34	22 20:26 (30) 20:40	28 19:36 (22) 19:26	43 18:50 (18) 18:12	16:09	7 15:11 (19) 15:44		
31	04:53	20:05 (30) 05:45	19:06 (22) 06:41	17:56 (2) 07:36	07:37	15:02 (19) 15:44		
32	21:33	23 20:28 (30) 20:38	30 19:36 (22) 19:24	46 18:51 (18) 18:10	16:08	10 15:12 (19) 15:44		
33	04:55	20:04 (30) 05:47	19:06 (22) 06:43	17:54 (2) 07:38	07:38	15:01 (19) 15:44		
34	21:32	24 20:28 (30) 20:36	30 19:36 (22) 19:21	49 18:50 (18) 18:08	16:06	13 15:14 (19) 15:44		
35	04:57	20:03 (30) 05:49	19:06 (22) 06:44	17:54 (2) 07:40	07:40	15:01 (19) 15:44		
36	21:30	25 20:28 (30) 20:34	39 19:46 (21) 19:19	49 18:50 (18) 18:05	16:05	14 15:15 (19) 15:44		
37	04:58	20:02 (30) 05:50	19:05 (22) 06:46	17:53 (2) 07:42	07:42	15:00 (19) 15:44		
38	21:29	26 20:28 (30) 20:32	42 19:47 (21) 19:16	46 18:48 (18) 18:03	16:03	15 15:15 (19) 15:45		
39	04:59	20:02 (30) 05:52	19:05 (22) 06:48	17:53 (2) 07:44	07:44	15:00 (19) 15:45		
40	21:28	26 20:29 (30) 20:29	43 19:48 (21) 19:14	45 18:46 (18) 18:01	16:02	16 15:16 (19) 15:45		
41	05:01	20:02 (30) 05:54	19:05 (22) 06:50	17:52 (2) 07:46	07:46	15:01 (19) 15:45		
42	21:26	27 20:29 (30) 20:27	44 19:49 (21) 19:11	41 18:42 (18) 17:59	16:01	16 15:17 (19) 15:45		
43	05:02	20:03 (30) 05:56	19:04 (22) 06:52	17:52 (2) 07:48	07:48	15:01 (19) 15:46		
44	21:25	27 20:30 (30) 20:25	45 19:49 (21) 19:09	38 18:40 (18) 17:56	15:59	17 15:18 (19) 15:46		
45	05:04	20:02 (30) 05:58	19:04 (22) 06:53	17:52 (2) 07:50	07:50	15:01 (19) 15:46		
46	21:23	28 20:30 (30) 20:22	45 19:49 (21) 19:06	32 18:24 (2) 17:54	9 16:49 (3) 15:58	17 15:18 (19) 15:46		
47	05:06	20:01 (30) 05:59	19:04 (22) 06:55	17:53 (2) 07:51	16:47 (3) 15:51	15:01 (19) 15:46		
48	21:22	29 20:30 (30) 20:20	45 19:49 (21) 19:04	30 18:23 (2) 17:52	13 17:00 (3) 15:57	16 15:17 (19) 15:47		
49	05:07	20:02 (30) 06:01	19:05 (22) 06:57	17:54 (2) 06:53	15:45 (3) 15:53	15:01 (19) 15:47		
50	21:20	29 20:31 (30) 20:18	44 19:49 (21) 19:01	28 18:22 (2) 16:50	16 16:01 (3) 15:56	16 15:17 (19) 15:48		
51	05:09	20:01 (30) 06:03	19:05 (22) 06:59	17:53 (2) 06:55	15:44 (3) 15:54	15:02 (19) 15:48		
52	21:19	29 20:30 (30) 20:15	41 19:46 (21) 18:59	27 18:20 (2) 16:47	18 16:02 (3) 15:54	16 15:18 (19) 15:48		
53	05:10	20:02 (30) 06:05	19:06 (22) 07:01	17:55 (2) 06:57	15:43 (3) 15:56	16 15:03 (19) 15:48		
54	21:17	29 20:31 (30) 20:13	37 19:44 (21) 18:56	23 18:18 (2) 16:45	19 16:02 (3) 15:53	14 15:17 (19) 15:49		
55	05:12	20:01 (30) 06:07	19:07 (22) 07:03	17:54 (2) 06:59	15:43 (3) 15:58	15:03 (19) 15:49		
56	21:16	29 20:30 (30) 20:11	32 19:42 (21) 18:54	22 18:16 (2) 16:43	20 16:03 (3) 15:52	13 15:16 (19) 15:50		
57	05:14	20:02 (30) 06:08	19:07 (22) 07:04	17:53 (2) 07:01	15:43 (3) 15:51	15:05 (19) 15:51		
58	21:14	29 20:31 (30) 20:08	27 19:39 (21) 18:51	21 18:14 (2) 16:41	21 16:04 (3) 15:51	10 15:15 (19) 15:51		
59	05:15	20:02 (30) 06:10	19:09 (22) 07:06	17:52 (2) 07:03	15:43 (3) 15:51	15:06 (19) 15:52		
60	21:12	28 20:30 (25) 20:06	17 19:26 (22) 18:49	19 18:11 (20) 16:39	18:03 (3) 15:51	8 15:14 (19) 15:52		
61	05:17	20:02 (30) 06:12	19:12 (22) 07:05	17:52 (2) 07:05	15:43 (3) 15:51	15:06 (19) 15:52		
62	21:10	29 20:31 (25) 20:03	10 19:22 (22) 07:06	16:37	20 16:03 (3) 15:51	15:07 (19) 15:53		
63	Sonnenscheinstunden	514	461	383	328	257	231	
64	astr.max.mögl.Beschattung	582	922	700	269	290	13	
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14	
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
67	Reduktion Windrichtung	0.63	0.64	0.68	0.69	0.69	0.68	
68	Gesamte Reduktion	0.26	0.28	0.25	0.21	0.13	0.09	
69	Met.wahrsch.Beschattung	149	262	175	56	38	1	

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 27
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: L - IO12

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	07:57	06:59	06:43	18:17 (2) 05:33	19:11 (22) 04:42	20:03 (30)
	15:54	16:46	17:43	19:42	41 19:04 (18) 20:39	19:39 (22) 21:29	21 20:24 (30)
2	08:28	07:55	06:56	06:40	18:17 (2) 05:31	19:11 (22) 04:41	20:04 (30)
	15:55	16:48	17:45	19:44	32 19:00 (18) 20:40	19:39 (22) 21:31	20 20:24 (30)
3	08:28	07:54	06:54	06:38	18:18 (2) 05:28	19:12 (22) 04:40	20:04 (30)
	15:57	16:50	17:47	19:46	27 18:45 (2) 20:42	19:38 (22) 21:32	19 20:23 (30)
4	08:27	07:52	06:52	06:35	18:19 (2) 05:26	19:13 (22) 04:40	20:05 (30)
	15:58	16:52	17:49	19:48	24 18:43 (2) 20:44	19:37 (22) 21:33	18 20:23 (30)
5	08:27	07:50	06:49	06:33	18:20 (2) 05:24	19:14 (22) 04:39	20:05 (30)
	15:59	16:54	17:51	19:50	22 18:42 (2) 20:46	19:25 (25) 21:34	17 20:22 (30)
6	08:27	07:48	06:47	06:30	18:22 (2) 05:22	19:15 (22) 04:38	20:07 (30)
	16:00	16:56	17:53	19:52	17 18:39 (2) 20:48	20:17 (25) 21:35	15 20:22 (30)
7	08:26	07:46	06:45	06:28	18:25 (2) 05:20	19:16 (22) 04:37	20:07 (30)
	16:02	16:58	17:55	19:54	11 18:36 (2) 20:50	20:18 (25) 21:36	14 20:21 (30)
8	08:26	07:44	06:42	06:26	18:26 (2) 05:18	19:18 (22) 04:37	20:09 (30)
	16:03	17:00	17:57	19:55	20:51	27 20:20 (25) 21:37	12 20:21 (30)
9	08:25	07:42	06:40	06:23	18:27 (3) 05:17	19:22 (22) 04:36	20:09 (30)
	16:05	17:03	17:59	19:57	20:53	23 20:22 (25) 21:38	11 20:20 (30)
10	08:24	07:40	06:37	17:26 (20) 06:21	18:28 (2) 05:15	20:02 (30) 04:36	20:11 (30)
	16:06	17:05	18:00	19:59	20:55	22 20:24 (25) 21:39	9 20:20 (30)
11	08:24	07:38	06:35	17:24 (20) 06:18	18:29 (2) 05:13	20:01 (30) 04:35	20:12 (30)
	16:08	17:07	18:02	19:58	20:57	24 20:25 (25) 21:40	7 20:19 (30)
12	08:23	07:36	06:32	17:22 (20) 06:16	18:30 (2) 05:11	20:01 (30) 04:35	20:13 (30)
	16:09	17:09	18:04	19:59	20:59	25 20:26 (25) 21:41	4 20:17 (30)
13	08:22	07:34	06:30	17:21 (20) 06:14	18:31 (2) 05:09	20:00 (30) 04:34	
	16:11	17:11	18:06	19:59	21:00	26 20:26 (25) 21:41	
14	08:21	07:32	06:27	17:20 (20) 06:11	18:32 (2) 05:07	19:59 (30) 04:34	
	16:13	17:13	18:08	19:59	21:02	26 20:25 (25) 21:42	
15	08:20	07:30	06:25	17:20 (20) 06:09	18:33 (2) 05:06	19:59 (30) 04:34	
	16:14	17:15	18:10	19:59	21:04	26 20:25 (25) 21:43	
16	08:19	07:28	06:23	17:19 (20) 06:06	19:26 (22) 05:04	19:58 (30) 04:34	
	16:16	17:17	18:12	19:58	7 19:42 (21) 21:05	27 20:25 (30) 21:45	
17	08:18	07:26	06:20	17:20 (20) 06:04	18:34 (2) 05:02	19:59 (30) 04:34	
	16:18	17:19	18:14	19:59	21:06	27 20:26 (30) 21:44	
18	08:17	07:24	06:18	17:20 (20) 06:02	19:28 (22) 05:01	19:58 (30) 04:33	
	16:19	17:21	18:16	19:58	28 19:46 (21) 21:09	28 20:26 (30) 21:44	
19	08:16	07:22	06:15	17:21 (20) 05:59	19:29 (22) 04:59	19:58 (30) 04:33	
	16:21	17:23	18:18	19:59	32 19:48 (21) 21:10	28 20:26 (30) 21:45	
20	08:15	07:19	06:13	17:22 (20) 05:57	18:35 (2) 04:58	20:00 (30) 04:34	
	16:23	17:25	18:20	19:59	35 19:50 (21) 21:12	28 20:26 (30) 21:45	
21	08:14	07:17	06:10	17:24 (2) 05:55	19:14 (22) 04:56	19:58 (30) 04:34	
	16:25	17:27	18:22	19:59	37 19:51 (21) 21:14	28 20:26 (30) 21:45	
22	08:12	07:15	06:08	17:22 (2) 05:52	19:12 (22) 04:55	19:59 (30) 04:34	
	16:27	17:29	18:23	19:59	38 19:50 (21) 21:15	27 20:26 (30) 21:45	
23	08:11	07:13	06:05	17:21 (2) 05:50	19:12 (22) 04:53	19:59 (30) 04:34	
	16:29	17:31	18:25	19:59	38 19:50 (21) 21:17	27 20:26 (30) 21:45	
24	08:10	07:10	06:03	17:19 (2) 05:48	19:11 (22) 04:52	19:59 (30) 04:34	
	16:31	17:33	18:27	19:59	38 19:49 (21) 21:18	26 20:25 (30) 21:46	
25	08:08	07:08	06:00	17:19 (2) 05:46	19:11 (22) 04:50	19:59 (30) 04:35	
	16:32	17:35	18:29	19:59	37 19:48 (21) 21:20	27 20:26 (30) 21:46	
26	08:07	07:06	05:58	17:18 (2) 05:43	19:11 (22) 04:49	20:00 (30) 04:35	
	16:34	17:37	18:31	19:59	36 19:47 (21) 21:21	25 20:25 (30) 21:46	
27	08:05	07:03	05:55	17:17 (2) 05:41	19:10 (22) 04:48	20:00 (30) 04:36	
	16:36	17:39	18:33	19:59	35 19:45 (21) 21:23	25 20:25 (30) 21:45	
28	08:04	07:01	05:53	17:17 (2) 05:39	19:10 (22) 04:47	20:01 (30) 04:36	
	16:38	17:41	18:35	19:59	31 19:41 (22) 21:24	24 20:25 (30) 21:45	
29	08:02	07:00	05:50	17:17 (2) 05:37	19:11 (22) 04:45	20:01 (30) 04:37	
	16:40	17:43	18:37	19:59	29 19:40 (22) 21:26	24 20:25 (30) 21:45	
30	08:00	07:00	05:48	17:17 (2) 05:35	19:11 (22) 04:44	20:02 (30) 04:37	
	16:42	17:45	18:39	19:59	29 19:40 (22) 21:27	23 20:25 (30) 21:45	1 20:19 (30)
31	07:59	07:00	05:45	17:17 (2) 05:33	19:11 (22) 04:43	20:02 (30) 04:37	1 20:20 (30)
	16:44	17:47	18:41	19:59	22 20:24 (30) 21:46		
Sonnenscheinstunden	248	272	367	421	496	512	
astr.max.mögl.Beschattung	200	215	612	646	793	168	
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.69	0.70	0.68	0.65	0.63	0.63	
Gesamte Reduktion	0.11	0.15	0.19	0.24	0.29	0.26	
Met.wahrsch.Beschattung	22	33	119	157	233	44	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 28
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: L - IO12

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:38				20:12 (30)	06:14		07:08					
2	21:45	6	20:23 (30)	21:09	25	20:37 (25)	20:01	17	18:18 (20)	16:35	8	16:03 (3)	15:50
3	04:39		20:15 (30)	05:20		20:12 (30)	06:16		18:02 (20)	07:09		15:57 (3)	08:05
4	21:44	8	20:23 (30)	21:07	23	20:35 (25)	19:59	13	18:15 (20)	16:33	4	16:01 (3)	15:49
5	04:40		20:15 (30)	05:22		20:13 (30)	06:17		18:03 (20)	07:11			08:06
6	21:44	10	20:25 (30)	21:05	20	20:33 (25)	19:56	9	18:12 (20)	16:31			15:48
7	04:40		20:14 (30)	05:24		19:30 (22)	06:19		18:05 (20)	07:13			08:08
8	21:43	12	20:26 (30)	21:03	25	20:31 (25)	19:54	5	18:10 (20)	16:29			15:47
9	04:41		20:14 (30)	05:25		19:27 (22)	06:21		18:21 (2)	07:15			08:09
10	21:43	13	20:27 (30)	21:01	28	20:30 (25)	19:51	11	18:32 (2)	18:37			15:47
11	04:42		20:13 (30)	05:27		19:26 (22)	06:23		18:18 (2)	07:17			08:10
12	21:42	15	20:28 (30)	20:59	25	20:28 (25)	19:49	17	18:35 (2)	18:34			15:46
13	04:43		20:13 (30)	05:29		19:24 (22)	06:25		18:16 (2)	07:19			08:12
14	21:41	16	20:29 (30)	20:57	24	20:26 (25)	19:46	21	18:37 (2)	18:32			15:46
15	04:44		20:13 (30)	05:31		19:23 (22)	06:26		18:14 (2)	07:21			08:13
16	21:41	17	20:30 (30)	20:55	22	19:45 (22)	19:44	24	18:38 (2)	18:29			15:45
17	04:45		20:12 (30)	05:32		19:22 (22)	06:28		18:12 (2)	07:23			08:14
18	21:40	19	20:31 (30)	20:53	24	19:46 (22)	19:41	26	18:38 (2)	18:27			15:45
19	04:46		20:12 (30)	05:34		19:20 (22)	06:30		18:11 (2)	07:25			08:16
20	21:39	19	20:31 (30)	20:51	26	19:46 (22)	19:39	28	18:39 (2)	18:24			15:45
21	04:48		20:11 (30)	05:36		19:20 (22)	06:32		18:10 (2)	07:27		15:13 (19)	08:17
22	21:38	21	20:32 (30)	20:49	27	19:47 (22)	19:36	39	18:56 (18)	18:22	5	15:18 (19)	15:44
23	04:49		20:11 (30)	05:38		19:19 (22)	06:34		18:09 (2)	07:28		15:11 (19)	08:18
24	21:37	21	20:32 (30)	20:47	29	19:48 (22)	19:34	43	18:57 (19)	18:20	10	15:21 (19)	15:44
25	04:50		20:10 (30)	05:40		19:18 (22)	06:35		18:08 (2)	07:30		15:08 (19)	08:19
26	21:36	23	20:33 (30)	20:45	29	19:47 (22)	19:31	45	18:57 (18)	18:17	13	15:22 (19)	15:44
27	04:51		20:10 (30)	05:41		19:18 (22)	06:37		18:07 (2)	07:32		15:09 (19)	08:20
28	21:35	23	20:33 (30)	20:43	30	19:48 (22)	19:29	48	18:58 (18)	18:15	14	15:23 (19)	15:44
29	04:52		20:09 (30)	05:43		19:18 (22)	06:39		18:07 (2)	07:34		15:08 (19)	08:21
30	21:34	25	20:34 (30)	20:40	32	19:50 (21)	19:26	48	18:58 (18)	18:12	15	15:23 (19)	15:44
31	04:54		20:10 (30)	05:45		19:17 (22)	06:41		18:07 (2)	07:36		15:08 (19)	08:22
32	21:33	25	20:35 (30)	20:38	35	19:52 (21)	19:24	46	18:56 (18)	18:10	16	15:24 (19)	15:44
33	04:55		20:09 (30)	05:47		19:17 (22)	06:43		18:06 (2)	07:38		15:08 (19)	08:23
34	21:32	26	20:35 (30)	20:36	37	19:54 (21)	19:21	44	18:53 (18)	18:08	16	15:24 (19)	15:44
35	04:57		20:09 (30)	05:49		19:17 (22)	06:44		18:06 (2)	07:40		15:08 (19)	08:23
36	21:30	26	20:35 (30)	20:34	38	19:55 (21)	19:19	39	18:50 (18)	18:05	16	15:24 (19)	15:44
37	04:58		20:08 (30)	05:50		19:17 (22)	06:46		18:07 (2)	07:42		15:08 (19)	08:24
38	21:29	27	20:35 (30)	20:32	38	19:55 (21)	19:16	35	18:48 (18)	18:03	16	15:24 (19)	15:45
39	04:59		20:09 (30)	05:52		19:17 (22)	06:48		18:07 (2)	07:44		15:08 (19)	08:25
40	21:28	27	20:36 (30)	20:29	38	19:55 (21)	19:14	30	18:46 (18)	18:01	11	17:08 (3)	16:02
41	05:01		20:08 (30)	05:54		19:18 (22)	06:50		18:07 (2)	07:46		16:55 (3)	16:02
42	21:26	28	20:36 (30)	20:27	38	19:56 (21)	19:11	26	18:33 (2)	17:59	14	17:09 (3)	16:01
43	05:02		20:09 (30)	05:56		19:18 (22)	06:52		18:08 (2)	07:48		16:54 (3)	16:02
44	21:25	28	20:37 (30)	20:25	37	19:55 (21)	19:09	24	18:32 (2)	17:56	16	17:10 (3)	15:59
45	05:04		20:08 (30)	05:58		19:19 (22)	06:53		18:07 (2)	07:50		16:53 (3)	16:02
46	21:23	28	20:36 (30)	20:22	34	19:53 (21)	19:06	23	18:30 (2)	17:54	18	17:11 (3)	15:58
47	05:06		20:08 (30)	05:59		19:20 (22)	06:55		18:05 (20)	07:51		16:52 (3)	16:02
48	21:22	28	20:36 (30)	20:20	31	19:51 (21)	19:04	23	18:28 (2)	17:52	19	17:11 (3)	15:57
49	05:07		20:09 (30)	06:01		19:22 (22)	06:57		18:04 (20)	06:53		15:51 (3)	16:02
50	21:20	27	20:36 (30)	20:18	27	19:49 (21)	19:01	20	18:24 (2)	16:50	20	16:11 (3)	15:56
51	05:09		20:08 (30)	06:03		19:23 (22)	06:59		18:02 (20)	06:55		15:51 (3)	16:02
52	21:19	28	20:36 (30)	20:15	20	19:46 (21)	18:59	18	18:20 (20)	16:47	20	16:11 (3)	15:54
53	05:10		20:09 (30)	06:05		19:29 (22)	07:01		18:01 (20)	06:57		15:51 (3)	16:02
54	21:17	27	20:36 (30)	20:13	4	19:44 (21)	18:56	19	18:20 (20)	16:45	20	16:11 (3)	15:53
55	05:12		20:09 (30)	06:07		07:03			18:01 (20)	06:59		15:51 (3)	16:02
56	21:16	26	20:35 (30)	20:11		18:54	19	18:20 (20)	16:43	19	16:10 (3)	15:52	15:50
57	05:14		20:10 (30)	06:08		07:04			18:01 (20)	07:01		15:52 (3)	16:02
58	21:14	26	20:36 (30)	20:08		18:51	19	18:20 (20)	16:41	18	16:10 (3)	15:51	15:51
59	05:15		20:09 (30)	06:10		07:06			18:01 (20)	07:03		15:53 (3)	16:02
60	21:12	26	20:35 (25)	20:06		18:49	18	18:19 (20)	16:39	15	16:08 (3)	15:51	15:52
61	05:17		20:10 (30)	06:12					17:05			15:54 (3)	16:02
62	21:10	26	20:36 (25)	20:03					16:37	12	16:06 (3)		15:53
63	Sonnenscheinstunden	514		461		383		328			257		231
64	astr.max.mögl.Beschattung	677		766		753		246			215		
65	Red.Sonnenscheinwahrsch.	0.44		0.48		0.40		0.33			0.21		
66	Reduktion Betriebsdauer	0.91		0.91		0.91		0.91			0.91		
67	Reduktion Windrichtung	0.63		0.64		0.68		0.70			0.69		
68	Gesamte Reduktion	0.26		0.28		0.25		0.21			0.13		
69	Met.wahrsch.Beschattung	173		215		188		52			28		

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 29

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: M - IO13

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	07:57	15:43 (19) 06:59	06:43	18:39 (2) 05:33	19:43 (22) 04:42	20:19 (30)	
	15:54	16:46	16 15:59 (19) 17:43	19:42	37 19:16 (18) 20:39	21 20:04 (21) 21:29	27 20:46 (30)	
2	08:28	07:55	15:44 (19) 06:56	06:40	18:37 (2) 05:31	19:41 (22) 04:41	20:20 (30)	
	15:55	16:48	14 15:58 (19) 17:45	19:44	40 19:17 (18) 20:40	22 20:03 (21) 21:31	27 20:47 (30)	
3	08:28	07:54	15:45 (19) 06:54	06:38	18:36 (2) 05:28	19:39 (22) 04:40	20:19 (30)	
	15:57	16:50	12 15:57 (19) 17:47	19:46	43 19:19 (18) 20:42	23 20:02 (21) 21:32	28 20:47 (30)	
4	08:27	07:52	15:48 (19) 06:52	06:35	18:35 (2) 05:26	19:38 (22) 04:40	20:19 (30)	
	15:58	16:52	8 15:56 (19) 17:49	19:48	43 19:18 (18) 20:44	24 20:02 (21) 21:33	28 20:47 (30)	
5	08:27	07:50	06:49	06:33	18:34 (2) 05:24	19:37 (22) 04:39	20:19 (30)	
	15:59	16:54	17:51	19:50	44 19:18 (18) 20:46	26 20:03 (21) 21:34	28 20:47 (30)	
6	08:27	07:48	06:47	06:30	18:33 (2) 05:22	19:36 (22) 04:38	20:20 (30)	
	16:00	16:56	17:53	19:52	43 19:16 (18) 20:48	28 20:04 (21) 21:35	28 20:48 (30)	
7	08:26	07:46	06:45	06:28	18:33 (2) 05:20	19:35 (22) 04:37	20:19 (30)	
	16:02	16:58	17:55	19:54	42 19:15 (18) 20:50	29 20:04 (21) 21:36	28 20:47 (30)	
8	08:26	07:44	06:42	06:26	18:33 (2) 05:18	19:34 (22) 04:37	20:20 (30)	
	16:03	17:00	17:57	19:55	40 19:13 (18) 20:51	30 20:04 (21) 21:37	28 20:48 (30)	
9	08:25	07:42	06:40	06:23	18:32 (2) 05:17	19:35 (22) 04:36	20:20 (30)	
	16:05	17:03	17:59	19:57	34 18:33 (2) 20:53	30 20:05 (21) 21:38	28 20:48 (30)	
10	08:24	07:40	06:37	06:21	18:33 (2) 05:15	19:34 (22) 04:36	20:20 (30)	
	16:06	17:05	18:00	19:59	33 19:06 (2) 20:55	31 20:05 (21) 21:39	28 20:48 (30)	
11	08:24	07:38	06:35	06:18	18:32 (2) 05:13	19:34 (22) 04:35	20:21 (30)	
	16:08	17:07	18:02	20:01	33 19:05 (2) 20:57	31 20:05 (21) 21:40	28 20:49 (30)	
12	08:23	07:36	06:32	06:16	18:33 (2) 05:11	19:34 (22) 04:35	20:20 (30)	
	16:09	17:09	18:04	20:03	31 19:04 (2) 20:59	32 20:06 (21) 21:41	28 20:48 (30)	
13	08:22	07:34	06:30	06:14	18:33 (2) 05:09	19:34 (22) 04:34	20:21 (30)	
	16:11	17:11	18:06	20:05	31 19:04 (2) 21:00	32 20:08 (21) 21:41	28 20:49 (30)	
14	08:21	07:32	16:36 (3) 06:27	06:11	18:33 (2) 05:07	19:34 (22) 04:34	20:21 (30)	
	16:13	17:13	7 16:43 (3) 18:08	20:07	29 19:02 (2) 21:02	35 20:30 (25) 21:42	28 20:49 (30)	
15	08:20	07:30	16:34 (3) 06:25	06:09	18:35 (2) 05:06	19:34 (22) 04:34	20:22 (30)	
	16:14	17:15	11 16:45 (3) 18:10	20:09	26 19:01 (2) 21:04	38 20:32 (25) 21:43	27 20:49 (30)	
16	08:19	07:28	16:33 (3) 06:23	17:40 (20) 06:06	18:36 (2) 05:04	19:34 (22) 04:34	20:22 (30)	
	16:16	17:17	14 16:47 (3) 18:12	5 17:45 (20) 20:10	24 19:00 (2) 21:05	40 20:33 (25) 21:43	28 20:50 (30)	
17	08:18	07:26	16:32 (3) 06:20	17:37 (20) 06:04	18:37 (2) 05:02	19:35 (22) 04:34	20:22 (30)	
	16:18	17:19	18 16:50 (3) 18:14	10 17:47 (20) 20:12	20 18:57 (2) 21:07	41 20:35 (25) 21:44	28 20:50 (30)	
18	08:17	07:24	16:31 (3) 06:18	17:35 (20) 06:02	18:39 (2) 05:01	19:35 (22) 04:33	20:23 (30)	
	16:19	17:21	20 16:51 (3) 18:16	14 17:49 (20) 20:14	16 18:55 (2) 21:09	41 20:36 (25) 21:44	27 20:50 (30)	
19	08:16	07:22	16:30 (3) 06:15	17:34 (20) 05:59	18:43 (2) 04:59	19:36 (22) 04:33	20:23 (30)	
	16:21	17:23	21 16:51 (3) 18:18	17 17:51 (20) 20:16	9 18:52 (2) 21:10	42 20:38 (25) 21:45	27 20:50 (30)	
20	08:15	15:46 (19) 07:19	16:30 (3) 06:13	17:32 (20) 05:57	04:58	19:34 (22) 04:34	20:23 (30)	
	16:23	2 15:48 (19) 17:25	21 16:51 (3) 18:20	19 17:51 (20) 20:18	21:12	43 20:38 (25) 21:45	27 20:50 (30)	
21	08:14	15:44 (19) 07:17	16:30 (3) 06:10	17:32 (20) 05:55	04:56	19:36 (22) 04:34	20:23 (30)	
	16:25	6 15:50 (19) 17:27	22 16:52 (3) 18:22	19 17:51 (20) 20:20	21:14	44 20:40 (25) 21:45	27 20:50 (30)	
22	08:12	15:44 (19) 07:15	16:30 (3) 06:08	17:31 (20) 05:52	04:55	19:37 (22) 04:34	20:23 (30)	
	16:27	9 15:53 (19) 17:29	21 16:51 (3) 18:23	20 17:51 (20) 20:22	21:15	44 20:41 (25) 21:45	27 20:50 (30)	
23	08:11	15:42 (19) 07:13	16:31 (3) 06:05	17:31 (20) 05:50	19:53 (21) 04:53	19:38 (22) 04:34	20:24 (30)	
	16:29	12 15:54 (19) 17:31	20 16:51 (3) 18:25	20 17:51 (20) 20:24	1 19:54 (21) 21:17	45 20:42 (20) 21:45	27 20:51 (30)	
24	08:10	15:42 (19) 07:10	16:31 (3) 06:03	17:31 (20) 05:48	19:51 (21) 04:52	19:38 (22) 04:34	20:24 (30)	
	16:31	14 15:56 (19) 17:33	19 16:50 (3) 18:27	19 17:50 (20) 20:25	5 19:56 (21) 21:18	44 20:42 (20) 21:46	27 20:51 (30)	
25	08:08	15:42 (19) 07:08	16:32 (3) 06:00	17:32 (20) 05:46	19:49 (21) 04:50	19:39 (22) 04:35	20:23 (30)	
	16:32	16 15:58 (19) 17:35	16 16:48 (3) 18:29	17 17:49 (20) 20:27	9 19:58 (21) 21:20	45 20:43 (20) 21:46	28 20:51 (30)	
26	08:07	15:41 (19) 07:06	16:33 (3) 05:58	17:32 (20) 05:43	19:48 (21) 04:49	19:40 (22) 04:35	20:24 (30)	
	16:34	17 15:58 (19) 17:37	14 16:47 (3) 18:31	15 17:47 (20) 20:29	12 20:00 (21) 21:21	44 20:44 (20) 21:46	28 20:52 (30)	
27	08:05	15:41 (19) 07:03	16:35 (3) 05:55	17:34 (20) 05:41	19:47 (21) 04:48	19:42 (22) 04:36	20:24 (30)	
	16:36	17 15:58 (19) 17:39	9 16:44 (3) 18:33	12 17:46 (20) 20:31	15 20:02 (21) 21:23	41 20:44 (20) 21:45	28 20:52 (30)	
28	08:04	15:42 (19) 07:01	05:53	17:36 (20) 05:39	19:47 (21) 04:47	19:43 (22) 04:36	20:25 (30)	
	16:38	18 16:00 (19) 17:41	18:35	13 17:56 (2) 20:33	17 20:04 (21) 21:24	40 20:45 (20) 21:45	27 20:52 (30)	
29	08:02	15:42 (19)	06:50	18:45 (2) 05:37	19:47 (21) 04:45	19:44 (22) 04:37	20:24 (30)	
	16:40	18 16:00 (19)	19:37	16 19:01 (2) 20:35	17 20:04 (21) 21:26	39 20:45 (20) 21:45	28 20:52 (30)	
30	08:00	15:42 (19)	06:48	18:42 (2) 05:35	19:46 (22) 04:44	19:46 (22) 04:37	20:25 (30)	
	16:42	17 15:59 (19)	19:38	26 19:12 (18) 20:37	18 20:04 (21) 21:27	36 20:46 (20) 21:45	28 20:53 (30)	
31	07:59	15:42 (19)	06:45	18:40 (2)	04:43	19:49 (22)		
	16:44	17 15:59 (19)	19:40	32 19:13 (18)	21:28	31 20:46 (20)		
Sonnenscheinstunden	248	272	367	421	496	512		
astr.max.mögl.Beschattung	163	283	274	712	1092	829		
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45		
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91		
Reduktion Windrichtung	0.69	0.70	0.68	0.67	0.63	0.62		
Gesamte Reduktion	0.11	0.15	0.19	0.25	0.29	0.26		
Met.wahrsch.Beschattung	18	43	53	178	320	213		

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 30

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: M - IO13

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1 04:38	20:25 (30) 05:19		19:45 (22) 06:14	18:32 (2) 07:08		07:07	08:03
2 21:45	28 20:53 (30) 21:09	31	20:16 (22) 20:01	33 19:05 (2) 18:46		16:35	15:50
3 04:39	20:25 (30) 05:20		19:44 (22) 06:16	18:31 (2) 07:10		07:09	08:05
4 21:44	28 20:53 (30) 21:07	31	20:15 (22) 19:59	33 19:04 (2) 18:44		16:33	15:49
5 04:40	20:25 (30) 05:22		19:45 (22) 06:17	18:30 (2) 07:12		07:11	08:06
6 21:44	28 20:53 (30) 21:05	30	20:15 (22) 19:56	34 19:04 (2) 18:41		16:31	15:48
7 04:40	20:25 (30) 05:24		19:44 (22) 06:19	18:30 (2) 07:14		07:13	08:08
8 21:43	28 20:53 (30) 21:03	30	20:14 (22) 19:54	40 19:10 (18) 18:39		16:29	15:47
9 04:41	20:26 (30) 05:25		19:45 (22) 06:21	18:29 (2) 07:15		07:15	08:09
10 21:43	28 20:54 (30) 21:01	29	20:14 (22) 19:51	42 19:11 (16) 18:37		16:27	15:47
11 04:42	20:26 (30) 05:27		19:46 (22) 06:23	18:29 (2) 07:17		07:17	08:10
12 21:42	28 20:54 (30) 20:59	28	20:14 (22) 19:49	43 19:12 (18) 18:34		16:25	15:46
13 04:43	20:26 (30) 05:29		19:46 (22) 06:25	18:29 (2) 07:19		07:19	08:12
14 21:41	28 20:54 (30) 20:57	27	20:13 (22) 19:46	44 19:13 (18) 18:32	9	15:17 (19) 15:46	
15 04:44	20:27 (30) 05:31		19:47 (22) 06:26	18:30 (2) 07:21		07:21	08:13
16 21:41	27 20:54 (30) 20:55	25	20:12 (22) 19:44	43 19:13 (18) 18:29	12	15:28 (19) 15:45	
17 04:45	20:27 (30) 05:33		19:48 (22) 06:28	18:29 (2) 07:23		07:23	08:14
18 21:40	28 20:55 (30) 20:53	24	20:12 (22) 19:41	43 19:12 (18) 18:27	15	15:29 (19) 15:45	
19 04:46	20:27 (30) 05:34		19:48 (22) 06:30	18:30 (2) 07:25		07:25	08:16
20 21:39	28 20:55 (30) 20:51	23	20:11 (21) 19:39	40 19:10 (18) 18:24	16	15:30 (19) 15:45	
21 04:48	20:27 (30) 05:36		19:50 (22) 06:32	18:31 (2) 07:27		07:27	08:17
22 21:38	27 20:54 (30) 20:49	22	20:12 (21) 19:36	37 19:08 (18) 18:22	17	15:31 (19) 15:44	
23 04:49	20:27 (30) 05:38		19:52 (22) 06:34	18:32 (2) 07:28		07:29	08:18
24 21:37	27 20:54 (30) 20:47	20	20:12 (21) 19:34	34 19:06 (18) 18:20	17	15:31 (19) 15:44	
25 04:50	19:56 (22) 05:40		19:54 (21) 06:35	18:32 (2) 07:30		07:31	08:19
26 21:36	33 20:54 (30) 20:45	18	20:12 (21) 19:31	28 19:03 (18) 18:17	16	15:31 (19) 15:44	
27 04:51	19:54 (22) 05:41		19:54 (21) 06:37	18:35 (2) 07:32	17:11 (3) 07:33	15:14 (19) 15:44	
28 21:35	37 20:54 (30) 20:43	18	20:12 (21) 19:29	17 18:52 (2) 18:15	4	17:15 (3) 16:11	15:14 (19) 15:44
29 04:53	19:52 (22) 05:43		19:55 (21) 06:39	18:27 (2) 07:34		07:35	08:21
30 21:34	40 20:54 (30) 20:40	16	20:11 (21) 19:26	15 18:48 (2) 18:12	11	17:18 (3) 16:09	15:14 (19) 15:44
31 04:54	19:52 (22) 05:45		19:54 (21) 06:41	18:24 (2) 07:36	15	17:05 (3) 07:37	15:14 (19) 15:44
32 21:33	41 20:54 (30) 20:38	14	20:08 (21) 19:24	11 18:35 (2) 18:10	17:20 (3) 16:08	17	15:31 (19) 15:44
33 04:55	19:50 (22) 05:47		19:55 (21) 06:43	18:21 (2) 07:38		17:04 (3) 07:38	15:15 (19) 15:44
34 21:32	44 20:54 (30) 20:36	11	20:06 (21) 19:21	15 18:36 (2) 18:08	17	17:21 (3) 16:06	16 15:31 (19) 15:44
35 04:57	19:49 (22) 05:49		19:56 (21) 06:44	18:19 (2) 07:40		17:02 (3) 07:40	15:15 (19) 15:44
36 21:30	44 20:53 (30) 20:34	8	20:04 (21) 19:19	18 18:37 (2) 18:05	20	17:22 (3) 16:05	15 15:30 (19) 15:44
37 04:58	19:48 (22) 05:50		19:57 (21) 06:46	18:19 (2) 07:42		17:02 (3) 07:42	15:16 (19) 15:44
38 21:29	44 20:52 (30) 20:32	5	20:02 (21) 19:16	18 18:37 (2) 18:03	20	17:22 (3) 16:03	12 15:28 (19) 15:45
39 04:59	19:48 (22) 05:52		19:58 (21) 06:48	18:18 (2) 07:44		17:01 (3) 07:44	15:18 (19) 15:45
40 21:28	45 20:52 (30) 20:29		19:14	19 18:37 (2) 18:01	21	17:22 (3) 16:02	9 15:27 (19) 15:45
41 05:01	19:47 (22) 05:54		06:50	18:17 (2) 07:46		17:01 (3) 07:46	15:20 (19) 15:45
42 21:26	44 20:51 (30) 20:27		19:11	19 18:36 (2) 17:59	21	17:22 (3) 16:01	6 15:26 (19) 15:45
43 05:02	19:47 (22) 05:56		06:52	18:17 (2) 07:48		17:01 (3) 07:48	15:23 (19) 15:46
44 21:25	43 20:51 (30) 20:25		19:09	19 18:36 (2) 17:56	21	17:22 (3) 15:59	2 15:25 (19) 15:46
45 05:04	19:46 (22) 05:58		06:53	18:17 (2) 07:50		17:01 (3) 07:49	08:27
46 21:23	44 20:50 (25) 20:22		19:06	19 18:36 (2) 17:54	20	17:21 (3) 15:58	15:46
47 05:06	19:46 (22) 05:59		18:46 (2) 06:55	18:17 (2) 07:51		17:01 (3) 07:51	08:27
48 21:22	42 20:48 (25) 20:20	10	18:56 (2) 19:04	18 18:35 (2) 17:52	19	17:20 (3) 15:57	15:47
49 05:07	19:46 (22) 06:01		18:42 (2) 06:57	18:18 (2) 06:53		16:01 (3) 07:53	08:27
50 21:20	42 20:47 (25) 20:18	17	18:59 (2) 19:01	15 18:33 (2) 16:50	18	16:19 (3) 15:56	15:48
51 05:09	19:45 (22) 06:03		18:39 (2) 06:59	18:18 (2) 06:55		16:02 (3) 07:55	08:28
52 21:19	40 20:45 (25) 20:15	21	19:00 (2) 18:59	12 18:30 (2) 16:48	14	16:16 (3) 15:54	15:48
53 05:10	19:45 (22) 06:05		18:38 (2) 07:01	18:21 (2) 06:57		16:04 (3) 07:56	08:28
54 21:17	39 20:44 (25) 20:13	24	19:02 (2) 18:56	6 18:27 (2) 16:45	10	16:14 (3) 15:53	15:49
55 05:12	19:44 (22) 06:07		18:36 (2) 07:03	06:59		16:06 (3) 07:58	08:28
56 21:16	38 20:42 (25) 20:11	27	19:03 (2) 18:54	16:43	6	16:12 (3) 15:52	15:50
57 05:14	19:45 (22) 06:08		18:34 (2) 07:04	07:01		08:00	08:28
58 21:14	36 20:41 (25) 20:08	29	19:03 (2) 18:51	16:41		15:51	15:51
59 05:15	19:44 (22) 06:10		18:33 (2) 07:06	07:03		08:01	08:28
60 21:12	34 20:39 (25) 20:06	31	19:04 (2) 18:49	16:39		15:51	15:52
61 05:17	19:44 (22) 06:12		18:33 (2)	07:05		08:02	08:28
62 21:10	32 20:16 (22) 20:03	31	19:04 (2)	16:37		15:53	15:53
Sonnenscheinstunden	514	461	383	328	257		231
astr.max.mögl.Beschattung	1095	600	715	237	214		
Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21		
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91		
Reduktion Windrichtung	0.63	0.65	0.68	0.70	0.69		
Gesamte Reduktion	0.25	0.29	0.25	0.21	0.13		
Met.wahrsch.Beschattung	278	172	177	50	28		

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 31
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersieglug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: N - IO14

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28 15:54	07:57 16:46	15:48 (19) 06:59 16:06 (19) 17:43	16:40 (3) 06:43 16:53 (3) 19:42	19:15 (18) 05:33 19:16 (18) 20:39	19:53 (21) 04:42 20:09 (21) 21:29	19:50 (22) 20:51 (30)	
2	08:28 15:55	07:57 16:48	15:48 (19) 06:56 16:06 (19) 17:45	16:42 (3) 06:40 16:50 (3) 19:44	18:57 (2) 05:31 19:17 (18) 20:40	19:53 (21) 04:41 20:13 (21) 21:31	19:51 (22) 20:53 (30)	
3	08:28 15:57	07:54 16:50	15:49 (19) 06:54 16:06 (19) 17:47	16:38 19:46	18:54 (2) 05:28 19:19 (18) 20:42	19:53 (21) 04:40 20:10 (21) 21:32	19:52 (22) 20:53 (30)	
4	08:27 15:58	07:52 16:52	15:50 (19) 06:52 16:06 (19) 17:49	16:35 19:48	18:51 (2) 05:26 19:20 (18) 20:44	19:53 (21) 04:40 20:09 (21) 21:33	19:52 (22) 20:53 (30)	
5	08:27 15:59	07:50 16:54	15:51 (19) 06:49 16:06 (19) 17:51	16:33 19:50	18:49 (2) 05:24 19:23 (18) 20:46	19:53 (21) 04:39 20:09 (21) 21:34	19:53 (22) 20:53 (30)	
6	08:27 16:00	07:48 16:56	15:52 (19) 06:47 16:05 (19) 17:53	16:30 19:52	18:47 (2) 05:22 19:24 (18) 20:48	19:53 (21) 04:38 20:08 (21) 21:35	19:54 (22) 20:54 (30)	
7	08:26 16:02	07:46 16:58	15:53 (19) 06:45 16:02 (19) 17:55	16:28 19:54	18:46 (2) 05:20 19:24 (18) 20:50	19:52 (22) 04:37 20:09 (22) 21:36	19:54 (22) 20:54 (30)	
8	08:26 16:03	07:44 17:00	16:02 (19) 17:55 16:06 (19) 17:57	16:26 19:55	18:45 (2) 05:18 19:23 (18) 20:51	19:51 (22) 04:37 20:10 (22) 21:37	19:56 (22) 20:55 (30)	
9	08:25 16:05	07:42 17:03	16:06 (19) 17:59 16:06 (19) 17:59	16:23 19:57	18:44 (2) 05:17 19:22 (18) 20:53	19:50 (22) 04:36 20:13 (22) 21:38	19:56 (22) 20:54 (22)	
10	08:24 16:06	07:40 17:05	16:07 (19) 17:59 16:06 (19) 18:00	16:21 19:59	18:43 (2) 05:15 19:21 (18) 20:55	19:49 (22) 04:36 20:13 (22) 21:39	19:57 (22) 20:55 (30)	
11	08:24 16:08	07:38 17:07	16:07 (19) 18:00 16:06 (19) 18:02	16:18 20:01	18:42 (2) 05:13 19:17 (18) 20:57	19:48 (22) 04:35 20:13 (22) 21:40	19:58 (22) 20:56 (30)	
12	08:23 16:09	07:36 17:09	16:07 (19) 18:02 16:06 (19) 18:04	16:16 20:03	18:42 (2) 05:11 19:16 (2) 20:59	19:48 (22) 04:35 20:15 (22) 21:41	19:59 (22) 20:55 (30)	
13	08:22 16:11	07:34 17:11	16:06 (19) 18:06 16:06 (19) 18:06	16:14 20:05	18:42 (2) 05:09 19:16 (2) 21:00	19:47 (22) 04:34 20:15 (22) 21:41	20:00 (22) 20:56 (30)	
14	08:21 16:13	07:32 17:13	16:07 (19) 18:06 16:06 (19) 18:08	16:11 20:07	18:41 (2) 05:07 19:15 (2) 21:02	19:46 (22) 04:34 20:15 (22) 21:42	20:01 (22) 20:56 (30)	
15	08:20 16:14	07:30 17:15	16:07 (19) 18:06 16:06 (19) 18:10	16:09 20:09	18:42 (2) 05:06 19:15 (2) 21:04	19:46 (22) 04:34 20:16 (22) 21:43	20:02 (22) 20:57 (30)	
16	08:19 16:16	07:28 17:17	16:07 (19) 18:06 16:06 (19) 18:12	16:06 20:10	18:42 (2) 05:04 19:16 (2) 21:05	19:45 (22) 04:34 20:33 (25) 21:43	20:04 (22) 20:57 (30)	
17	08:18 16:18	07:26 17:19	16:03 (3) 06:20 16:50 (3) 18:14	16:04 20:12	18:42 (2) 05:02 19:13 (2) 21:07	19:46 (22) 04:34 20:35 (25) 21:44	20:30 (30) 20:57 (30)	
18	08:17 16:19	07:24 17:21	16:41 (3) 06:18 16:52 (3) 18:16	16:02 20:14	18:42 (2) 05:01 19:13 (2) 21:09	19:45 (22) 04:33 20:36 (25) 21:44	20:30 (30) 20:57 (30)	
19	08:16 16:21	07:22 17:23	16:39 (3) 06:15 16:54 (3) 18:18	16:01 20:16	18:43 (2) 04:59 19:12 (2) 21:10	19:46 (22) 04:33 20:38 (25) 21:45	20:30 (30) 20:57 (30)	
20	08:15 16:23	07:19 17:25	16:38 (3) 06:13 16:56 (3) 18:20	16:04 17:45 (20) 05:17	18:44 (2) 04:58 19:11 (2) 21:12	19:48 (22) 04:34 20:38 (25) 21:45	20:30 (30) 20:58 (30)	
21	08:14 16:25	07:17 17:27	16:38 (3) 06:10 16:58 (3) 18:22	16:03 17:43 (20) 05:55	18:46 (2) 04:56 19:10 (2) 21:14	19:46 (22) 04:34 20:40 (25) 21:45	20:30 (30) 20:58 (30)	
22	08:12 16:27	07:15 17:29	16:36 (3) 06:08 16:57 (3) 18:23	16:02 17:41 (20) 05:52	18:46 (2) 04:55 19:07 (2) 21:15	19:46 (22) 04:34 20:42 (25) 21:45	20:30 (30) 20:58 (30)	
23	08:11 16:29	07:13 17:31	16:36 (3) 06:05 16:58 (3) 18:25	16:00 17:40 (20) 05:50	18:48 (2) 04:53 19:05 (2) 21:17	19:46 (22) 04:34 20:44 (25) 21:45	20:31 (30) 20:58 (30)	
24	08:10 16:31	07:11 17:33	16:37 (3) 06:03 16:57 (3) 18:27	16:00 17:38 (20) 05:41	18:51 (2) 04:52 19:02 (2) 21:18	19:46 (22) 04:34 20:44 (25) 21:46	20:31 (30) 20:58 (30)	
25	08:08 16:32	07:08 17:35	16:36 (3) 06:00 16:57 (3) 18:29	16:00 17:58 (20) 05:46	18:50 (2) 04:50 19:02 (2) 21:18	19:46 (22) 04:35 20:46 (30) 21:46	20:31 (30) 20:58 (30)	
26	08:07 16:34	07:06 17:37	16:37 (3) 05:58 16:57 (3) 18:31	16:00 17:57 (20) 05:43	18:51 (2) 04:49 19:12 (2) 21:20	19:47 (22) 04:35 20:47 (30) 21:46	20:30 (30) 20:59 (30)	
27	08:05 16:36	07:03 17:39	16:37 (3) 05:55 16:55 (3) 18:33	16:00 17:58 (20) 05:41	18:54 (2) 04:58 20:02 (21) 21:23	19:48 (22) 04:36 20:48 (30) 21:45	20:35 (22) 20:59 (30)	
28	08:04 16:38	07:01 17:41	16:38 (3) 05:53 16:55 (3) 18:35	16:00 17:58 (20) 05:39	19:55 (21) 04:47 20:04 (21) 21:24	19:48 (22) 04:36 20:49 (30) 21:45	20:35 (22) 20:59 (30)	
29	08:02 16:40	06:59 17:42	16:38 (3) 05:50 16:55 (3) 18:35	16:00 18:39 (20) 05:37	19:54 (21) 04:45 20:05 (21) 21:26	19:49 (22) 04:37 20:50 (30) 21:45	20:33 (22) 20:59 (30)	
30	08:00 16:42	06:57 17:43	16:38 (3) 05:48 16:54 (3) 18:38	16:00 18:40 (20) 05:35	19:54 (21) 04:44 20:07 (21) 21:27	19:49 (22) 04:37 20:51 (30) 21:45	20:33 (22) 20:59 (30)	
31	07:59 16:44	06:55 17:44	16:38 (3) 05:45 16:54 (3) 18:38	16:00 18:41 (20) 05:37	19:54 (21) 04:43 20:07 (21) 21:27	19:49 (22) 04:37 20:51 (30) 21:45	20:33 (22) 20:59 (30)	
Sonnenscheinstunden	248	272	317	367	421	496	512	
astr.max.mögl.Beschattung	105		317	210	725	993		1071
Red.Sonnenscheinwahrsch.	0.17		0.24	0.31	0.41	0.51		0.45
Reduktion Betriebsdauer	0.91		0.91	0.91	0.91	0.91		0.91
Reduktion Windrichtung	0.70		0.70	0.68	0.67	0.63		0.62
Gesamte Reduktion	0.11		0.15	0.19	0.25	0.29		0.26
Met.wahrsch.Beschattung	12		48	41	180	291		275

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 32
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: N - IO14

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1 04:38	20:03 (22) 05:19	19:58 (22) 06:14	18:42 (2) 07:08	07:07	08:03		
2 21:45	38 21:00 (30) 21:09	20:25 (22) 20:01	35 19:17 (18) 18:46	16:35	15:50		
3 04:39	20:02 (22) 05:20	19:58 (22) 06:16	18:41 (2) 07:10	07:09	08:05		
4 21:44	39 20:59 (30) 21:07	25 20:23 (22) 19:59	37 19:18 (18) 18:44	16:33	15:49		
5 04:40	20:01 (22) 05:22	19:59 (22) 06:17	18:42 (2) 07:12	07:11	15:26 (19) 08:06		
6 21:44	42 21:00 (30) 21:05	24 20:23 (22) 19:56	38 19:20 (18) 18:41	16:31	3 15:29 (19) 15:48		
7 04:40	20:01 (22) 05:24	20:00 (22) 06:19	18:42 (2) 07:14	07:13	15:23 (19) 08:08		
8 21:43	42 21:00 (30) 21:03	21 20:21 (22) 19:54	38 19:20 (18) 18:39	16:29	9 15:32 (19) 15:47		
9 04:41	20:01 (22) 05:25	20:01 (22) 06:21	18:42 (2) 07:15	07:15	15:22 (19) 08:09		
10 21:43	43 21:00 (30) 21:01	19 20:20 (22) 19:51	38 19:20 (18) 18:37	16:27	13 15:35 (19) 15:47		
11 04:42	20:01 (22) 05:27	20:03 (22) 06:23	18:43 (2) 07:17	07:17	15:21 (19) 08:10		
12 21:42	44 21:00 (30) 20:59	16 20:19 (22) 19:49	37 19:20 (18) 18:34	16:25	15 15:36 (19) 15:46		
13 04:43	20:00 (22) 05:29	20:02 (21) 06:25	18:44 (2) 07:19	07:19	15:20 (19) 08:12		
14 21:41	44 21:00 (30) 20:57	16 20:18 (21) 19:46	34 19:18 (18) 18:32	16:23	16 15:36 (19) 15:46		
15 04:44	20:00 (22) 05:31	20:02 (21) 06:26	18:46 (2) 07:21	07:21	15:19 (19) 08:13		
16 21:41	45 21:00 (30) 20:55	16 20:18 (21) 19:44	30 19:16 (18) 18:29	16:21	18 15:37 (19) 15:45		
17 04:45	19:59 (22) 05:33	20:02 (21) 06:28	18:47 (2) 07:23	07:23	15:19 (19) 08:14		
18 21:40	46 21:00 (30) 20:53	17 20:19 (21) 19:41	26 19:13 (18) 18:27	16:19	18 15:37 (19) 15:45		
19 04:46	19:59 (22) 05:34	20:01 (21) 06:30	18:50 (2) 07:25	07:25	15:19 (19) 08:16		
20 21:39	46 21:00 (30) 20:51	17 20:18 (21) 19:39	16 19:10 (18) 18:24	16:18	18 15:37 (19) 15:45		
21 04:48	19:59 (22) 05:36	20:01 (21) 06:32	19:07 (18) 07:27	17:19 (3) 07:27	15:20 (19) 08:17		
22 21:38	47 21:00 (30) 20:49	17 20:18 (21) 19:36	1 19:08 (18) 18:22	2 17:21 (3) 16:16	18 15:38 (19) 15:44		
23 04:49	19:58 (22) 05:38	20:02 (21) 06:34	18:34 (20) 07:28	17:14 (3) 07:29	15:20 (19) 08:18		
24 21:37	47 21:00 (30) 20:47	15 20:17 (21) 19:34	9 18:43 (20) 18:20	11 17:25 (3) 16:14	18 15:38 (19) 15:44		
25 04:50	19:58 (22) 05:40	19:53 (22) 06:35	18:31 (20) 07:30	17:12 (3) 07:31	17 15:20 (19) 08:19		
26 21:36	47 20:59 (30) 20:45	13 20:14 (21) 19:31	13 18:44 (20) 18:17	15 17:27 (3) 16:13	17 15:37 (19) 15:44		
27 04:51	19:57 (22) 05:41	20:02 (21) 06:37	18:29 (20) 07:32	17:11 (3) 07:33	15:21 (19) 08:20		
28 21:35	47 20:59 (30) 20:43	10 20:12 (21) 19:29	16 18:45 (20) 18:15	17 17:28 (3) 16:11	16 15:37 (19) 15:44		
29 04:53	19:57 (22) 05:43	20:03 (21) 06:39	18:28 (20) 07:34	17:10 (3) 07:35	15:22 (19) 08:21		
30 21:34	47 20:58 (30) 20:40	8 20:11 (21) 19:26	18 18:46 (20) 18:12	19 17:29 (3) 16:09	13 15:35 (19) 15:44		
31 04:54	19:57 (22) 05:45	20:04 (21) 06:41	18:29 (20) 07:36	17:09 (3) 07:37	15:23 (19) 08:22		
1 21:33	46 20:58 (30) 20:38	4 20:08 (21) 19:24	19 18:47 (20) 18:10	20 17:29 (3) 16:08	11 15:34 (19) 15:44		
2 04:55	19:57 (22) 05:47	06:43	18:26 (20) 07:38	17:08 (3) 07:38	15:24 (19) 08:23		
3 21:32	45 20:57 (30) 20:36	19:21	20 18:46 (20) 18:08	21 17:29 (3) 16:06	8 15:32 (19) 15:44		
4 04:57	19:56 (22) 05:49	06:44	18:26 (20) 07:40	17:08 (3) 07:40	15:26 (19) 08:23	14:35 (23)	
5 21:30	46 20:56 (30) 20:34	19:19	20 18:46 (20) 18:05	21 17:29 (3) 16:05	4 15:30 (19) 15:44	2 14:37 (23)	
6 04:58	19:56 (22) 05:50	18:56 (2) 06:46	18:26 (20) 07:42	17:08 (3) 07:42	08:24	14:36 (23)	
7 21:29	44 20:54 (25) 20:32	13 19:09 (2) 19:16	19 18:45 (20) 18:03	21 17:29 (3) 16:03	15:45	3 14:39 (23)	
8 04:59	19:56 (22) 05:52	18:53 (2) 06:48	18:26 (20) 07:44	17:08 (3) 07:44	08:25	14:35 (23)	
9 21:28	44 20:54 (25) 20:29	18 19:11 (2) 19:14	19 18:45 (20) 18:01	20 17:28 (3) 16:02	15:45	4 14:39 (23)	
10 05:01	19:56 (22) 05:54	18:51 (2) 06:50	18:26 (20) 07:46	17:08 (3) 07:46	08:25	14:36 (23)	
11 21:26	43 20:52 (25) 20:27	22 19:13 (2) 19:11	16 18:42 (20) 17:59	20 17:28 (3) 16:01	15:45	4 14:40 (23)	
12 05:02	19:56 (22) 05:56	18:49 (2) 06:52	18:27 (20) 07:48	17:09 (3) 07:48	08:26	14:36 (23)	
13 21:25	43 20:52 (25) 20:25	25 19:14 (2) 19:09	13 18:40 (20) 17:56	17 17:26 (3) 15:59	15:46	4 14:40 (23)	
14 05:04	19:56 (22) 05:58	18:48 (2) 06:53	18:29 (20) 07:50	17:09 (3) 07:49	08:27	14:37 (23)	
15 21:23	40 20:50 (25) 20:22	19:15 (2) 19:06	9 18:38 (20) 17:54	15 17:24 (3) 15:58	15:46	4 14:41 (23)	
16 05:06	19:55 (22) 05:59	18:47 (2) 06:55	18:33 (20) 07:51	17:11 (3) 07:51	08:27	14:37 (23)	
17 21:22	39 20:48 (25) 20:20	29 19:16 (2) 19:04	1 18:34 (20) 17:52	10 17:21 (3) 15:57	15:47	4 14:41 (23)	
18 05:07	19:56 (22) 06:01	18:46 (2) 06:57	06:53	16:13 (3) 07:53	08:27	14:38 (23)	
19 21:20	37 20:47 (25) 20:18	31 19:17 (2) 19:01	16:50	6 16:19 (3) 15:56	15:48	3 14:41 (23)	
20 05:09	19:56 (22) 06:03	18:44 (2) 06:59	06:55	07:55	08:28		
21 21:19	34 20:45 (25) 20:15	32 19:16 (2) 18:59	16:48	15:54	15:48		
22 05:10	19:56 (22) 06:05	18:44 (2) 07:01	06:57	07:56	08:28		
23 21:17	32 20:44 (25) 20:13	33 19:17 (2) 18:56	16:45	15:53	15:49		
24 05:12	19:56 (22) 06:07	18:44 (2) 07:03	06:59	07:58	08:28		
25 21:16	30 20:26 (22) 20:11	33 19:17 (2) 18:54	16:43	15:52	15:50		
26 05:14	19:57 (22) 06:08	18:42 (2) 07:04	07:01	08:00	08:28		
27 21:14	29 20:26 (22) 20:08	34 19:16 (2) 18:51	16:41	15:51	15:51		
28 05:15	19:56 (22) 06:10	18:42 (2) 07:06	07:03	08:01	08:28		
29 21:12	29 20:25 (22) 20:06	34 19:16 (2) 18:49	16:39	15:51	15:52		
30 05:17	19:57 (22) 06:12	18:42 (2) 07:05	07:05	08:00	08:28		
31 21:10	28 20:25 (22) 20:03	34 19:16 (2) 18:49	16:37	15:53	15:53		
Sonnenscheinstunden	514	461	383	328	257	231	
astr.max.mögl.Beschattung	1273	630	522	235	215	28	
Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.63	0.65	0.67	0.70	0.70	0.67	
Gesamte Reduktion	0.25	0.29	0.25	0.21	0.13	0.08	
Met.wahrsch.Beschattung	323	182	128	49	28	2	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 33

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: O - IO15

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	07:57	15:49 (19) 06:59	16:40 (3) 06:43	18:43 (20) 05:33	19:59 (21) 04:42	19:55 (22)	
2	15:54	16:46	19 16:08 (19) 17:43	18 16:58 (3) 19:42	15 18:58 (20) 20:39	10 20:09 (21) 21:29	49 20:54 (30)	
3	08:28	07:55	15:49 (19) 06:56	16:41 (3) 06:40	18:44 (20) 05:31	19:58 (21) 04:41	19:56 (22)	
4	15:57	16:48	19 16:08 (19) 17:45	15 16:56 (3) 19:44	12 18:56 (20) 20:40	13 20:11 (21) 21:31	49 20:56 (30)	
5	08:27	07:54	15:50 (19) 06:54	16:43 (3) 06:38	18:47 (20) 05:28	19:58 (21) 04:40	19:56 (22)	
6	15:57	16:50	18 16:08 (19) 17:47	11 16:54 (3) 19:46	6 19:19 (18) 20:42	14 20:12 (21) 21:32	49 20:56 (30)	
7	08:27	07:52	15:51 (19) 06:52	16:46 (3) 06:35	19:15 (18) 05:26	19:57 (21) 04:40	19:56 (22)	
8	15:58	16:52	18 16:09 (19) 17:49	3 16:49 (3) 19:48	5 19:20 (18) 20:44	17 20:14 (21) 21:33	50 20:57 (30)	
9	08:27	07:50	15:52 (19) 06:49	06:33	19:04 (2) 05:24	19:57 (21) 04:39	19:56 (22)	
10	15:59	16:54	16 16:08 (19) 17:51	06:30	19:50	16 19:23 (18) 20:46	17 20:14 (21) 21:34	50 20:57 (30)
11	08:27	07:48	15:52 (19) 06:47	06:30	18:59 (2) 05:22	20:15 (21) 04:38	19:57 (22)	
12	16:00	16:56	16 16:08 (19) 17:53	19:52	25 19:24 (18) 20:48	17 20:14 (21) 21:35	50 20:58 (30)	
13	08:26	07:46	15:53 (19) 06:45	06:28	18:57 (2) 05:20	19:57 (21) 04:37	19:57 (22)	
14	16:02	16:58	13 16:06 (19) 17:55	19:54	29 19:26 (18) 20:50	17 20:14 (21) 21:36	50 20:58 (30)	
15	08:26	07:44	15:54 (19) 06:42	06:26	18:55 (2) 05:18	19:57 (21) 04:37	19:58 (22)	
16	16:03	17:00	10 16:04 (19) 17:57	19:55	33 19:28 (18) 20:51	16 20:13 (21) 21:37	50 20:59 (30)	
17	08:25	07:42	15:58 (19) 06:40	06:23	18:53 (2) 05:17	19:58 (21) 04:36	19:56 (22)	
18	16:05	17:03	3 16:01 (19) 17:59	19:57	34 19:27 (18) 20:53	15 20:13 (21) 21:38	50 20:59 (30)	
19	08:24	07:40	06:37	06:21	18:52 (2) 05:15	19:58 (21) 04:36	19:59 (22)	
20	16:06	17:05	18:00	19:59	35 19:27 (18) 20:55	14 20:12 (21) 21:39	51 21:00 (30)	
21	08:24	07:38	06:35	06:18	18:50 (2) 05:13	19:59 (21) 04:35	19:59 (22)	
22	16:08	17:07	18:02	20:01	35 19:25 (18) 20:57	16 20:15 (22) 21:40	51 21:01 (30)	
23	08:23	07:36	06:32	06:16	18:49 (2) 05:11	20:01 (21) 04:35	19:59 (22)	
24	16:09	17:09	18:04	20:03	35 19:24 (18) 20:59	16 20:17 (22) 21:41	50 21:00 (30)	
25	08:22	07:34	06:30	06:14	18:49 (2) 05:09	20:00 (21) 04:34	20:00 (22)	
26	16:11	17:11	18:06	20:05	33 19:22 (2) 21:00	19 20:19 (22) 21:41	51 21:01 (30)	
27	08:21	07:32	06:27	06:11	18:47 (2) 05:07	19:58 (21) 04:34	20:00 (22)	
28	16:13	17:13	18:08	20:07	35 19:22 (2) 21:02	21 20:19 (22) 21:42	50 21:01 (30)	
29	08:20	07:30	06:25	06:09	18:47 (2) 05:06	19:58 (21) 04:34	20:01 (22)	
30	16:14	17:15	18:10	20:09	35 19:22 (2) 21:04	23 20:21 (22) 21:43	50 21:02 (30)	
31	08:19	07:28	06:23	06:06	18:47 (2) 05:04	19:56 (21) 04:34	20:01 (22)	
32	16:16	17:17	18:12	20:10	35 19:22 (2) 21:05	25 20:21 (22) 21:43	50 21:02 (30)	
33	08:18	07:26	06:20	06:04	18:46 (2) 05:02	19:56 (21) 04:34	20:01 (22)	
34	16:18	17:19	18:14	20:12	35 19:21 (2) 21:07	26 20:22 (22) 21:44	50 21:02 (30)	
35	08:17	07:24	16:46 (3) 06:18	06:02	18:46 (2) 05:01	19:55 (21) 04:33	20:02 (22)	
36	16:19	17:21	6 16:52 (3) 18:16	20:14	35 19:21 (2) 21:09	28 20:23 (22) 21:44	51 21:03 (30)	
37	08:16	07:22	16:43 (3) 06:15	05:59	18:47 (2) 04:59	19:55 (21) 04:33	20:02 (22)	
38	16:21	17:23	11 16:54 (3) 18:18	20:16	34 19:21 (2) 21:10	29 20:26 (22) 21:45	51 21:03 (30)	
39	08:15	07:19	16:42 (3) 06:13	05:57	18:47 (2) 04:58	19:54 (21) 04:34	20:02 (22)	
40	16:23	17:25	14 16:56 (3) 18:20	20:18	33 19:20 (2) 21:12	32 20:28 (22) 21:45	51 21:03 (30)	
41	08:14	07:17	16:41 (3) 06:10	05:55	18:48 (2) 04:56	19:54 (21) 04:34	20:02 (22)	
42	16:25	17:27	18 16:59 (3) 18:22	20:20	32 19:20 (2) 21:14	35 20:40 (22) 21:45	51 21:03 (30)	
43	08:12	07:15	16:39 (3) 06:08	17:48 (20) 05:52	18:47 (2) 04:55	19:54 (21) 04:34	20:02 (22)	
44	16:27	17:29	20 16:59 (3) 18:23	8 17:56 (20) 20:22	31 19:18 (2) 21:15	38 20:42 (22) 21:45	51 21:03 (30)	
45	08:11	07:13	16:39 (3) 06:05	05:50	17:46 (20) 05:50	19:55 (21) 04:34	20:03 (22)	
46	16:29	17:31	21 17:00 (3) 18:25	13 17:59 (20) 20:24	30 19:18 (2) 21:17	39 20:44 (22) 21:45	51 21:04 (30)	
47	08:10	07:10	16:39 (3) 06:03	05:48	17:44 (20) 05:48	18:49 (2) 04:52	19:54 (21) 04:34	20:03 (22)
48	16:31	17:33	22 17:01 (3) 18:27	16 18:00 (20) 20:25	28 19:17 (2) 21:18	40 20:44 (22) 21:46	51 21:04 (30)	
49	08:08	15:55 (19) 07:08	16:38 (3) 06:00	05:46	17:43 (20) 05:46	18:50 (2) 04:50	19:54 (21) 04:35	20:03 (22)
50	16:32	4 15:59 (19) 17:35	22 17:00 (3) 18:29	18 18:01 (20) 20:27	25 19:15 (2) 21:20	43 20:46 (22) 21:46	51 21:04 (30)	
51	08:07	15:53 (19) 07:06	16:38 (3) 05:58	05:43	17:42 (20) 05:43	18:51 (2) 04:49	19:54 (21) 04:35	20:03 (22)
52	16:34	8 16:01 (19) 17:37	22 17:00 (3) 18:31	19 18:01 (20) 20:29	23 19:14 (2) 21:21	44 20:47 (22) 21:46	50 21:04 (30)	
53	08:05	15:51 (19) 07:03	16:38 (3) 05:55	05:41	17:42 (20) 05:41	18:53 (2) 04:48	19:54 (21) 04:36	20:03 (22)
54	16:36	12 16:03 (19) 17:39	21 16:59 (3) 18:33	20 18:02 (20) 20:31	19 19:12 (2) 21:23	45 20:48 (22) 21:45	50 21:04 (30)	
55	08:04	15:51 (19) 07:01	16:39 (3) 05:53	05:39	17:41 (20) 05:39	18:55 (2) 04:47	19:54 (21) 04:36	20:03 (22)
56	16:38	15 16:06 (19) 17:41	20 16:59 (3) 18:35	20 18:01 (20) 20:33	15 19:10 (2) 21:24	47 20:50 (22) 21:45	51 21:05 (30)	
57	08:02	15:50 (19)	06:50	05:37	18:41 (20) 05:37	18:59 (2) 04:45	19:55 (21) 04:37	20:03 (22)
58	16:40	16 16:06 (19)	19:37	20 19:01 (20) 20:35	10 20:05 (21) 21:26	46 20:50 (22) 21:45	51 21:04 (30)	
59	08:00	15:50 (19)	06:48	05:35	18:42 (20) 05:35	20:01 (21) 04:44	19:55 (21) 04:37	20:03 (22)
60	16:42	17 16:07 (19)	19:38	19 19:01 (20) 20:37	6 20:07 (21) 21:27	48 20:52 (22) 21:45	52 21:05 (30)	
61	07:59	15:49 (19)	06:45	05:33	18:42 (20)	04:43	19:55 (21)	
62	16:44	18 16:07 (19)	19:40	17 18:59 (20)	21:28	48 20:53 (30)		
63	Sonnenscheinstunden	248	272	367	421	496	512	
64	astr.max.mögl.Beschattung	90		329	217	774	858	1512
65	Red.Sonnenscheinwahrsch.	0.17		0.24	0.31	0.41	0.51	0.45
66	Reduktion Betriebsdauer	0.91		0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.70		0.70	0.68	0.66	0.63	0.63
68	Gesamte Reduktion	0.11		0.15	0.19	0.25	0.29	0.26
69	Met.wahrsch.Beschattung	10		50	42	191	251	388

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 34

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: O - IO15

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember		
1	04:38	20:04 (22) 05:19	20:11 (21) 06:14	18:50 (2) 07:08	17:07	18:03		
2	21:45	50 21:05 (30) 21:09	16 20:27 (22) 20:01	35 19:25 (18) 18:46	16:35	15:50		
3	04:39	20:03 (22) 05:20	20:09 (21) 06:16	18:50 (2) 07:10	107:09	15:27 (19) 08:05		
4	21:44	51 21:04 (30) 21:07	15 20:24 (22) 19:59	35 19:25 (18) 18:44	16:33	4 15:31 (19) 15:49		
5	04:40	20:03 (22) 05:22	20:08 (21) 06:17	18:51 (2) 07:12	107:11	15:24 (19) 08:06		
6	21:44	50 21:04 (30) 21:05	15 20:23 (21) 19:56	34 19:25 (18) 18:41	16:31	10 15:34 (19) 15:48		
7	04:40	20:03 (22) 05:24	20:07 (21) 06:19	18:52 (2) 07:14	107:13	15:22 (19) 08:08		
8	21:43	51 21:05 (30) 21:03	16 20:23 (21) 19:54	33 19:25 (18) 18:39	16:29	14 15:36 (19) 15:47		
9	04:41	20:03 (22) 05:25	20:07 (21) 06:21	18:53 (2) 07:15	107:15	15:22 (19) 08:09		
10	21:43	52 21:05 (30) 21:01	16 20:23 (21) 19:51	29 19:22 (18) 18:37	16:27	15 15:37 (19) 15:47		
11	04:42	20:04 (22) 05:27	20:07 (21) 06:23	18:55 (2) 07:17	107:17	15:21 (19) 08:10		
12	21:42	50 21:05 (30) 20:59	17 20:24 (21) 19:49	25 19:20 (18) 18:34	16:25	17 15:38 (19) 15:46		
13	04:43	20:04 (22) 05:29	20:06 (21) 06:25	18:59 (2) 07:19	107:19	15:21 (19) 08:12		
14	21:41	50 21:05 (30) 20:57	17 20:23 (21) 19:46	17 19:18 (18) 18:32	16:23	17 15:38 (19) 15:46		
15	04:44	20:04 (22) 05:31	20:06 (21) 06:26	19:10 (18) 07:21	107:21	15:20 (19) 08:13		
16	21:41	49 21:04 (30) 20:55	18 20:24 (21) 19:44	6 19:16 (18) 18:29	16:21	18 15:38 (19) 15:45		
17	04:45	20:04 (22) 05:33	20:07 (21) 06:28	18:41 (20) 07:23	107:23	15:20 (19) 08:14		
18	21:40	48 21:04 (30) 20:53	16 20:23 (21) 19:41	6 19:13 (18) 18:27	16:20	19 15:39 (19) 15:45		
19	04:46	20:04 (22) 05:34	20:06 (21) 06:30	18:37 (20) 07:25	17:19 (3) 07:25	15:20 (19) 08:16		
20	21:39	48 21:03 (30) 20:51	14 20:20 (21) 19:39	12 18:49 (20) 18:24	8 17:27 (3) 16:18	18 15:38 (19) 15:45		
21	04:48	20:03 (22) 05:36	20:07 (21) 06:32	18:35 (20) 07:27	17:16 (3) 07:27	15:21 (19) 08:17		
22	21:38	50 21:03 (30) 20:49	11 20:18 (21) 19:36	15 18:50 (20) 18:22	13 17:29 (3) 16:16	18 15:39 (19) 15:44		
23	04:49	20:03 (22) 05:38	20:08 (21) 06:34	18:34 (20) 07:28	17:14 (3) 07:29	15:22 (19) 08:18		
24	21:37	49 21:02 (30) 20:47	9 20:17 (21) 19:34	17 18:51 (20) 18:20	17 17:31 (3) 16:14	17 15:38 (19) 15:44		
25	04:50	20:04 (22) 05:40	20:08 (21) 06:35	18:32 (20) 07:30	17:13 (3) 07:31	15:22 (19) 08:19		
26	21:36	49 21:01 (30) 20:45	6 20:14 (21) 19:31	19 18:51 (20) 18:17	18 17:31 (3) 16:13	16 15:38 (19) 15:44		
27	04:51	20:03 (22) 05:41	19:06 (2) 06:37	18:32 (20) 07:32	17:12 (3) 07:33	15:23 (19) 08:20		
28	21:35	48 21:00 (30) 20:43	10 20:12 (21) 19:29	19 18:51 (20) 18:15	20 17:32 (3) 16:11	14 15:37 (19) 15:44		
29	04:53	20:03 (22) 05:43	19:02 (2) 06:39	18:31 (20) 07:34	17:11 (3) 07:35	15:24 (19) 08:21	14:33 (23)	
30	21:34	46 20:58 (25) 20:40	16 19:18 (2) 19:26	20 18:51 (20) 18:12	21 17:32 (3) 16:09	11 15:35 (19) 15:44	2 14:35 (23)	
31	04:54	20:04 (22) 05:45	18:59 (2) 06:41	18:31 (20) 07:36	17:10 (3) 07:37	15:26 (19) 08:22	4 14:33 (23)	
32	21:33	46 20:59 (25) 20:38	20 19:19 (2) 19:24	20 18:51 (20) 18:10	22 17:32 (3) 16:08	8 15:34 (19) 15:44	4 14:37 (23)	
33	04:55	20:04 (22) 05:47	18:58 (2) 06:43	18:30 (20) 07:38	17:10 (3) 07:38	15:28 (19) 08:23	14:33 (23)	
34	21:32	44 20:57 (25) 20:36	23 19:21 (2) 19:21	20 18:50 (20) 18:08	22 17:32 (3) 16:06	4 15:32 (19) 15:44	5 14:38 (23)	
35	04:57	20:03 (22) 05:49	18:56 (2) 06:44	18:31 (20) 07:40	17:10 (3) 07:40	15:23 (19) 08:23	14:33 (23)	
36	21:30	44 20:56 (25) 20:34	26 19:22 (2) 19:19	18 18:49 (20) 18:05	22 17:32 (3) 16:05	15:44	6 14:39 (23)	
37	04:58	20:03 (22) 05:50	18:54 (2) 06:46	18:31 (20) 07:42	17:10 (3) 07:42	15:24 (19) 08:24	14:34 (23)	
38	21:29	42 20:54 (25) 20:32	28 19:22 (2) 19:16	17 18:48 (20) 18:03	21 17:31 (3) 16:03	15:45	6 14:40 (23)	
39	04:59	20:04 (22) 05:52	18:53 (2) 06:48	18:32 (20) 07:44	17:11 (3) 07:44	15:25 (19) 08:25	7 14:42 (23)	
40	21:28	41 20:54 (25) 20:29	29 19:23 (2) 19:14	14 18:46 (20) 18:01	19 17:30 (3) 16:02	15:45	7 14:40 (23)	
41	05:01	20:04 (22) 05:54	18:53 (2) 06:50	18:33 (20) 07:46	17:11 (3) 07:46	15:25 (19) 08:25	14:34 (23)	
42	21:26	38 20:52 (25) 20:27	31 19:24 (2) 19:11	9 18:42 (20) 17:59	17 17:28 (3) 16:01	15:45	7 14:41 (23)	
43	05:02	20:05 (22) 05:56	18:51 (2) 06:52	17:56	17:12 (3) 07:48	15:26 (19) 08:26	14:34 (23)	
44	21:25	37 20:52 (25) 20:25	33 19:24 (2) 19:09	17:56	14 17:26 (3) 15:59	15:46	7 14:41 (23)	
45	05:04	20:05 (22) 05:58	18:51 (2) 06:53	17:50	17:14 (3) 07:49	15:27 (19) 08:27	14:35 (23)	
46	21:23	33 20:50 (25) 20:22	33 19:24 (2) 19:06	17:54	10 17:24 (3) 15:58	15:46	7 14:42 (23)	
47	05:06	20:05 (22) 05:59	18:50 (2) 06:55	17:51	17:17 (3) 07:51	15:27 (19) 08:27	14:36 (23)	
48	21:22	30 20:48 (25) 20:20	35 19:25 (2) 19:04	17:52	4 17:21 (3) 15:57	15:47	6 14:42 (23)	
49	05:07	20:06 (22) 06:01	18:50 (2) 06:57	17:53	17:17 (3) 07:53	15:28 (19) 08:27	14:36 (23)	
50	21:20	28 20:34 (22) 20:18	35 19:25 (2) 19:01	17:50	15:56	15:48	6 14:42 (23)	
51	05:09	20:06 (22) 06:03	18:49 (2) 06:59	17:55	17:15 (3) 07:55	15:28 (19) 08:28	14:37 (23)	
52	21:19	27 20:33 (22) 20:15	35 19:24 (2) 18:59	17:48	15:54	15:48	5 14:42 (23)	
53	05:10	20:07 (22) 06:05	18:49 (2) 07:01	17:57	17:16 (3) 07:56	15:46	7 14:37 (23)	
54	21:17	26 20:33 (22) 20:13	35 19:24 (2) 18:56	17:45	15:53	15:49	5 14:42 (23)	
55	05:12	20:07 (22) 06:07	18:48 (2) 07:03	17:59	17:18 (3) 07:58	15:48	6 14:40 (23)	
56	21:16	24 20:31 (22) 20:11	35 19:24 (2) 18:54	17:43	15:52	15:50	3 14:43 (23)	
57	05:14	20:08 (22) 06:08	18:48 (2) 07:04	17:51	17:19 (3) 07:59	15:48	6 14:42 (23)	
58	21:14	23 20:31 (22) 20:08	34 19:22 (2) 18:51	17:41	15:51	15:51	14:37 (23)	
59	05:15	20:09 (22) 06:10	18:49 (2) 07:06	17:53	17:20 (3) 08:01	15:48	6 14:42 (23)	
60	21:12	20:29 (22) 20:06	33 19:22 (2) 18:49	17:39	15:51	15:52	14:37 (23)	
61	05:17	20:11 (22) 06:12	18:49 (2) 07:05	17:55	17:21 (3) 08:02	15:48	6 14:42 (23)	
62	21:10	17 20:28 (22) 20:03	35 19:24 (18) 18:49	17:37	15:53	15:53	14:37 (23)	
63	Sonnenscheinstunden	514	461	383	328	257	231	
64	astr.max.mögl.Beschattung	1261	712	420	248	220	76	
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14	
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
67	Reduktion Windrichtung	0.63	0.65	0.67	0.69	0.70	0.67	
68	Gesamte Reduktion	0.25	0.29	0.25	0.21	0.13	0.08	
69	Met.wahrsch.Beschattung	319	206	103	52	29	6	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 35
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersieglug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: P - IO16

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	14:07 (1) 07:57	15:59 (19) 06:59	16:46 (3) 06:43	18:49 (20) 05:33	19:02 (2) 04:42	20:06 (22)
2	15:54	21 14:54 (23) 16:46	15 16:14 (19) 17:43	22 17:08 (3) 19:42	20 19:09 (20) 20:39	23 19:25 (2) 21:29	43 20:54 (25)
3	08:28	14:09 (1) 07:54	15:58 (19) 06:54	16:46 (3) 06:38	18:49 (20) 05:28	19:05 (2) 04:40	20:07 (22)
4	08:27	14:12 (1) 07:52	15:59 (19) 06:52	16:46 (3) 06:35	18:49 (20) 05:26	19:08 (2) 04:40	20:06 (22)
5	08:27	14:49 (23) 16:50	15:59 (19) 06:49	16:48 (3) 06:33	18:51 (20) 05:24	20:04 (21) 04:39	20:06 (22)
6	08:27	14:53 (23) 16:54	15:59 (19) 06:47	16:49 (3) 06:30	18:52 (20) 05:22	20:03 (21) 04:38	20:06 (22)
7	08:26	16:56	16:17 (19) 17:53	12 17:01 (3) 19:52	11 19:24 (18) 20:48	14 20:17 (21) 21:35	48 21:00 (30)
8	08:26	16:58	15:58 (19) 06:45	7 16:52 (3) 06:28	5 19:21 (18) 20:50	15 20:03 (21) 04:37	20:07 (22)
9	08:25	17:00	16:16 (19) 17:55	16:58 (3) 06:26	19:19 (18) 20:50	17 20:18 (21) 21:36	48 21:00 (30)
10	08:24	17:02	15:58 (19) 06:42	16:58 (3) 06:26	19:19 (18) 20:51	17 20:18 (21) 21:37	49 21:02 (30)
11	08:24	17:03	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
12	08:23	17:06	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
13	08:22	17:07	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
14	08:21	17:08	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
15	08:20	17:09	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
16	08:19	17:10	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
17	08:18	17:11	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
18	08:17	17:12	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
19	08:16	17:13	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
20	08:15	17:14	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
21	08:14	17:15	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
22	08:12	17:16	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
23	08:11	17:17	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
24	08:10	17:18	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
25	08:08	17:19	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
26	08:07	17:20	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
27	08:05	17:21	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
28	08:04	17:22	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
29	08:02	17:23	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
30	08:00	17:24	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
31	07:59	17:25	16:16 (19) 17:59	16:57 (3) 06:25	19:18 (18) 20:50	17 20:17 (21) 21:36	49 21:02 (30)
	16:44	12 16:12 (19)	19:40	20 19:09 (20)	21:28	43 20:53 (25)	512
Sonnenscheinstunden	248	272	367	421	496	512	
astr.max.mögl.Beschattung	95		214	752	704	1459	
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.68	0.70	0.68	0.65	0.63	0.62	
Gesamte Reduktion	0.11	0.15	0.20	0.24	0.29	0.26	
Met.wahrsch.Beschattung	10	47	42	184	206	374	

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 36

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: P - IO16

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1 04:38	20:13 (22) 05:19	20:14 (21) 06:14	19:09 (2) 07:08	17:26 (3) 07:19	15:30 (19) 08:03	
2 21:45	49 21:09 (30) 21:09	20:30 (21) 20:01	24 19:33 (18) 18:46	16:35 15 15:45 (19) 15:50		
3 04:39	20:12 (22) 05:20	20:13 (21) 06:16	19:12 (2) 07:10	16:27 16:27	15:29 (19) 08:05	
4 21:44	50 21:08 (30) 21:07	20:30 (21) 19:59	18 19:30 (18) 18:44	16:33 16 15:45 (19) 15:49		
5 04:40	20:12 (22) 05:22	20:13 (21) 06:17	19:16 (18) 07:12	17:11 17:11	15:28 (19) 08:06	
6 21:44	49 21:07 (30) 21:05	20:30 (21) 19:56	12 19:28 (18) 18:41	16:31 18 15:46 (19) 15:48		
7 04:40	20:13 (22) 05:24	20:12 (21) 06:19	19:16 (18) 07:14	17:13 17:13	15:28 (19) 08:08	
8 21:43	49 21:07 (30) 21:03	20:30 (21) 19:54	9 19:25 (18) 18:39	16:29 18 15:46 (19) 15:47		
9 04:41	20:13 (22) 05:25	20:13 (21) 06:21	19:17 (18) 07:15	17:15 15:28 (19) 08:09		
10 21:43	49 21:07 (30) 21:01	20:30 (21) 19:51	5 19:22 (18) 18:37	16:27 19 15:47 (19) 15:47		
11 04:42	20:13 (22) 05:27	20:13 (21) 06:23	18:48 (20) 07:17	17:17 17:17	15:28 (19) 08:10	
12 21:42	48 21:06 (30) 20:59	15 20:28 (21) 19:49	11 19:20 (18) 18:34	16:25 19 15:47 (19) 15:46		
13 04:43	20:14 (22) 05:29	20:13 (21) 06:25	18:46 (20) 07:19	17:26 (3) 07:19	15:28 (19) 08:12	14:36 (23)
14 21:41	47 21:06 (30) 20:57	13 20:26 (21) 19:46	14 19:00 (20) 18:32	10 17:36 (3) 16:23	18 15:46 (19) 15:46	4 14:40 (23)
15 04:44	20:14 (22) 05:31	19:21 (2) 06:26	18:44 (20) 07:21	17:24 (3) 07:21	15:29 (19) 08:13	14:00 (1)
16 21:41	47 21:05 (30) 20:55	13 20:24 (21) 19:44	17 19:01 (20) 18:29	14 17:38 (3) 16:21	17 15:46 (19) 15:45	8 14:41 (23)
17 04:45	20:14 (22) 05:33	19:16 (2) 06:28	18:42 (20) 07:23	17:22 (3) 07:23	15:29 (19) 08:14	13:58 (1)
18 21:40	47 21:05 (30) 20:53	21 20:23 (21) 19:41	19 19:01 (20) 18:27	17:19 (3) 16:20	16 15:45 (19) 15:45	16 14:43 (23)
19 04:46	20:14 (22) 05:34	19:13 (2) 06:30	18:42 (20) 07:25	17:21 (3) 07:25	15:30 (19) 08:16	13:57 (1)
20 21:39	45 21:03 (25) 20:51	23 20:20 (21) 19:39	19 19:01 (20) 18:24	19 17:40 (3) 16:18	14 15:44 (19) 15:45	20 14:44 (23)
21 04:48	20:14 (22) 05:36	19:11 (2) 06:32	18:41 (20) 07:27	17:20 (3) 07:27	15:32 (19) 08:17	13:57 (1)
22 21:38	45 21:03 (25) 20:49	22 20:18 (21) 19:36	20 19:01 (20) 18:22	21 17:41 (3) 16:16	11 15:43 (19) 15:44	21 14:44 (23)
23 04:49	20:14 (22) 05:38	19:10 (2) 06:34	18:41 (20) 07:28	17:19 (3) 07:29	15:34 (19) 08:18	13:56 (1)
24 21:37	44 21:02 (25) 20:47	24 19:34 (2) 19:34	20 19:01 (20) 18:20	22 17:41 (3) 16:14	7 15:41 (19) 15:44	24 14:45 (23)
25 04:50	20:14 (22) 05:40	19:08 (2) 06:35	18:40 (20) 07:30	17:19 (3) 07:31	15:38 (19) 08:19	13:56 (1)
26 21:36	43 21:01 (25) 20:45	26 19:34 (2) 19:31	20 19:00 (20) 18:17	22 17:41 (3) 16:13	1 15:39 (19) 15:44	26 14:46 (23)
27 04:51	20:14 (22) 05:41	19:07 (2) 06:37	18:41 (20) 07:32	17:19 (3) 07:33	15:40 (19) 08:20	13:56 (1)
28 21:35	42 21:00 (25) 20:43	28 19:35 (2) 19:29	18 18:59 (20) 18:15	21 17:40 (3) 16:11	15:44 27 14:46 (23)	
29 04:53	20:15 (22) 05:43	19:06 (2) 06:39	18:41 (20) 07:34	17:19 (3) 07:35	15:44 27 14:46 (23)	
30 21:34	39 20:59 (25) 20:40	30 19:36 (2) 19:26	17 18:58 (20) 18:12	21 17:40 (3) 16:09	15:44 29 14:47 (23)	
31 04:54	20:16 (22) 05:45	19:05 (2) 06:41	18:42 (20) 07:36	17:19 (3) 07:37	15:44 29 14:47 (23)	
1 21:33	38 20:59 (25) 20:38	31 19:35 (2) 19:24	14 18:56 (20) 18:10	20 17:39 (3) 16:08	15:44 29 14:48 (23)	
2 04:55	20:16 (22) 05:47	19:04 (2) 06:43	18:43 (20) 07:38	17:19 (3) 07:38	15:44 29 14:48 (23)	
3 21:32	36 20:57 (25) 20:36	33 19:37 (2) 19:21	10 18:53 (20) 18:08	19 17:38 (3) 16:06	15:44 30 14:49 (23)	
4 04:57	20:16 (22) 05:49	19:04 (2) 06:44	18:46 (20) 07:40	17:20 (3) 07:40	15:44 30 14:49 (23)	
5 21:30	34 20:56 (25) 20:34	33 19:37 (2) 19:19	4 18:50 (20) 18:05	16 17:36 (3) 16:05	15:44 30 14:49 (23)	
6 04:58	20:16 (22) 05:50	19:03 (2) 06:46	17:22 (3) 07:42	17:22 (3) 07:42	15:44 30 14:49 (23)	
7 21:29	31 20:54 (25) 20:32	33 19:36 (2) 19:16	11 18:03 16:03	11 17:33 (3) 16:03	15:45 31 14:50 (23)	
8 04:59	20:14 (22) 05:52	19:03 (2) 06:48	18:44 17:24 (3) 07:44	17:24 (3) 07:44	15:45 31 14:50 (23)	
9 21:28	29 20:54 (25) 20:29	34 19:37 (2) 19:14	18:01 17:31 (3) 16:02	15:45 31 14:50 (23)		
10 05:01	20:17 (22) 05:54	19:03 (2) 06:50	17:46 17:46	15:45 31 14:50 (23)		
11 21:26	26 20:52 (25) 20:27	34 19:37 (2) 19:11	17:59 16:01	16:01 15:45 31 14:51 (23)		
12 05:02	20:19 (22) 05:56	19:02 (2) 06:52	17:48 17:48	15:45 31 14:51 (23)		
13 21:25	23 20:42 (22) 20:25	34 19:36 (2) 19:09	17:56 17:56	15:46 31 14:51 (23)		
14 05:04	20:19 (22) 05:58	19:02 (2) 06:53	17:50 17:50	15:46 31 14:51 (23)		
15 21:23	22 20:41 (22) 20:22	34 19:36 (2) 19:06	17:54 17:54	15:46 31 14:52 (23)		
16 05:06	20:20 (22) 05:59	19:02 (2) 06:55	17:51 17:51	15:46 31 14:52 (23)		
17 21:22	20 20:40 (22) 20:20	33 19:36 (2) 19:04	17:52 17:52	15:47 31 14:52 (23)		
18 05:07	20:21 (22) 06:01	19:03 (2) 06:57	17:53 17:53	15:47 31 14:52 (23)		
19 21:20	18 20:39 (22) 20:18	32 19:35 (2) 19:01	16:50 16:50	15:48 30 14:52 (23)		
20 05:09	20:22 (22) 06:03	19:02 (2) 06:59	17:55 17:55	15:48 30 14:52 (23)		
21 21:19	15 20:37 (22) 20:15	32 19:34 (2) 18:59	16:48 16:48	15:54 15:48	30 14:53 (23)	
22 05:10	20:25 (22) 06:05	19:03 (2) 07:01	17:54 17:54	15:48 30 14:53 (23)		
23 21:17	11 20:36 (22) 20:13	30 19:33 (2) 18:56	16:45 16:45	15:53 15:49	30 14:53 (23)	
24 05:12	20:17 (21) 06:07	19:04 (2) 07:03	16:59 16:59	15:53 15:49	30 14:53 (23)	
25 21:16	9 20:30 (22) 20:11	28 19:32 (2) 18:54	16:43 16:43	15:52 15:50	28 14:54 (23)	
26 05:14	20:16 (21) 06:08	19:04 (2) 07:04	17:01 17:01	15:52 15:48	28 14:54 (23)	
27 21:14	11 20:27 (21) 20:08	27 19:31 (18) 18:51	16:41 16:41	15:51 15:51	27 14:53 (23)	
28 05:15	20:15 (21) 06:10	19:05 (2) 07:06	17:03 17:03	15:51 15:51	27 14:53 (23)	
29 21:12	13 20:28 (21) 20:06	27 19:32 (18) 18:49	16:39 16:39	9 15:42 (19) 15:51	15:52 27 14:54 (23)	
30 05:17	20:14 (21) 06:12	19:07 (2) 19:07	17:05 17:05	15:31 (19) 15:31	15:52 27 14:54 (23)	
31 21:10	15 20:29 (21) 20:03	26 19:33 (18) 18:48	16:37 16:37	13 15:44 (19) 15:44	15:53 25 14:54 (23)	
Sonnenscheinstunden 514	461	383	328	257	231	647
astr.max.mögl.Beschattung 1044	801	271	262	189	231	647
Red.Sonnenscheinwahrsch. 0.44	0.48	0.40	0.33	0.21	0.14	0.14
Reduktion Betriebsdauer 0.91	0.91	0.91	0.91	0.91	0.91	0.91
Reduktion Windrichtung 0.63	0.65	0.67	0.69	0.70	0.67	0.67
Gesamte Reduktion 0.25	0.29	0.25	0.21	0.13	0.08	0.08
Met.wahrsch.Beschattung 264	230	67	54	25	55	55

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 37
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersieglug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: Q - IO17

Voraussetzungen für Berechnung des Schattenwurfs
Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	14:06 (1) 07:57	06:59	16:54 (3) 06:43	19:02 (20) 05:33	19:11 (2) 04:42	20:27 (22)	
2	15:54 36	15:01 (23) 16:46	17:43	17:15 (3) 19:42	19:16 (20) 20:39	19:45 (2) 21:29	25 20:54 (25)	
3	08:28	14:07 (1) 07:55	16:11 (19) 06:56	16:53 (3) 06:40	19:00 (20) 05:31	19:11 (2) 04:41	20:27 (22)	
4	15:55 34	15:01 (23) 16:48	16:15 (19) 17:45	17:14 (3) 19:44	19:17 (20) 20:40	19:45 (2) 21:31	28 20:56 (25)	
5	08:28	14:07 (1) 07:54	16:08 (19) 06:54	16:53 (3) 06:38	18:59 (20) 05:28	19:11 (2) 04:40	20:26 (22)	
6	15:57 33	15:01 (23) 16:50	16:18 (19) 17:47	17:15 (3) 19:46	19:18 (20) 20:42	19:44 (2) 21:32	30 20:57 (25)	
7	08:27	14:08 (1) 07:52	16:08 (19) 06:52	16:52 (3) 06:35	18:58 (20) 05:26	19:11 (2) 04:40	20:26 (22)	
8	15:58 32	15:02 (23) 16:52	16:21 (19) 17:49	17:14 (3) 19:48	19:17 (20) 20:44	19:44 (2) 21:33	32 20:58 (25)	
9	08:27	14:09 (1) 07:50	16:07 (19) 06:49	16:52 (3) 06:33	18:58 (20) 05:24	19:11 (2) 04:39	20:25 (22)	
10	15:59 30	15:01 (23) 16:54	16:22 (19) 17:51	17:15 (3) 19:50	19:18 (20) 20:46	19:43 (2) 21:34	33 20:58 (25)	
11	08:27	14:10 (1) 07:48	16:06 (19) 06:47	16:52 (3) 06:30	18:57 (20) 05:22	19:12 (2) 04:38	20:26 (22)	
12	16:00 27	15:01 (23) 16:56	17:16 (23) 17:53	22 17:14 (3) 19:52	20 19:17 (20) 20:48	30 19:42 (2) 21:35	34 21:00 (25)	
13	08:26	14:12 (1) 07:46	16:05 (19) 06:45	16:53 (3) 06:28	18:57 (20) 05:20	19:12 (2) 04:37	20:25 (22)	
14	16:02 24	15:01 (23) 16:58	18 16:23 (19) 17:55	20 17:13 (3) 19:54	20 19:17 (20) 20:50	31 20:18 (21) 21:36	35 21:00 (25)	
15	08:26	14:13 (1) 07:44	16:05 (19) 06:42	16:53 (3) 06:26	18:58 (20) 05:18	19:13 (2) 04:37	20:25 (22)	
16	16:03 21	15:01 (23) 17:00	19 16:24 (19) 17:57	19 17:12 (3) 19:55	18 19:16 (20) 20:51	33 20:20 (21) 21:37	37 21:02 (25)	
17	08:25	14:15 (1) 07:42	16:05 (19) 06:40	16:54 (3) 06:23	19:18 (20) 05:17	19:14 (2) 04:36	20:25 (22)	
18	16:05 15	15:00 (23) 17:03	19 16:24 (19) 17:59	17 17:11 (3) 19:57	17 19:15 (20) 20:53	34 20:22 (21) 21:38	37 21:02 (25)	
19	08:24	14:55 (23) 07:40	16:05 (19) 06:37	16:55 (3) 06:21	18:59 (20) 05:15	19:15 (2) 04:36	20:25 (22)	
20	16:06 3	14:58 (23) 17:05	19 16:24 (19) 18:00	13 17:08 (3) 19:59	16 19:32 (18) 20:55	35 20:24 (21) 21:39	38 21:03 (25)	
21	08:24	07:38	16:05 (19) 06:35	16:59 (3) 06:18	19:00 (20) 05:13	19:16 (2) 04:35	20:26 (22)	
22	16:08	17:07	19 16:24 (19) 18:02	6 17:05 (3) 20:01	16 19:33 (18) 20:57	34 20:25 (21) 21:40	38 21:04 (25)	
23	08:23	07:36	16:06 (19) 06:32	06:16	19:04 (20) 05:11	19:18 (2) 04:35	20:25 (22)	
24	16:09 18	17:09	18 16:24 (19) 18:04	16:14	12 19:35 (18) 20:59	30 20:27 (21) 21:41	39 21:04 (25)	
25	08:22	07:34	16:07 (19) 06:30	06:14	11 19:26 (18) 05:09	33 20:28 (21) 21:43	40 21:05 (25)	
26	16:11	17:11	17 16:23 (19) 18:06	20:05	11 19:37 (18) 21:00	30 20:28 (21) 21:41	40 21:05 (25)	
27	08:21	07:32	16:07 (19) 06:27	06:11	19:24 (18) 05:07	19:22 (2) 04:34	20:26 (22)	
28	16:13	17:13	14 16:21 (19) 18:08	20:07	14 19:38 (18) 21:02	26 20:28 (21) 21:42	39 21:05 (25)	
29	08:20	07:30	16:09 (19) 06:25	06:09	19:24 (18) 05:06	20:12 (2) 04:34	20:26 (22)	
30	16:14	17:15	11 16:20 (19) 18:10	20:09	16 19:40 (18) 21:04	17 20:29 (21) 21:43	39 21:05 (25)	
31	08:19	07:28	16:12 (19) 06:23	06:06	19:24 (18) 05:04	20:12 (2) 04:34	20:26 (22)	
32	16:16	17:17	5 16:17 (19) 18:12	20:10	17 19:41 (18) 21:05	16 20:28 (21) 21:43	40 21:06 (25)	
33	08:18	07:26	06:20	06:04	19:25 (18) 05:02	20:13 (2) 04:34	20:26 (22)	
34	16:18	17:19	18:14	20:12	15 19:40 (18) 21:07	15 20:28 (21) 21:44	40 21:06 (25)	
35	08:17	07:24	06:18	06:02	19:22 (2) 05:01	20:12 (2) 04:33	20:26 (22)	
36	16:19	17:21	18:16	20:14	17 19:39 (18) 21:09	15 20:27 (21) 21:44	40 21:06 (25)	
37	08:16	07:22	06:15	05:59	19:20 (2) 04:59	20:14 (2) 04:33	20:26 (22)	
38	16:21	17:23	18:18	20:16	19 19:39 (2) 21:10	13 20:27 (21) 21:44	40 21:06 (25)	
39	08:15	07:19	06:13	05:57	19:18 (2) 04:58	20:14 (2) 04:34	20:27 (22)	
40	16:23	17:25	18:20	20:18	23 19:41 (2) 21:12	12 20:26 (21) 21:45	39 21:06 (25)	
41	08:14	07:17	06:10	05:55	19:17 (2) 04:56	20:15 (2) 04:34	20:27 (22)	
42	16:25	17:27	18:22	20:20	25 19:42 (2) 21:14	10 20:25 (21) 21:45	39 21:06 (25)	
43	08:12	07:15	06:08	05:52	19:14 (2) 04:55	20:17 (2) 04:34	20:27 (22)	
44	16:27	17:29	18:23	20:22	29 19:43 (2) 21:15	7 20:24 (21) 21:45	39 21:06 (25)	
45	08:11	07:13	06:05	05:50	19:14 (2) 04:53	20:20 (21) 04:34	20:28 (22)	
46	16:29	17:31	18:25	20:24	29 19:43 (2) 21:17	2 20:22 (21) 21:45	39 21:07 (25)	
47	08:10	07:10	06:03	05:48	19:13 (2) 04:52	04:34	20:27 (22)	
48	16:31	17:33	18:27	20:25	31 19:44 (2) 21:18	21:46	40 21:07 (25)	
49	08:08	07:08	17:02 (3) 06:00	05:46	19:12 (2) 04:50	04:35	20:27 (22)	
50	16:32	17:35	5 17:07 (3) 18:29	20:27	33 19:45 (2) 21:20	21:46	40 21:07 (25)	
51	08:07	07:06	16:59 (3) 05:58	05:43	19:12 (2) 04:49	04:35	20:28 (22)	
52	16:34	17:37	10 17:09 (3) 18:31	20:29	33 19:45 (2) 21:21	21:46	40 21:08 (25)	
53	08:05	07:03	16:56 (3) 05:55	05:41	19:11 (2) 04:48	20:33 (22) 04:36	20:29 (22)	
54	16:36	17:39	15 17:11 (3) 18:33	20:31	34 19:45 (2) 21:23	6 20:39 (22) 21:45	40 21:08 (25)	
55	08:04	07:01	16:55 (3) 05:53	05:39	19:11 (2) 04:47	20:31 (22) 04:36	20:29 (22)	
56	16:38	17:41	18 17:13 (3) 18:35	20:33	34 19:45 (2) 21:24	10 20:41 (22) 21:45	39 21:08 (25)	
57	08:02		06:50	05:37	19:11 (2) 04:45	20:29 (22) 04:37	20:28 (22)	
58	16:40		19:37	20:35	34 19:45 (2) 21:26	15 20:51 (25) 21:45	40 21:08 (25)	
59	08:00		06:48	05:35	19:11 (2) 04:44	20:28 (22) 04:37	20:29 (22)	
60	16:42		19:38	20:37	34 19:45 (2) 21:27	19 20:52 (25) 21:45	39 21:08 (25)	
61	07:59		06:45	05:33	19:03 (20)	04:43	20:27 (22)	
62	16:44		19:40	20:37	10 19:13 (20)	21:28	22 20:53 (25)	512
Sonnenscheinstunden	248	272	367	421	496			
astr.max.mögl.Beschattung	255	265	220	656	631	1118		
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45		
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91		
Reduktion Windrichtung	0.67	0.70	0.68	0.65	0.63	0.62		
Gesamte Reduktion	0.11	0.15	0.20	0.24	0.29	0.26		
Met.wahrsch.Beschattung	27	40	43	159	185	285		

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 38
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: Q - IO17

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember							
1	04:38	20:30 (22)	05:19	19:28 (2)	06:14	19:00 (20)	07:08	17:07	15:35 (19)	08:03								
2	21:44	39	21:09 (25)	21:09	33	20:37 (21)	20:01	16	19:33 (18)	18:46	16:35	19	15:54 (19)	15:50				
3	04:40	38	21:07 (25)	21:07	35	20:35 (21)	19:59	16	19:30 (18)	18:44	16:33	19	15:53 (19)	15:49	3	14:41 (23)		
4	21:44	37	21:07 (25)	21:05	35	20:33 (21)	19:56	17	19:13 (20)	18:41	10	17:45 (3)	16:31	19	15:53 (19)	15:48	15	14:44 (23)
5	04:41	36	21:07 (25)	21:03	34	20:31 (21)	19:54	18	19:13 (20)	18:39	15	17:47 (3)	16:29	18	15:53 (19)	15:47	20	14:45 (23)
6	21:43	36	21:07 (25)	21:01	33	20:30 (21)	19:51	20	19:13 (20)	18:37	18	17:48 (3)	16:27	17	15:53 (19)	15:47	23	14:46 (23)
7	04:42	34	21:06 (25)	20:59	31	20:28 (21)	19:49	20	19:13 (20)	18:34	20	17:49 (3)	16:25	15	15:52 (19)	15:46	27	14:47 (23)
8	21:41	34	21:06 (25)	20:57	31	19:52 (2)	19:46	20	19:13 (20)	18:32	21	17:49 (3)	16:23	13	15:51 (19)	15:46	30	14:48 (23)
9	04:44	32	21:05 (25)	20:55	32	19:53 (2)	19:44	20	19:13 (20)	18:32	22	17:28 (3)	16:21	10	15:49 (19)	15:45	31	14:49 (23)
10	21:41	31	21:05 (25)	20:53	33	19:53 (2)	19:41	19	19:11 (20)	18:27	23	17:27 (3)	16:20	2	15:45 (19)	15:45	33	14:50 (23)
11	04:46	29	21:04 (25)	20:51	34	19:53 (2)	19:39	17	19:10 (20)	18:24	22	17:49 (3)	16:18		15:45	33	14:50 (23)	
12	21:39	26	21:03 (25)	20:49	34	19:53 (2)	19:36	14	19:08 (20)	18:22	22	17:49 (3)	16:16		15:44	35	14:51 (23)	
13	04:49	23	21:02 (25)	20:47	35	19:54 (2)	19:34	11	19:06 (20)	18:20	21	17:48 (3)	16:14		15:44	35	14:52 (23)	
14	21:37	21	21:01 (25)	20:45	35	19:53 (2)	19:31	6	19:03 (20)	18:17	19	17:47 (3)	16:13		15:44	37	14:52 (23)	
15	04:51	17	21:00 (25)	20:43	35	19:53 (2)	19:29		18:15	16	17:45 (3)	16:11		15:44	38	14:52 (23)		
16	21:35	13	20:59 (25)	20:40	34	19:53 (2)	19:26		17:30 (3)	17:35		16:21		15:44	38	14:53 (23)		
17	04:53	9	20:50 (22)	20:38	34	19:52 (2)	19:24		18:10	9	17:41 (3)	16:08		15:44	38	14:53 (23)		
18	21:33	9	20:50 (22)	20:38	34	19:52 (2)	19:24		18:10	9	17:41 (3)	16:08		15:44	38	14:53 (23)		
19	04:55		20:36	33	19:51 (2)	19:21		18:08		16:06		15:44	39	14:54 (23)				
20	21:32		20:36	33	19:51 (2)	19:21		18:08		16:06		15:44	39	14:54 (23)				
21	04:57		20:36	33	19:51 (2)	19:21		18:08		16:06		15:44	39	14:54 (23)				
22	21:30		20:34	32	19:51 (2)	19:19		18:05		16:05		15:44	39	14:55 (23)				
23	04:58		20:32	31	19:50 (2)	19:18		18:03		16:03		15:44	40	14:56 (23)				
24	21:29		20:32	31	19:50 (2)	19:18		18:03		16:03		15:44	40	14:56 (23)				
25	04:59		20:29	30	19:49 (2)	19:14		18:01		16:02		15:45	39	14:55 (23)				
26	21:28		20:29	30	19:49 (2)	19:14		18:01		16:02		15:45	39	14:55 (23)				
27	05:01		20:28 (21)	20:27	28	19:48 (2)	19:11		17:59		16:01	15:45	39	14:56 (23)				
28	21:26	5	20:33 (21)	20:27	28	19:48 (2)	19:11		17:59		16:01	15:45	39	14:56 (23)				
29	05:02		20:26 (21)	20:25	26	19:46 (2)	19:09		17:56		15:59	15:46	39	14:56 (23)				
30	21:25	9	20:35 (21)	20:25	26	19:46 (2)	19:09		17:56		15:59	15:46	39	14:56 (23)				
31	05:04		20:25 (21)	20:22	23	19:45 (2)	19:06		17:54		15:58	15:46	39	14:57 (23)				
32	21:23	11	20:36 (21)	20:22	23	19:45 (2)	19:06		17:54		15:58	15:46	39	14:57 (23)				
33	05:06		20:24 (21)	20:20	19	19:43 (2)	19:04		17:52		15:57	15:47	40	14:58 (23)				
34	21:22	13	20:37 (21)	20:20	19	19:43 (2)	19:04		17:52		15:57	15:47	40	14:58 (23)				
35	05:07		20:24 (21)	20:18	16	19:42 (18)	19:01		16:50		15:56	15:48	39	14:58 (23)				
36	21:20	14	20:38 (21)	20:18	16	19:42 (18)	19:01		16:50		15:56	15:48	39	14:58 (23)				
37	05:09		20:23 (21)	20:15	15	19:42 (18)	18:59		16:48	7	15:41 (19)	15:54	15:48	40	14:59 (23)			
38	21:19	15	20:38 (21)	20:15	15	19:42 (18)	18:59		16:48	7	15:41 (19)	15:54	15:48	40	14:59 (23)			
39	05:10		20:23 (21)	20:13	16	19:42 (18)	18:56		16:45	12	15:60 (19)	15:53	15:49	39	14:58 (23)			
40	21:17	16	20:39 (21)	20:13	16	19:42 (18)	18:56		16:45	12	15:60 (19)	15:53	15:49	39	14:58 (23)			
41	05:12		20:22 (21)	20:11	16	19:42 (18)	18:54		16:43	15	15:51 (19)	15:52	15:50	39	15:00 (23)			
42	21:16	17	20:39 (21)	20:11	16	19:42 (18)	18:54		16:43	15	15:51 (19)	15:52	15:50	39	15:00 (23)			
43	05:14		20:22 (21)	20:08	14	19:39 (18)	18:51		16:41	17	15:53 (19)	15:51	15:51	37	14:59 (23)			
44	21:14	17	20:39 (21)	20:08	14	19:39 (18)	18:51		16:41	17	15:53 (19)	15:51	15:51	37	14:59 (23)			
45	05:15		19:31 (2)	20:06	11	19:37 (18)	18:49		16:39	18	15:53 (19)	15:51	15:52	38	15:00 (23)			
46	21:12	29	20:39 (21)	20:06	11	19:37 (18)	18:49		16:39	18	15:53 (19)	15:51	15:52	38	15:00 (23)			
47	05:17		19:29 (2)	20:03	13	19:35 (18)			16:37	19	15:54 (19)		15:53	37	15:00 (23)			
48	21:10	32	20:38 (21)	20:03	13	19:35 (18)			16:37	19	15:54 (19)		15:53	37	15:00 (23)			
49			Sonnenscheinstunden	514		461		383		328		257		231				
50			astr.max.mögl.Beschattung	633		861		214		339		132		1019				
51			Red.Sonnenscheinwahrsch.	0.44		0.48		0.40		0.33		0.21		0.14				
52			Reduktion Betriebsdauer	0.91		0.91		0.91		0.91		0.91		0.91				
53			Reduktion Windrichtung	0.62		0.63		0.67		0.69		0.70		0.67				
54			Gesamte Reduktion	0.25		0.28		0.25		0.21		0.13		0.08				
55			Met.wahrsch.Beschattung	159		242		53		70		18		86				

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 40
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: R - IO18

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:38											
2	21:44	29	20:40 (22) 05:19		19:30 (2) 06:14		19:01 (20) 07:08		17:40 (3) 07:07		15:38 (19) 08:03	13:59 (1)
3	04:40	27	21:07 (25) 21:07		19:28 (2) 06:17		18:59 (20) 07:12		17:35 (3) 07:11		15:39 (19) 08:06	13:57 (1)
4	04:40	26	21:07 (25) 21:05		19:27 (2) 06:19		18:59 (20) 07:14		17:34 (3) 07:13		15:39 (19) 08:08	13:56 (1)
5	04:41	25	21:07 (25) 21:03		19:27 (2) 06:21		18:58 (20) 07:15		17:33 (3) 07:15		15:41 (19) 08:09	13:56 (1)
6	04:42	24	21:07 (25) 21:01		19:27 (2) 06:23		18:58 (20) 07:17		17:32 (3) 07:17		15:43 (19) 08:10	13:55 (1)
7	04:43	22	21:06 (25) 20:59		19:26 (2) 06:25		18:59 (20) 07:19		17:32 (3) 07:19		15:46 (19) 08:12	13:56 (1)
8	04:44	21	21:06 (25) 20:57		19:26 (2) 06:26		18:59 (20) 07:21		17:31 (3) 07:21		15:45 (19) 08:13	13:56 (1)
9	04:45	20	21:05 (25) 20:55		19:26 (2) 06:28		18:58 (20) 07:23		17:31 (3) 07:23		15:44 (19) 08:14	13:55 (1)
10	04:46	19	21:05 (25) 20:53		19:26 (2) 06:30		18:58 (20) 07:25		17:31 (3) 07:25		15:45 (19) 08:16	13:56 (1)
11	04:48	18	21:04 (25) 20:51		19:26 (2) 06:32		19:01 (20) 07:27		17:32 (3) 07:27		15:45 (19) 08:17	13:56 (1)
12	04:49	17	21:03 (25) 20:49		19:26 (2) 06:34		18:22 (20) 07:28		17:32 (3) 07:29		15:44 (19) 08:18	13:56 (1)
13	04:50	16	21:02 (25) 20:47		19:26 (2) 06:35		18:20 (20) 07:30		17:30 (3) 07:31		15:44 (19) 08:19	13:56 (1)
14	04:51	15	21:01 (25) 20:45		19:26 (2) 06:37		18:17 (20) 07:32		17:30 (3) 07:33		15:44 (19) 08:20	13:56 (1)
15	04:53	14	21:00 (25) 20:43		19:26 (2) 06:39		18:15 (20) 07:34		17:29 (3) 07:35		15:44 (19) 08:21	13:57 (1)
16	04:54	13	21:00 (25) 20:41		19:26 (2) 06:41		18:12 (20) 07:36		17:29 (3) 07:37		15:44 (19) 08:22	13:57 (1)
17	04:55	12	21:00 (25) 20:39		19:26 (2) 06:43		18:10 (20) 07:38		17:28 (3) 07:38		15:44 (19) 08:23	13:58 (1)
18	04:57	11	21:00 (25) 20:37		19:26 (2) 06:45		18:08 (20) 07:40		17:28 (3) 07:40		15:44 (19) 08:24	13:59 (1)
19	04:58	10	21:00 (25) 20:35		19:26 (2) 06:47		18:06 (20) 07:42		17:27 (3) 07:42		15:44 (19) 08:25	13:59 (1)
20	04:59	9	21:00 (25) 20:33		19:26 (2) 06:49		18:04 (20) 07:44		17:27 (3) 07:44		15:44 (19) 08:26	13:59 (1)
21	05:01	8	21:00 (25) 20:31		19:26 (2) 06:51		18:02 (20) 07:46		17:26 (3) 07:46		15:44 (19) 08:27	14:00 (1)
22	05:02	7	21:00 (25) 20:29		19:26 (2) 06:53		18:01 (20) 07:48		17:26 (3) 07:48		15:44 (19) 08:28	14:01 (1)
23	05:04	6	21:00 (25) 20:27		19:26 (2) 06:55		18:00 (20) 07:50		17:25 (3) 07:50		15:44 (19) 08:29	14:01 (1)
24	05:06	5	21:00 (25) 20:25		19:26 (2) 06:57		17:59 (20) 07:52		17:25 (3) 07:52		15:44 (19) 08:30	14:01 (1)
25	05:07	4	21:00 (25) 20:23		19:26 (2) 06:59		17:58 (20) 07:54		17:24 (3) 07:54		15:44 (19) 08:31	14:01 (1)
26	05:09	3	21:00 (25) 20:21		19:26 (2) 07:01		17:57 (20) 07:56		17:24 (3) 07:56		15:44 (19) 08:32	14:01 (1)
27	05:10	2	21:00 (25) 20:19		19:26 (2) 07:03		17:56 (20) 07:58		17:23 (3) 07:58		15:44 (19) 08:33	14:01 (1)
28	05:12	1	21:00 (25) 20:17		19:26 (2) 07:05		17:55 (20) 07:60		17:23 (3) 07:60		15:44 (19) 08:34	14:01 (1)
29	05:14		21:00 (25) 20:15		19:26 (2) 07:07		17:54 (20) 07:62		17:22 (3) 07:62		15:44 (19) 08:35	14:01 (1)
30	05:15		21:00 (25) 20:13		19:26 (2) 07:09		17:53 (20) 07:64		17:22 (3) 07:64		15:44 (19) 08:36	14:01 (1)
31	05:17		21:00 (25) 20:11		19:26 (2) 07:11		17:52 (20) 07:66		17:21 (3) 07:66		15:44 (19) 08:37	14:01 (1)
	21:10	39	20:38 (21) 20:03		19:35 (18) 06:31		16:37 (19) 05:57		15:57 (19) 05:13		15:53 (19) 04:28	15:03 (23)
	Sonnenscheinstunden	514	461	809	383	174	328	257	106	231	1216	
	astr.max.mögl.Beschattung	556		809		174	380	106			1216	
	Red.Sonnenscheinwahrsch.	0.44		0.48		0.40	0.33	0.21			0.14	
	Reduktion Betriebsdauer	0.91		0.91		0.91	0.91	0.91			0.91	
	Reduktion Windrichtung	0.63		0.64		0.66	0.69	0.70			0.67	
	Gesamte Reduktion	0.25		0.28		0.24	0.21	0.13			0.08	
	Met.wahrsch.Beschattung	141		228		43	79	14			103	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 41

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: S - IO19

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:28		13:50 (1) 07:57		06:43		05:33
15:54	55	15:01 (23) 16:46		17:43		17:20
2 08:28		13:51 (1) 07:55		06:56		05:31
15:55	50	15:02 (23) 16:48		17:45		17:19
3 08:28		13:51 (1) 07:54		06:54		05:29
15:57	49	15:01 (23) 16:50		17:47		17:18
4 08:27		13:52 (1) 07:52		06:52		05:26
15:58	48	15:02 (23) 16:52		17:49		17:19
5 08:27		13:53 (1) 07:50		06:49		05:24
15:59	47	15:02 (23) 16:54		17:51	4	17:24 (26) 19:50
6 08:27		13:53 (1) 07:48		06:47		05:22
16:00	47	15:02 (23) 16:56		17:53	7	17:25 (26) 19:52
7 08:26		13:54 (1) 07:46		06:45		05:20
16:02	45	15:03 (23) 16:58		17:55	14	17:28 (26) 19:54
8 08:26		13:55 (1) 07:44		06:42		05:19
16:03	44	15:03 (23) 17:00		17:57	18	17:29 (26) 19:55
9 08:25		13:56 (1) 07:42		06:40		05:17
16:05	41	15:02 (23) 17:03	4	16:26 (19) 17:59	23	17:32 (26) 19:57
10 08:24		13:57 (1) 07:40		06:37		05:15
16:06	39	15:02 (23) 17:05	11	16:30 (19) 18:00	23	17:31 (26) 19:59
11 08:24		13:58 (1) 07:38		06:35		05:13
16:08	37	15:02 (23) 17:07	15	16:32 (19) 18:02	24	17:31 (3) 20:01
12 08:23		13:59 (1) 07:36		06:32		05:11
16:09	35	15:02 (23) 17:09	18	16:34 (19) 18:04	24	17:30 (3) 20:03
13 08:22		14:00 (1) 07:34		06:30		05:09
16:11	31	15:01 (23) 17:11	20	16:35 (19) 18:06	25	17:31 (3) 20:05
14 08:21		14:02 (1) 07:32		06:27		05:07
16:13	26	15:01 (23) 17:13	21	16:35 (19) 18:08	25	17:30 (3) 20:07
15 08:20		14:04 (1) 07:30		06:25		05:06
16:14	19	14:59 (23) 17:15	21	16:35 (19) 18:10	25	17:30 (3) 20:09
16 08:19		14:06 (1) 07:28		06:23		05:04
16:16	11	14:17 (1) 07:17	22	16:36 (19) 18:12	24	17:29 (3) 20:10
17 08:18		14:11 (1) 07:26		06:20		05:02
16:18	2	14:13 (1) 07:19	22	16:36 (19) 18:14	24	17:29 (3) 20:12
18 08:17		14:14 (1) 07:24		06:18		05:01
16:19		17:21	22	16:36 (19) 18:16	23	17:28 (3) 20:14
19 08:16		17:22		06:15		05:00
16:21		17:23	21	16:35 (19) 18:18	20	17:27 (3) 20:16
20 08:15		17:19		06:13		05:00
16:23		17:25	21	16:35 (19) 18:20	17	17:24 (3) 20:18
21 08:14		17:17		06:10		05:00
16:25		17:27	19	16:34 (19) 18:22	13	17:23 (3) 20:20
22 08:12		17:15		06:08		05:00
16:27		17:29	17	16:33 (19) 18:23	3	17:17 (3) 20:22
23 08:11		17:13		06:05		05:00
16:29		17:31	13	16:31 (19) 18:25		05:00
24 08:10		17:10		06:03		05:00
16:31		17:33	8	16:29 (19) 18:27		05:00
25 08:08		17:08		06:00		05:00
16:32		17:35		18:29		05:00
26 08:07		17:06		05:58		05:00
16:34		17:37		18:31		05:00
27 08:05		17:03		05:55		05:00
16:36		17:39		18:33		05:00
28 08:04		17:01		05:53		05:00
16:38		17:41		18:35		05:00
29 08:02				05:50		05:00
16:40				19:37		05:00
30 08:00				06:48		05:00
16:42				19:39		05:00
31 07:59				06:45		05:00
16:44				19:40		05:00
Sonnenscheinstunden	248	272	367	421	496	512
astr.max.mögl.Beschattung	626	275	336	388	640	1686
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
Reduktion Windrichtung	0.67	0.70	0.68	0.64	0.63	0.63
Gesamte Reduktion	0.11	0.15	0.20	0.24	0.29	0.26
Met.wahrsch.Beschattung	66	42	66	93	188	436

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		Zeitpunkt (SS:MM) Schattende	
	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)		Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)		

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 42
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersiezug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: S - IO19

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1 04:38	20:00 (2) 05:19		06:14	07:08	17:45 (3) 07:07	15:49 (19) 08:03	13:40 (1)
21 04:44	57 21:06 (21) 21:09		20:01	18:46	25 18:10 (3) 16:35	10 15:59 (19) 15:50	36 14:44 (23)
3 04:39	19:59 (2) 05:20		06:16	07:10	17:46 (3) 07:09		108:05 13:40 (1)
4 21:44	57 21:06 (21) 21:07		19:59	18:44	24 18:10 (3) 16:33		15:49 39 14:45 (23)
5 04:40	20:00 (2) 05:22		06:17	07:12	17:45 (3) 07:11		08:06 13:40 (1)
6 21:44	57 21:06 (21) 21:05		19:56	18:41	24 18:09 (26) 16:31		15:48 42 14:47 (23)
7 04:40	20:00 (2) 05:24		06:19	07:14	17:46 (3) 07:13		08:08 13:39 (1)
8 21:43	57 21:07 (21) 21:03		19:54	18:39	23 18:09 (26) 16:29		15:47 44 14:47 (23)
9 04:41	20:00 (2) 05:25		06:21	07:15	17:47 (3) 07:15		08:09 13:40 (1)
10 21:43	57 21:07 (21) 21:01		19:51	18:37	20 18:07 (26) 16:27		15:47 45 14:48 (23)
11 04:42	20:01 (2) 05:27		06:23	07:17	17:48 (3) 07:17		08:10 13:39 (1)
12 21:42	55 21:06 (21) 20:59		19:49	18:34	17 18:05 (26) 16:25		15:46 46 14:48 (23)
13 04:43	20:01 (2) 05:29	20:00 (18) 06:25		07:19	17:51 (3) 07:19		08:12 13:40 (1)
14 21:41	55 21:06 (21) 20:57	7 20:07 (18) 19:46		18:32	11 18:02 (26) 16:23		15:46 47 14:49 (23)
15 04:44	20:01 (2) 05:31	19:58 (18) 06:26		07:21	17:54 (26) 07:21		08:13 13:39 (1)
16 21:41	54 21:05 (21) 20:55	11 20:09 (18) 19:44		18:29	6 18:00 (26) 16:21		15:45 48 14:49 (23)
17 04:45	20:01 (2) 05:33	19:57 (18) 06:28		07:23	17:55 (26) 07:23		08:14 13:40 (1)
18 21:40	53 21:05 (21) 20:53	14 20:11 (18) 19:41		18:27	3 17:58 (26) 16:20		15:45 49 14:50 (23)
19 04:46	20:02 (2) 05:34	19:55 (18) 06:30		07:25	07:25		08:16 13:40 (1)
20 21:39	51 21:04 (21) 20:51	16 20:11 (18) 19:39		18:24	16:18		15:45 50 14:51 (23)
21 04:48	20:02 (2) 05:36	19:55 (18) 06:32		07:27	07:27		08:17 13:40 (1)
22 21:38	50 21:03 (21) 20:49	16 20:11 (18) 19:36		18:22	16:16		15:44 54 14:51 (23)
23 04:49	20:02 (2) 05:38	19:55 (18) 06:34		07:28	07:29		08:18 13:40 (1)
24 21:37	48 21:02 (21) 20:47	17 20:12 (18) 19:34		18:20	16:14		15:44 56 14:51 (23)
25 04:50	20:02 (2) 05:40	19:36 (20) 06:35		07:30	07:31		08:19 13:41 (1)
26 21:36	47 21:01 (21) 20:45	22 20:11 (18) 19:31		18:17	16:13		15:44 57 14:52 (23)
27 04:51	20:02 (2) 05:41	19:33 (20) 06:37		07:32	07:33		08:20 13:41 (1)
28 21:35	45 21:00 (21) 20:43	30 20:12 (18) 19:29		18:15	16:11		15:44 58 14:52 (23)
29 04:53	20:02 (2) 05:43	19:31 (20) 06:39		07:34	07:35		08:21 13:41 (1)
30 21:34	43 20:59 (21) 20:40	32 20:11 (18) 19:26		18:12	16:09		15:44 59 14:53 (23)
31 04:54	20:04 (2) 05:45	19:29 (20) 06:41		07:36	07:37		08:22 13:42 (1)
1 21:33	40 20:59 (21) 20:38	32 20:08 (18) 19:24		18:10	16:08		15:44 58 14:53 (23)
2 04:55	20:04 (2) 05:47	19:28 (20) 06:43		07:38	07:38		08:23 13:42 (1)
3 21:32	36 20:57 (21) 20:36	32 20:06 (18) 19:21		18:08	16:06		15:44 59 14:54 (23)
4 04:57	20:04 (2) 05:49	19:28 (20) 06:44		07:40	16:51 (19) 07:40		08:23 13:43 (1)
5 21:30	35 20:39 (2) 20:34	29 20:04 (18) 19:19		18:05	10 17:01 (19) 16:05		15:45 58 14:54 (23)
6 04:58	20:04 (2) 05:50	19:26 (20) 06:46		07:42	16:48 (19) 07:42		08:24 13:44 (1)
7 21:29	34 20:38 (2) 20:32	28 20:02 (18) 19:16		18:03	15 17:03 (19) 16:03		15:45 59 14:55 (23)
8 04:59	20:05 (2) 05:52	19:26 (20) 06:48		07:44	16:47 (19) 07:44		08:25 13:44 (1)
9 21:28	34 20:39 (2) 20:29	23 20:00 (18) 19:14		18:01	17 17:04 (19) 16:02		15:45 59 14:55 (23)
10 05:01	20:05 (2) 05:54	19:26 (20) 06:50		07:46	16:45 (19) 07:46		08:25 13:44 (1)
11 21:26	33 20:38 (2) 20:27	22 19:48 (20) 19:11		17:59	20 17:05 (19) 16:01		15:46 60 14:56 (23)
12 05:02	20:07 (2) 05:56	19:25 (20) 06:52	17:55 (3) 07:48		16:45 (19) 07:48		08:26 13:44 (1)
13 21:25	31 20:38 (2) 20:25	22 19:47 (20) 19:09	11 18:06 (3) 17:56	20 17:05 (19) 15:59		15:46 60 14:56 (23)	
14 05:04	20:07 (2) 05:58	19:25 (20) 06:53	16 17:53 (3) 07:50	22 16:44 (19) 07:49		08:27 13:45 (1)	
15 21:23	30 20:37 (2) 20:22	22 19:47 (20) 19:06	16 18:09 (3) 17:54	22 17:06 (19) 15:58		15:46 60 14:57 (23)	
16 05:06	20:07 (2) 05:59	19:26 (20) 06:55	17 17:51 (3) 07:51	16:43 (19) 07:51		08:27 13:46 (1)	
17 21:22	29 20:36 (2) 20:20	21 19:47 (20) 19:04	19 18:10 (3) 17:52	23 17:06 (19) 15:57		15:47 59 14:57 (23)	
18 05:07	20:09 (2) 06:01	19:26 (20) 06:57	17:49 (3) 06:53	15:43 (19) 07:53		08:27 13:46 (1)	
19 21:20	26 20:35 (2) 20:18	20 19:46 (20) 19:01	22 18:11 (3) 16:50	23 16:06 (19) 15:56		15:48 59 14:57 (23)	
20 05:09	20:10 (2) 06:03	19:26 (20) 06:59	17:47 (3) 06:55	15:43 (19) 07:55	13:44 (1) 08:28	13:46 (1)	
21 21:19	24 20:34 (2) 20:15	18 19:44 (20) 18:59	24 18:11 (3) 16:48	22 16:05 (19) 15:54	11 13:55 (1) 15:48	59 14:58 (23)	
22 05:10	20:12 (2) 06:05	19:28 (20) 07:01	17:47 (3) 06:57	15:43 (19) 07:56		13:43 (1) 08:28	
23 21:17	21 20:33 (2) 20:13	15 19:43 (20) 18:56	24 18:11 (3) 16:45	22 16:05 (19) 15:53	19 14:38 (23) 15:49	58 14:58 (23)	
24 05:12	20:13 (2) 06:07	19:29 (20) 07:03	17:46 (3) 06:59	15:43 (19) 07:58		13:42 (1) 08:28	
25 21:16	18 20:31 (2) 20:11	12 19:41 (20) 18:54	25 18:11 (3) 16:43	21 16:04 (19) 15:52	26 14:41 (23) 15:50	58 14:59 (23)	
26 05:14	20:16 (2) 06:08	19:32 (20) 07:04	17:46 (3) 07:01	15:45 (19) 08:00		13:41 (1) 08:28	
27 21:14	13 20:29 (2) 20:08	5 19:37 (20) 18:51	25 18:11 (3) 16:41	19 16:04 (19) 15:51	31 14:42 (23) 15:51	58 14:59 (23)	
28 05:15	20:19 (2) 06:10	07:06	17:45 (3) 07:03	15:46 (19) 08:01		13:41 (1) 08:28	
29 21:12	5 20:24 (2) 20:06	18:49	26 18:11 (3) 16:39	17 16:03 (19) 15:51	34 14:44 (23) 15:52	57 14:59 (23)	
30 05:17	06:12		07:05	15:47 (19)		08:28	13:49 (1)
31 21:10	20:03		16:37	14 16:01 (19)		15:53	57 15:00 (23)
Sonnenscheinstunden 514		461	383	328	257	231	
astr.max.mögl.Beschattung	1195	466	192	418	131	1668	
Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.63	0.64	0.68	0.69	0.67	0.67	
Gesamte Reduktion	0.25	0.28	0.25	0.21	0.13	0.08	
Met.wahrsch.Beschattung	304	131	48	87	17	141	

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 43

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: T - IO20

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	13:30 (1) 07:57	06:59	06:43	05:33	19:28 (20) 04:42	20:26 (2)
1	15:54	50 14:49 (23) 16:46	17:43	19:42	20:39	37 20:09 (18) 21:29	10 20:36 (2)
2	08:28	13:31 (1) 07:55	06:56	06:40	05:31	19:28 (20) 04:41	20:25 (2)
3	15:55	49 14:49 (23) 16:48	17:45	19:44	20:40	38 20:10 (18) 21:31	14 20:38 (2)
3	08:28	13:31 (1) 07:54	06:54	06:38	05:29	19:29 (20) 04:40	20:24 (2)
4	15:57	47 14:49 (23) 16:50	17:47	19:46	20:42	39 20:12 (18) 21:32	16 20:40 (2)
4	08:27	13:33 (1) 07:52	06:52	06:35	05:26	19:29 (20) 04:40	20:22 (2)
4	15:58	46 14:50 (23) 16:52	17:49	19:48	20:44	38 20:12 (18) 21:33	19 20:41 (2)
5	08:27	13:33 (1) 07:50	06:49	17:21 (26) 06:33	05:24	19:30 (20) 04:39	20:21 (2)
5	15:59	44 14:49 (23) 16:54	17:51	3 17:24 (26) 19:50	20:46	37 20:12 (18) 21:34	21 20:42 (2)
6	08:27	13:33 (1) 07:48	06:47	17:19 (25) 06:31	05:22	19:31 (20) 04:38	20:21 (2)
6	16:00	43 14:49 (23) 16:56	17:53	6 17:25 (26) 19:52	20:48	35 20:12 (18) 21:35	23 20:44 (2)
7	08:26	13:35 (1) 07:46	06:45	17:18 (26) 06:28	05:20	19:32 (20) 04:37	20:20 (2)
7	16:02	42 14:50 (23) 16:58	17:55	10 17:28 (26) 19:54	20:50	31 20:11 (18) 21:36	24 20:44 (2)
8	08:26	13:36 (1) 07:44	06:42	17:13 (3) 06:26	05:19	19:35 (20) 04:37	20:20 (2)
8	16:03	38 14:49 (23) 17:00	7 16:22 (19) 17:57	16 17:29 (26) 19:55	20:51	25 20:11 (18) 21:37	25 20:45 (2)
9	08:25	13:37 (1) 07:42	06:40	17:11 (3) 06:23	05:17	19:34 (18) 21:38	20:19 (2)
9	16:05	36 14:49 (23) 17:03	13 16:25 (19) 17:59	21 17:32 (26) 19:57	20:53	17 20:11 (18) 21:38	27 20:46 (2)
10	08:24	13:38 (1) 07:40	06:37	17:08 (3) 06:21	05:15	19:35 (18) 04:36	20:19 (2)
11	16:06	32 14:48 (23) 17:05	17 16:27 (19) 18:00	25 17:33 (26) 19:59	20:55	15 20:10 (18) 21:39	29 21:03 (21)
11	08:24	13:39 (1) 07:38	06:35	17:07 (3) 06:18	05:13	19:35 (18) 04:35	20:20 (2)
11	16:08	28 14:47 (23) 17:07	19 16:28 (19) 18:02	25 17:32 (26) 20:01	20:57	14 20:09 (18) 21:40	30 21:04 (21)
12	08:23	13:41 (1) 07:36	06:32	17:06 (3) 06:16	05:11	19:37 (18) 04:35	20:19 (2)
12	16:09	20 14:45 (23) 17:09	21 16:29 (19) 18:04	25 17:31 (3) 20:03	20:59	11 20:08 (18) 21:41	31 21:04 (21)
13	08:22	13:43 (1) 07:34	06:30	17:05 (3) 06:14	05:09	19:39 (18) 04:34	20:19 (2)
14	16:11	14 13:57 (1) 17:11	22 16:30 (19) 18:06	27 17:32 (3) 20:05	21:00	7 20:06 (18) 21:41	33 21:05 (21)
14	08:21	13:45 (1) 07:32	06:27	17:04 (3) 06:11	05:07	19:40 (18) 04:34	20:19 (2)
15	16:13	10 13:55 (1) 17:13	23 16:30 (19) 18:08	27 17:31 (3) 20:07	21:02	21:42	35 21:06 (21)
15	08:20	13:46 (1) 07:30	06:25	17:03 (3) 06:09	05:06	19:41 (18) 04:34	20:19 (2)
16	16:14	13:41 (1) 17:15	25 16:31 (19) 18:10	28 17:32 (3) 20:09	21:04	21:43	35 21:06 (21)
16	08:19	13:42 (1) 07:28	06:23	17:03 (3) 06:06	05:04	19:42 (18) 04:34	20:19 (2)
17	16:16	11:17	25 16:31 (19) 18:12	28 17:31 (3) 20:10	21:05	21:43	37 21:07 (21)
17	08:18	13:43 (1) 07:26	06:20	17:03 (3) 06:04	05:02	19:43 (18) 04:34	20:19 (2)
18	16:18	17:19	24 16:31 (19) 18:14	28 17:31 (3) 20:12	21:07	21:44	37 21:07 (21)
18	08:17	13:44 (1) 07:24	06:18	17:03 (3) 06:02	05:01	19:44 (18) 04:33	20:19 (2)
19	16:19	17:21	24 16:31 (19) 18:16	27 17:30 (3) 20:14	21:09	21:44	39 21:08 (21)
19	08:16	13:45 (1) 07:22	06:15	17:04 (3) 05:59	04:59	19:45 (18) 04:33	20:19 (2)
20	16:21	17:23	23 16:30 (19) 18:18	26 17:30 (3) 20:16	21:10	21:44	39 21:08 (21)
20	08:15	13:46 (1) 07:19	06:13	17:04 (3) 05:57	04:58	19:46 (18) 04:34	20:19 (2)
21	16:23	17:25	23 16:30 (19) 18:20	24 17:28 (3) 20:18	9 19:46 (20) 21:12	21:45	39 21:08 (21)
21	08:14	13:47 (1) 07:17	06:10	17:05 (3) 05:55	04:56	19:47 (18) 04:34	20:19 (2)
22	16:25	17:27	22 16:30 (19) 18:22	23 17:28 (3) 20:20	15 19:49 (20) 21:14	21:45	39 21:08 (21)
22	08:12	13:48 (1) 07:15	06:08	17:05 (3) 05:52	04:55	19:48 (18) 04:34	20:19 (2)
23	16:27	17:29	19 16:28 (19) 18:23	21 17:26 (3) 20:22	17 19:49 (20) 21:15	21:45	39 21:08 (21)
23	08:11	13:49 (1) 07:13	06:05	17:03 (3) 05:50	04:53	19:49 (18) 04:34	20:19 (2)
24	16:29	17:31	16 16:27 (19) 18:25	17 17:24 (3) 20:24	21 19:51 (20) 21:17	21:45	39 21:09 (21)
24	08:10	13:50 (1) 07:11	06:03	17:02 (3) 05:48	04:52	19:50 (18) 04:34	20:20 (2)
25	16:31	17:33	12 16:25 (19) 18:27	12 17:21 (3) 20:26	21 19:51 (20) 21:18	21:46	39 21:09 (21)
25	08:08	13:51 (1) 07:08	06:00	17:01 (3) 05:46	04:50	19:51 (18) 04:35	20:20 (2)
26	16:32	17:35	11 16:24 (19) 18:29	11 17:20 (3) 20:28	23 19:52 (20) 21:20	21:46	38 21:09 (21)
26	08:07	13:52 (1) 07:06	05:58	17:00 (3) 05:44	04:49	19:52 (18) 04:35	20:21 (2)
27	16:34	17:37	10 16:23 (19) 18:31	10 17:19 (3) 20:30	24 19:53 (20) 21:21	21:46	37 21:09 (21)
27	08:05	13:53 (1) 07:03	05:55	16:59 (3) 05:41	04:48	19:53 (18) 04:36	20:21 (2)
28	16:36	17:39	9 16:22 (19) 18:33	9 17:18 (3) 20:32	24 19:54 (20) 21:23	21:45	37 21:09 (21)
28	08:04	13:54 (1) 07:01	05:53	16:58 (3) 05:39	04:47	19:54 (18) 04:36	20:22 (2)
29	16:38	17:41	8 16:21 (19) 18:35	8 17:17 (3) 20:34	27 19:55 (20) 21:24	21:45	35 21:09 (21)
29	08:02	13:55 (1) 06:59	05:51	16:57 (3) 05:37	04:46	19:55 (18) 04:37	20:22 (2)
30	16:40	17:43	7 16:20 (19) 18:37	7 17:16 (3) 20:36	31 19:56 (20) 21:25	21:45	33 21:08 (21)
30	08:00	13:56 (1) 06:57	05:49	16:56 (3) 05:35	04:45	19:56 (18) 04:37	20:23 (2)
31	16:42	17:45	6 16:19 (19) 18:39	6 17:15 (3) 20:38	34 19:57 (20) 21:27	21:45	32 21:08 (21)
31	07:59	13:57 (1) 06:55	05:47	16:55 (3) 05:33	04:43	19:57 (18) 04:38	20:24 (2)
31	16:44	17:47	5 16:18 (19) 18:41	5 17:14 (3) 20:40	35 19:58 (20) 21:29	21:45	31 21:07 (21)
Sonnenscheinstunden	248	272	367	421	496	512	931
astr.max.mögl.Beschattung	499	335	419	246	344	512	931
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.51	0.45
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Reduktion Windrichtung	0.65	0.70	0.68	0.63	0.64	0.64	0.62
Gesamte Reduktion	0.10	0.15	0.19	0.24	0.29	0.29	0.25
Met.wahrsch.Beschattung	52	51	82	58	101	237	237

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 44
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: T - IO20

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember	
1	04:38	20:24 (2) 05:19	20:07 (18) 06:14	07:08	17:45 (3) 07:07	15:40 (19) 08:03	13:21 (1)
2	21:45	31 21:09 (21) 21:09	12 20:19 (18) 20:01	18:46	26 18:11 (3) 16:35	16 15:56 (19) 15:50	28 14:29 (23)
3	04:39	20:23 (2) 05:20	20:05 (18) 06:16	07:10	17:46 (3) 07:09	15:42 (19) 08:05	13:21 (1)
4	21:44	29 21:07 (21) 21:07	15 20:20 (18) 19:59	18:44	25 18:11 (26) 16:33	12 15:54 (19) 15:49	32 14:31 (23)
5	04:40	20:24 (2) 05:22	20:05 (18) 06:17	07:12	17:46 (3) 07:11	15:45 (19) 08:06	13:21 (1)
6	21:44	27 20:51 (2) 21:05	16 20:21 (18) 19:56	18:41	24 18:10 (26) 16:31	6 15:51 (19) 15:48	36 14:33 (23)
7	04:40	20:25 (2) 05:24	20:04 (18) 06:19	07:14	17:47 (3) 07:13	15:48	36 14:33 (23)
8	21:43	26 20:51 (2) 21:03	17 20:21 (18) 19:54	18:39	23 18:10 (26) 16:29	15:48	38 14:33 (23)
9	04:41	20:26 (2) 05:26	19:44 (20) 06:21	07:15	17:49 (3) 07:15	15:49	38 14:33 (23)
10	21:43	25 20:51 (2) 21:01	27 20:21 (18) 19:51	18:37	18 18:07 (26) 16:27	15:47	42 14:35 (23)
11	04:42	20:27 (2) 05:27	19:42 (20) 06:23	07:17	17:52 (3) 07:17	15:47	42 14:35 (23)
12	21:42	23 20:50 (2) 20:59	33 20:22 (18) 19:49	18:34	13 18:05 (26) 16:25	15:46	42 14:35 (23)
13	04:43	20:28 (2) 05:29	19:40 (20) 06:25	07:19	17:54 (26) 07:19	15:46	42 14:35 (23)
14	21:41	22 20:50 (2) 20:57	35 20:21 (18) 19:46	18:32	8 18:02 (26) 16:23	15:46	45 14:36 (23)
15	04:44	20:29 (2) 05:31	19:39 (20) 06:26	07:21	17:55 (26) 07:21	15:46	45 14:36 (23)
16	21:41	20 20:49 (2) 20:55	38 20:22 (18) 19:44	18:29	5 18:00 (26) 16:21	15:45	46 14:37 (23)
17	04:45	20:30 (2) 05:33	19:38 (20) 06:28	07:23	17:57 (26) 07:23	15:44	46 14:37 (23)
18	21:40	18 20:48 (2) 20:53	40 20:22 (18) 19:41	18:27	1 17:58 (26) 16:20	15:45	47 14:38 (23)
19	04:46	20:32 (2) 05:34	19:37 (20) 06:30	07:25	17:59 (26) 07:25	15:45	47 14:38 (23)
20	21:39	15 20:47 (2) 20:51	39 20:20 (18) 19:39	18:24	16:18	15:45	48 14:38 (23)
21	04:48	20:34 (2) 05:36	19:37 (20) 06:32	07:27	17:02	15:44	48 14:38 (23)
22	21:38	11 20:45 (2) 20:49	38 20:18 (18) 19:36	18:22	16:16	15:44	49 14:39 (23)
23	04:49	20:37 (2) 05:38	19:36 (20) 06:34	07:28	17:09	15:44	49 14:39 (23)
24	21:37	6 20:43 (2) 20:47	37 20:17 (18) 19:34	18:20	16:14	15:44	50 14:39 (23)
25	04:50	20:38 (2) 05:40	19:35 (20) 06:35	07:30	17:13	15:44	50 14:39 (23)
26	21:36	20:45	35 20:14 (18) 19:31	18:17	16:13	15:44	51 14:40 (23)
27	04:51	20:46	19:35 (20) 06:37	07:32	17:16	15:44	51 14:40 (23)
28	21:35	20:43	31 20:12 (18) 19:29	18:15	16:11	15:44	51 14:40 (23)
29	04:53	20:44	19:35 (20) 06:39	07:34	17:19	15:44	51 14:40 (23)
30	21:34	20:40	27 20:11 (18) 19:26	18:12	16:09	15:44	51 14:41 (23)
31	04:54	20:45	19:35 (20) 06:41	07:36	17:22	15:44	51 14:41 (23)
1	21:33	20:38	24 19:59 (20) 19:24	18:10	16:08	15:44	51 14:41 (23)
2	04:55	20:47	19:35 (20) 06:43	07:38	16:47 (19) 07:38	15:44	51 14:41 (23)
3	21:32	20:36	24 19:59 (20) 19:21	18:08	7 16:54 (19) 16:06	15:44	52 14:42 (23)
4	04:57	20:49	19:36 (20) 06:44	07:40	16:43 (19) 07:40	15:44	52 14:42 (23)
5	21:30	20:34	22 19:58 (20) 19:19	18:05	14 16:57 (19) 16:05	15:45	54 14:43 (23)
6	04:58	20:50	19:35 (20) 06:46	17:57 (3) 07:42	16:41 (19) 07:42	15:45	54 14:43 (23)
7	21:29	20:32	22 19:57 (20) 19:16	18:07 (3) 18:03	17 16:58 (19) 16:03	15:45	56 14:44 (23)
8	04:59	20:52	19:36 (20) 06:48	17:54 (3) 07:44	16:40 (19) 07:44	15:45	56 14:44 (23)
9	21:28	20:29	20 19:56 (20) 19:14	18:10 (3) 18:01	19 16:59 (19) 16:02	15:45	57 14:43 (23)
10	05:01	20:54	19:37 (20) 06:50	17:51 (3) 07:46	16:39 (19) 07:46	15:45	57 14:43 (23)
11	21:26	20:27	18 19:55 (20) 19:11	20 18:11 (3) 17:59	21 17:00 (19) 16:01	15:46	57 14:44 (23)
12	05:02	20:56	19:38 (20) 06:52	17:50 (3) 07:48	16:38 (19) 07:48	15:46	57 14:44 (23)
13	21:25	20:25	14 19:52 (20) 19:09	22 18:12 (3) 17:56	23 17:01 (19) 15:59	15:46	57 14:44 (23)
14	05:04	20:58	19:41 (20) 06:53	17:48 (3) 07:50	16:37 (19) 07:49	15:47	57 14:45 (23)
15	21:23	20:22	9 19:50 (20) 19:06	25 18:13 (3) 17:54	24 17:01 (19) 15:58	15:47	57 14:45 (23)
16	04:56	20:59	19:42 (20) 06:55	17:48 (3) 07:51	16:36 (19) 07:51	15:47	57 14:45 (23)
17	21:22	20:20	19:04	25 18:13 (3) 17:52	25 17:01 (19) 15:57	15:47	57 14:46 (23)
18	05:07	20:01	19:01	27 17:47 (3) 06:53	15:36 (19) 07:53	15:47	57 14:46 (23)
19	21:20	20:18	19:01	27 18:14 (3) 16:50	25 16:01 (19) 15:56	15:48	55 14:46 (23)
20	04:59	20:03	19:59	28 17:45 (3) 06:55	15:36 (19) 07:55	15:48	55 14:46 (23)
21	21:19	20:15	18:59	28 18:13 (3) 16:48	25 16:01 (19) 15:54	15:48	53 14:46 (23)
22	05:10	20:06	19:01	28 17:45 (3) 06:57	15:36 (19) 07:56	15:48	53 14:46 (23)
23	21:17	20:13	18:56	28 18:13 (3) 16:45	24 16:00 (19) 15:53	15:49	52 14:46 (23)
24	05:12	20:07	19:03	28 17:45 (3) 06:59	15:36 (19) 07:58	13:25 (1) 08:28	52 14:46 (23)
25	21:16	20:11	18:54	28 18:13 (3) 16:43	24 16:00 (19) 15:52	10 13:35 (1) 15:50	52 14:48 (23)
26	05:14	20:08	19:04	27 17:45 (3) 07:01	15:38 (19) 08:00	13:24 (1) 08:28	52 14:47 (23)
27	21:14	20:08	18:51	27 18:12 (3) 16:41	22 16:00 (19) 15:51	14 13:38 (1) 15:51	52 14:47 (23)
28	05:15	20:12 (18) 06:10	18:59	27 17:45 (3) 07:03	15:38 (19) 08:01	13:23 (1) 08:28	51 14:48 (23)
29	21:12	20:13 (18) 20:06	18:49	27 18:12 (3) 16:39	21 15:59 (19) 15:51	20 14:27 (23) 15:52	51 14:48 (23)
30	05:17	20:08 (18) 06:12	18:49	27 18:12 (3) 16:39	21 15:59 (19) 15:51	20 14:27 (23) 15:52	51 14:48 (23)
31	21:10	9 20:17 (18) 20:03	18:49	27 18:12 (3) 16:39	19 15:58 (19) 15:51	20 14:27 (23) 15:52	50 14:48 (23)
Sonnenscheinstunden	514	461	383	328	257	231	1519
astr.max.mögl.Beschattung	263	593	283	453	78	1519	
Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.62	0.63	0.68	0.69	0.67	0.66	
Gesamte Reduktion	0.25	0.28	0.25	0.21	0.13	0.08	
Met.wahrsch.Beschattung	66	166	71	95	10	126	

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 45
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: U - IO21

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28	12:48 (1) 07:57	15:44 (19) 06:59		05:33	19:35 (20) 04:42
2	08:28	12:50 (1) 07:55	15:43 (19) 06:56		05:31	19:34 (20) 04:41
3	08:28	12:50 (1) 07:54	15:43 (19) 06:54	17:16 (26) 06:38	05:29	19:33 (20) 04:40
4	08:27	12:52 (1) 07:52	15:42 (19) 06:52	17:13 (26) 06:35	05:26	19:32 (20) 04:40
5	08:27	12:54 (1) 07:50	15:41 (19) 06:49	17:04 (3) 06:33	05:24	19:32 (20) 04:39
6	08:27	12:55 (1) 07:48	15:40 (19) 06:47	17:00 (3) 06:31	05:22	19:31 (20) 04:38
7	08:26	12:56 (1) 07:46	15:39 (19) 06:45	16:58 (3) 06:28	05:20	19:31 (20) 04:37
8	08:26	12:57 (1) 07:44	15:38 (19) 06:42	16:55 (3) 06:26	05:19	19:31 (20) 04:37
9	08:25	12:58 (1) 07:42	15:37 (19) 06:40	16:54 (3) 06:23	05:17	19:31 (20) 04:36
10	08:24	12:59 (1) 07:40	15:36 (19) 06:37	16:52 (3) 06:21	05:15	19:31 (20) 04:36
11	08:24	13:00 (1) 07:38	15:35 (19) 06:35	16:50 (3) 06:19	05:13	19:31 (20) 04:35
12	08:23	13:01 (1) 07:36	15:34 (19) 06:32	16:48 (3) 06:17	05:11	19:32 (20) 04:35
13	08:22	13:02 (1) 07:34	15:33 (19) 06:30	16:46 (3) 06:15	05:09	19:32 (20) 04:34
14	08:21	13:03 (1) 07:32	15:32 (19) 06:27	16:44 (3) 06:13	05:07	19:32 (20) 04:34
15	08:20	13:04 (1) 07:30	15:31 (19) 06:25	16:42 (3) 06:11	05:05	19:32 (20) 04:34
16	08:19	13:05 (1) 07:28	15:30 (19) 06:23	16:40 (3) 06:09	05:03	19:32 (20) 04:34
17	08:18	13:06 (1) 07:26	15:29 (19) 06:20	16:38 (3) 06:07	05:01	19:32 (20) 04:34
18	08:17	13:07 (1) 07:24	15:28 (19) 06:18	16:36 (3) 06:05	04:59	19:32 (20) 04:34
19	08:16	13:08 (1) 07:22	15:27 (19) 06:15	16:34 (3) 06:03	04:57	19:32 (20) 04:34
20	08:15	13:09 (1) 07:20	15:26 (19) 06:13	16:32 (3) 06:01	04:55	19:32 (20) 04:34
21	08:14	13:10 (1) 07:18	15:25 (19) 06:10	16:30 (3) 05:59	04:53	19:32 (20) 04:34
22	08:12	13:11 (1) 07:16	15:24 (19) 06:08	16:28 (3) 05:57	04:51	19:32 (20) 04:34
23	08:11	13:12 (1) 07:14	15:23 (19) 06:05	16:26 (3) 05:55	04:49	19:32 (20) 04:34
24	08:10	13:13 (1) 07:12	15:22 (19) 06:03	16:24 (3) 05:53	04:47	19:32 (20) 04:34
25	08:08	13:14 (1) 07:10	15:21 (19) 06:00	16:22 (3) 05:51	04:45	19:32 (20) 04:34
26	08:07	13:15 (1) 07:08	15:20 (19) 05:58	16:20 (3) 05:49	04:43	19:32 (20) 04:34
27	08:05	13:16 (1) 07:06	15:19 (19) 05:55	16:18 (3) 05:47	04:41	19:32 (20) 04:34
28	08:04	13:17 (1) 07:04	15:18 (19) 05:52	16:16 (3) 05:45	04:39	19:32 (20) 04:34
29	08:02	13:18 (1) 07:02	15:17 (19) 05:50	16:14 (3) 05:43	04:37	19:32 (20) 04:34
30	08:00	13:19 (1) 07:00	15:16 (19) 05:47	16:12 (3) 05:41	04:35	19:32 (20) 04:34
31	07:59	13:20 (1) 06:58	15:15 (19) 05:45	16:10 (3) 05:39	04:33	19:32 (20) 04:34
	16:44	12 15:58 (19)	19:40		21:28	
Sonnenscheinstunden	248	272	367	421	496	512
astr.max.mögl.Beschattung	105	480	617	69	941	
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.62	0.70	0.88	0.64	0.64	
Gesamte Reduktion	0.10	0.15	0.19	0.24	0.29	
Met.wahrsch.Beschattung	10	72	119	16	276	

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 46
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: U - IO21

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	05:19	19:42 (20) 06:14	07:08	17:30 (3) 07:07	15:08 (19) 08:03	
2	21:45	21:09	51 20:33 (18) 20:01	18:46	34 18:04 (26) 16:35	29 15:37 (19) 15:50	
3	04:39	05:20	19:41 (20) 06:16	07:10	17:31 (3) 07:09	15:08 (19) 08:05	
4	21:44	21:07	51 20:32 (18) 19:59	18:44	34 18:05 (26) 16:33	29 15:37 (19) 15:49	
5	04:40	05:22	19:41 (20) 06:17	07:12	17:30 (3) 07:11	15:09 (19) 08:06	
6	21:44	21:05	50 20:32 (18) 19:56	18:41	35 18:05 (26) 16:31	28 15:37 (19) 15:48	
7	04:40	05:24	19:41 (20) 06:19	07:14	17:31 (3) 07:13	15:09 (19) 08:08	
8	21:43	21:03	48 20:30 (18) 19:54	18:39	34 18:05 (26) 16:29	27 15:36 (19) 15:48	
9	04:41	05:26	19:41 (20) 06:21	07:15	17:32 (3) 07:15	15:10 (19) 08:09	
10	21:43	21:01	47 20:30 (18) 19:51	18:37	33 18:05 (26) 16:27	27 15:37 (19) 15:47	
11	04:42	05:27	19:41 (20) 06:23	07:17	17:33 (3) 07:17	15:11 (19) 08:10	
12	21:42	20:59	44 20:28 (18) 19:49	18:34	32 18:05 (26) 16:25	25 15:36 (19) 15:46	8 12:42 (1)
13	04:43	05:29	19:41 (20) 06:25	07:19	17:35 (3) 07:19	15:11 (19) 08:12	12 12:41 (1)
14	21:41	20:57	40 20:26 (18) 19:46	18:32	27 18:02 (26) 16:23	24 15:35 (19) 15:46	12 12:53 (1)
15	04:44	05:31	19:41 (20) 06:26	07:21	17:37 (3) 07:21	15:12 (19) 08:13	12 12:40 (1)
16	21:41	20:55	35 20:24 (18) 19:44	18:29	23 18:00 (26) 16:21	22 15:34 (19) 15:45	14 12:54 (1)
17	04:45	05:33	19:42 (20) 06:28	07:23	17:47 (26) 07:23	15:14 (19) 08:14	12 12:40 (1)
18	21:40	20:53	28 20:10 (20) 19:41	18:27	11 17:58 (26) 16:20	18 15:32 (19) 15:45	16 12:56 (1)
19	04:46	05:34	19:42 (20) 06:30	07:25	17:49 (26) 07:25	15:15 (19) 08:16	12 12:39 (1)
20	21:39	20:51	27 20:09 (20) 19:39	18:24	6 17:55 (26) 16:18	16 15:31 (19) 15:45	18 12:57 (1)
21	04:48	05:36	19:43 (20) 06:32	07:27	17:51 (26) 07:27	15:18 (19) 08:17	12 12:39 (1)
22	21:38	20:49	25 20:08 (20) 19:36	18:22	2 17:53 (26) 16:16	12 15:30 (19) 15:44	19 12:58 (1)
23	04:49	05:38	19:44 (20) 06:34	07:28	07:29	08:18	12 12:38 (1)
24	21:37	20:47	23 20:07 (20) 19:34	18:20	16:14	15:44	21 12:59 (1)
25	04:50	05:40	19:44 (20) 06:35	07:30	07:31	08:19	12 12:38 (1)
26	21:36	20:45	21 20:05 (20) 19:31	18:17	16:13	15:44	22 13:00 (1)
27	04:51	05:41	19:45 (20) 06:37	07:32	07:33	08:20	12 12:38 (1)
28	21:35	20:43	19 20:04 (20) 19:29	18:15	16:11	15:44	23 13:01 (1)
29	04:53	05:43	19:47 (20) 06:39	07:34	07:35	08:21	12 12:38 (1)
30	21:34	20:40	15 20:02 (20) 19:26	18:12	16:09	15:44	23 13:01 (1)
31	04:54	05:45	19:49 (20) 06:41	07:36	07:37	08:22	12 12:38 (1)
32	21:33	20:38	10 19:59 (20) 19:24	18:10	16:08	15:44	24 13:02 (1)
33	04:55	05:47	06:43	07:38	07:38	08:23	12 12:39 (1)
34	21:32	20:36	19:21	18:08	16:06	15:44	24 13:03 (1)
35	04:57	20:18 (18) 05:49	06:44	17:47 (3) 07:40	07:40	08:23	12 12:39 (1)
36	21:30	7 20:25 (18) 20:34	19:19	17:55 (3) 18:05	16:05	15:45	25 13:04 (1)
37	04:58	20:17 (18) 05:50	06:46	17:43 (3) 07:42	07:42	08:24	12 12:40 (1)
38	21:29	10 20:27 (18) 20:32	19:16	17:59 (3) 18:03	16:03	15:45	28 14:03 (23)
39	04:59	19:54 (20) 05:52	06:48	17:40 (3) 07:44	07:44	08:25	12 12:40 (1)
40	21:28	18 20:28 (18) 20:29	19:14	21 18:01 (3) 18:01	16:02	15:45	29 14:04 (23)
41	05:01	19:51 (20) 05:54	06:50	17:37 (3) 07:46	07:46	08:25	12 12:41 (1)
42	21:26	25 20:29 (18) 20:27	19:11	25 18:02 (3) 17:59	16:01	15:46	30 14:05 (23)
43	05:02	19:50 (20) 05:56	06:52	17:36 (3) 07:48	16:18 (19) 07:48	08:26	12 12:41 (1)
44	21:25	30 20:30 (18) 20:25	19:09	27 18:03 (3) 17:56	16:30 (19) 15:59	15:46	30 14:05 (23)
45	05:04	19:48 (20) 05:58	06:53	17:35 (3) 07:50	16:15 (19) 07:50	08:27	12 12:42 (1)
46	21:23	35 20:31 (18) 20:22	19:06	28 18:03 (3) 17:54	16:33 (19) 15:58	15:47	29 14:06 (23)
47	05:06	19:46 (20) 05:59	06:55	17:34 (3) 07:51	16:13 (19) 07:51	08:27	12 12:42 (1)
48	21:22	39 20:31 (18) 20:20	19:04	30 18:04 (3) 17:52	21 16:34 (19) 15:57	15:47	29 14:06 (23)
49	05:07	19:46 (20) 06:01	06:57	17:33 (3) 06:53	15:12 (19) 07:53	08:27	12 12:42 (1)
50	21:20	41 20:32 (18) 20:18	19:01	31 18:04 (3) 16:50	23 15:35 (19) 15:56	15:48	27 14:05 (23)
51	05:09	19:44 (20) 06:03	06:59	17:31 (3) 06:55	15:11 (19) 07:55	08:28	12 12:43 (1)
52	21:19	44 20:32 (18) 20:15	18:59	33 18:04 (3) 16:48	25 15:36 (19) 15:55	15:48	24 13:07 (1)
53	05:10	19:44 (20) 06:05	07:01	17:31 (3) 06:57	15:10 (19) 07:56	08:28	12 12:43 (1)
54	21:17	47 20:33 (18) 20:13	18:56	33 18:04 (3) 16:45	26 15:36 (19) 15:53	15:49	24 13:07 (1)
55	05:12	19:43 (20) 06:07	07:03	17:30 (3) 06:59	15:10 (19) 07:58	08:28	12 12:45 (1)
56	21:16	47 20:32 (18) 20:11	18:54	34 18:04 (3) 16:43	27 15:37 (19) 15:52	15:50	23 13:08 (1)
57	05:14	19:43 (20) 06:08	07:04	17:30 (3) 07:01	15:09 (19) 08:00	08:28	12 12:45 (1)
58	21:14	49 20:33 (18) 20:08	18:51	33 18:03 (3) 16:41	29 15:38 (19) 15:51	15:51	22 13:07 (1)
59	05:15	19:42 (20) 06:10	07:06	17:30 (3) 07:03	15:09 (19) 08:01	08:28	12 12:46 (1)
60	21:12	50 20:32 (18) 20:06	18:49	33 18:03 (3) 16:39	29 15:38 (19) 15:51	15:52	22 13:08 (1)
61	05:17	19:42 (20) 06:12	07:05	17:30 (3) 07:05	15:09 (19) 08:02	08:28	12 12:47 (1)
62	21:10	50 20:33 (18) 20:03	18:47	33 18:03 (3) 16:37	29 15:38 (19) 15:51	15:53	21 13:08 (1)
63	Sonnenscheinstunden	514	461	383	328	257	231
64	astr.max.mögl.Beschattung	492	534	352	510	257	587
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.63	0.64	0.68	0.69	0.70	0.61
68	Gesamte Reduktion	0.25	0.28	0.25	0.21	0.13	0.08
69	Met.wahrsch.Beschattung	125	149	87	105	34	45

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 47

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: V - IO22

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	12:55 (1) 07:57	06:59	06:43	05:33	19:41 (20) 04:42	
2	15:54	36 14:21 (23) 16:46	17:43	19:42	20:39	21 20:02 (20) 21:29	
3	08:28	12:56 (1) 07:55	06:56	06:40	05:31	19:40 (20) 04:41	
4	15:57	34 14:21 (23) 16:48	17:45	19:44	20:40	23 20:03 (20) 21:31	
5	08:27	12:56 (1) 07:54	06:54	06:38	05:29	19:39 (20) 04:40	
6	15:57	30 14:19 (23) 16:50	17:47	19:46	20:42	24 20:03 (20) 21:32	
7	08:27	12:58 (1) 07:52	15:58 (19) 06:52	06:35	05:26	19:38 (20) 04:40	
8	15:58	24 13:22 (1) 16:52	10 16:08 (19) 17:49	19:48	20:44	26 20:04 (20) 21:33	
9	08:27	12:59 (1) 07:50	15:56 (19) 06:49	17:19 (26) 06:33	05:24	19:37 (20) 04:39	
10	15:59	22 13:21 (1) 16:54	16:11 (19) 17:51	17:24 (26) 19:50	20:46	27 20:04 (20) 21:34	
11	08:27	12:59 (1) 07:48	15:54 (19) 06:47	17:16 (26) 06:31	05:22	19:37 (20) 04:38	
12	16:00	21 13:20 (1) 16:56	19 16:13 (19) 17:53	9 17:25 (26) 19:52	20:48	34 20:17 (18) 21:35	
13	08:26	13:01 (1) 07:46	15:52 (19) 06:45	17:15 (26) 06:28	05:20	19:36 (20) 04:37	
14	16:02	19 13:20 (1) 16:58	21 16:13 (19) 17:55	13 17:28 (26) 19:54	20:50	39 20:18 (18) 21:36	
15	08:26	13:03 (1) 07:44	15:51 (19) 06:42	17:10 (3) 06:26	05:19	19:36 (20) 04:37	
16	16:03	16 13:19 (1) 17:00	24 16:15 (19) 17:57	19 17:29 (26) 19:55	20:51	42 20:20 (18) 21:37	
17	08:25	13:04 (1) 07:42	15:50 (19) 06:40	17:07 (3) 06:23	05:17	19:36 (20) 04:36	
18	16:05	14 13:18 (1) 17:03	26 16:16 (19) 17:59	25 17:32 (26) 19:57	20:53	45 20:22 (18) 21:38	
19	08:24	13:07 (1) 07:40	15:50 (19) 06:37	17:04 (3) 06:21	05:15	19:36 (20) 04:36	
20	16:06	10 13:17 (1) 17:05	26 16:16 (19) 18:00	27 17:31 (26) 19:59	20:55	47 20:23 (18) 21:39	
21	08:24	07:38	15:50 (19) 06:35	17:03 (3) 06:18	05:13	19:36 (20) 04:35	
22	16:08	17:07	27 16:17 (19) 18:02	29 17:32 (26) 20:01	20:57	47 20:23 (18) 21:40	
23	08:23	07:36	15:49 (19) 06:32	17:01 (3) 06:16	05:11	19:37 (20) 04:35	
24	16:09	17:09	29 16:18 (19) 18:04	29 17:30 (26) 20:03	20:59	47 20:24 (18) 21:41	
25	08:22	07:34	15:49 (19) 06:30	17:00 (3) 06:14	05:09	19:36 (20) 04:34	
26	16:11	17:11	29 16:18 (19) 18:06	30 17:30 (26) 20:05	21:00	48 20:24 (18) 21:41	
27	08:21	07:32	15:50 (19) 06:27	16:58 (3) 06:11	05:07	19:36 (20) 04:34	
28	16:13	17:13	28 16:18 (19) 18:08	31 17:29 (3) 20:07	21:02	48 20:24 (18) 21:42	
29	08:20	07:30	15:49 (19) 06:25	16:58 (3) 06:09	05:06	19:37 (20) 04:34	
30	16:14	17:15	28 16:17 (19) 18:10	31 17:29 (3) 20:09	21:04	48 20:25 (18) 21:43	
31	08:19	07:28	15:49 (19) 06:23	16:57 (3) 06:06	05:04	19:37 (20) 04:34	
32	16:16	17:17	28 16:17 (19) 18:12	32 17:29 (3) 20:10	21:05	47 20:24 (18) 21:43	
33	08:18	07:26	15:50 (19) 06:20	16:57 (3) 06:04	05:02	19:39 (20) 04:34	
34	16:18	17:19	27 16:17 (19) 18:14	32 17:29 (3) 20:12	21:07	44 20:24 (18) 21:44	
35	08:17	07:24	15:51 (19) 06:18	16:56 (3) 06:02	05:01	19:39 (20) 04:33	
36	16:19	17:21	26 16:17 (19) 18:16	33 17:29 (3) 20:14	21:09	43 20:24 (18) 21:44	
37	08:16	07:22	15:51 (19) 06:15	16:57 (3) 05:59	04:59	19:40 (20) 04:34	
38	16:21	17:23	25 16:16 (19) 18:18	32 17:29 (3) 20:16	21:10	41 20:24 (18) 21:45	
39	08:15	07:19	15:52 (19) 06:13	16:56 (3) 05:57	04:58	19:41 (20) 04:34	
40	16:23	17:25	23 16:15 (19) 18:20	32 17:28 (3) 20:18	21:12	39 20:24 (18) 21:45	
41	08:14	07:17	15:54 (19) 06:10	16:57 (3) 05:55	04:56	19:42 (20) 04:34	
42	16:25	17:27	20 16:14 (19) 18:22	30 17:27 (3) 20:20	21:14	35 20:23 (18) 21:45	
43	08:12	07:15	15:55 (19) 06:08	16:57 (3) 05:52	04:55	19:43 (20) 04:34	
44	16:27	17:29	16 16:11 (19) 18:23	29 17:26 (3) 20:22	21:15	31 20:22 (18) 21:45	
45	08:11	07:13	15:57 (19) 06:05	16:58 (3) 05:50	04:53	19:45 (20) 04:34	
46	16:29	17:31	12 16:09 (19) 18:25	27 17:25 (3) 20:24	21:17	27 20:22 (18) 21:45	
47	08:10	07:10	06:03	16:58 (3) 05:48	04:52	19:47 (20) 04:34	
48	16:31	17:33	18:27	25 17:23 (3) 20:26	21:18	20 20:20 (18) 21:46	
49	08:08	07:08	06:00	17:00 (3) 05:46	04:50	20:09 (18) 04:35	
50	16:32	17:35	18:29	22 17:22 (3) 20:27	21:20	10 20:19 (18) 21:46	
51	08:07	07:06	05:58	17:01 (3) 05:44	04:49	20:11 (18) 04:35	
52	16:34	17:37	18:31	19 17:20 (3) 20:29	21:21	7 20:18 (18) 21:46	
53	08:05	07:03	05:55	17:04 (3) 05:41	04:48	19:48 (20) 04:36	
54	16:36	17:39	18:33	13 17:17 (3) 20:31	21:23	21:45	
55	08:04	07:01	05:53	05:39	19:49 (20) 04:47	04:36	
56	16:38	17:41	18:35	20:33	6 19:55 (20) 21:24	21:45	
57	08:02	06:50	05:37	05:37	19:45 (20) 04:45	04:37	
58	16:40	19:37	20:35	14 19:59 (20) 21:26	21:45		
59	08:00	06:48	05:35	05:35	19:43 (20) 04:44	04:37	
60	16:42	19:39	20:37	17 20:00 (20) 21:27	21:45		
61	07:59	06:45	04:43	04:43	04:43	21:45	
62	16:44	19:40	21:28	21:28	496	512	
63	Sonnenscheinstunden	248	272	367	421	37	910
64	astr.max.mögl.Beschattung	226	459	574	641	9	266
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.51
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.61	0.70	0.68	0.64	0.64	0.64
68	Gesamte Reduktion	0.10	0.15	0.19	0.24	0.29	0.29
69	Met.wahrsch.Beschattung	22	69	111	9	266	266

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 48
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: V - IO22

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	05:19	19:47 (20) 06:14	07:08	17:40 (3) 07:07	15:20 (19) 08:03	
2	21:45	21:09	48 20:35 (18) 20:01	18:46	30 18:10 (26) 16:35	26 15:46 (19) 15:50	
3	04:39	05:20	19:46 (20) 06:16	07:10	17:41 (3) 07:09	15:20 (19) 08:05	12:50 (1)
4	21:44	21:07	48 20:34 (18) 19:59	18:44	29 18:10 (26) 16:33	25 15:45 (19) 15:49	9 12:59 (1)
5	04:40	05:22	19:46 (20) 06:17	07:12	17:41 (3) 07:11	15:21 (19) 08:06	12:49 (1)
6	21:44	21:05	47 20:33 (18) 19:56	18:41	28 18:09 (26) 16:31	23 15:44 (19) 15:48	13 13:02 (1)
7	04:40	05:24	19:46 (20) 06:19	07:14	17:43 (3) 07:13	15:22 (19) 08:08	12:47 (1)
8	21:43	21:03	44 20:31 (18) 19:54	18:39	26 18:09 (26) 16:29	21 15:43 (19) 15:48	16 13:03 (1)
9	04:41	05:26	19:46 (20) 06:21	07:15	17:45 (3) 07:15	15:24 (19) 08:09	12:47 (1)
10	21:43	21:01	42 20:30 (18) 19:51	18:37	22 18:07 (26) 16:27	18 15:42 (19) 15:47	18 13:05 (1)
11	04:42	05:27	19:47 (20) 06:23	07:17	17:51 (3) 07:17	15:26 (19) 08:10	12:46 (1)
12	21:42	20:59	38 20:28 (18) 19:49	18:34	14 18:05 (26) 16:25	14 15:40 (19) 15:46	20 13:06 (1)
13	04:43	05:29	19:46 (20) 06:25	07:19	17:52 (26) 07:19	15:28 (19) 08:12	12:46 (1)
14	21:41	20:57	34 20:26 (18) 19:46	18:32	10 18:02 (26) 16:23	10 15:38 (19) 15:46	22 13:08 (1)
15	04:44	05:31	19:47 (20) 06:26	07:21	17:53 (26) 07:21	15:30	12:45 (1)
16	21:41	20:55	26 20:13 (20) 19:44	18:29	7 18:00 (26) 16:21	15:45	24 13:09 (1)
17	04:45	05:33	19:48 (20) 06:28	07:23	17:55 (26) 07:23	15:34	12:47 (1)
18	21:40	20:53	25 20:13 (20) 19:41	18:27	3 17:58 (26) 16:20	15:45	29 14:08 (23)
19	04:46	05:34	19:48 (20) 06:30	07:25	17:57 (26) 07:25	15:36	12:45 (1)
20	21:39	20:51	24 20:12 (20) 19:39	18:24	16:18	15:45	34 14:10 (23)
21	04:48	05:36	19:49 (20) 06:32	07:27	17:59 (26) 07:27	15:37	12:45 (1)
22	21:38	20:49	22 20:11 (20) 19:36	18:22	16:16	15:44	37 14:11 (23)
23	04:49	05:38	19:50 (20) 06:34	07:28	17:59 (26) 07:29	15:38	12:45 (1)
24	21:37	20:47	20 20:10 (20) 19:34	18:20	16:14	15:44	38 14:12 (23)
25	04:50	05:40	19:51 (20) 06:35	07:30	17:59 (26) 07:30	15:39	12:45 (1)
26	21:36	20:45	16 20:07 (20) 19:31	18:17	16:13	15:44	40 14:13 (23)
27	04:51	05:41	19:53 (20) 06:37	07:32	17:59 (26) 07:32	15:40	12:45 (1)
28	21:35	20:43	12 20:05 (20) 19:29	18:15	16:11	15:44	41 14:14 (23)
29	04:53	05:43	19:58 (20) 06:39	07:34	17:59 (26) 07:34	15:41	12:45 (1)
30	21:34	20:40	3 20:01 (20) 19:26	18:12	16:09	15:44	42 14:14 (23)
31	04:54	05:45	19:59 (20) 06:41	07:37	17:59 (26) 07:37	15:42	12:46 (1)
1	21:33	20:38	19:24	12 18:06 (3) 18:10	16:08	15:44	43 14:15 (23)
2	04:55	20:22 (18) 05:47	06:43	17:50 (3) 07:38	16:06	15:44	45 14:16 (23)
3	21:32	4 20:26 (18) 20:36	19:21	18 18:08 (3) 18:08	16:06	15:44	45 14:16 (23)
4	04:57	20:19 (18) 05:49	06:44	17:47 (3) 07:40	16:06	15:44	45 14:16 (23)
5	21:30	9 20:28 (18) 20:34	19:19	22 18:09 (3) 18:05	6 16:32 (19) 07:40	15:45	44 14:17 (23)
6	04:58	19:59 (20) 05:50	06:46	17:46 (3) 07:42	16:28 (19) 07:42	15:44	12:47 (1)
7	21:29	15 20:30 (18) 20:32	19:16	25 18:11 (3) 18:03	13 16:41 (19) 07:44	15:45	46 14:18 (23)
8	04:59	19:56 (20) 05:52	06:48	17:44 (3) 07:44	16:25 (19) 07:44	15:45	46 14:18 (23)
9	21:28	24 20:31 (18) 20:29	19:14	28 18:12 (3) 18:01	18 16:43 (19) 07:46	15:45	46 14:18 (23)
10	05:01	19:54 (20) 05:54	06:50	17:42 (3) 07:46	16:23 (19) 07:46	15:45	46 14:18 (23)
11	21:26	29 20:32 (18) 20:27	19:11	29 18:11 (3) 17:59	22 16:45 (19) 07:48	15:46	46 14:19 (23)
12	05:02	19:53 (20) 05:56	06:52	17:41 (3) 07:48	16:22 (19) 07:48	15:46	46 14:19 (23)
13	21:25	33 20:33 (18) 20:25	19:09	31 18:12 (3) 17:56	24 16:46 (19) 07:49	15:46	46 14:19 (23)
14	05:04	19:51 (20) 05:58	06:53	17:41 (3) 07:50	16:21 (19) 07:49	15:47	46 14:20 (23)
15	21:23	37 20:33 (18) 20:22	19:06	31 18:12 (3) 17:54	25 16:46 (19) 07:51	15:47	46 14:20 (23)
16	05:06	19:50 (20) 05:59	06:55	17:40 (3) 07:51	16:20 (19) 07:51	15:47	46 14:20 (23)
17	21:22	40 20:33 (18) 20:20	19:04	32 18:12 (3) 17:52	27 16:47 (19) 07:52	15:47	46 14:20 (23)
18	05:07	19:50 (20) 06:01	06:57	17:40 (3) 06:53	15:19 (19) 07:53	15:47	46 14:20 (23)
19	21:20	41 20:34 (18) 20:18	19:01	32 18:12 (3) 16:50	28 15:47 (19) 07:56	15:48	44 14:20 (23)
20	05:09	19:49 (20) 06:03	06:59	17:39 (3) 06:55	15:19 (19) 07:55	15:48	44 14:20 (23)
21	21:19	43 20:34 (18) 20:15	18:59	32 18:11 (3) 16:48	28 15:47 (19) 07:55	15:48	45 14:20 (23)
22	05:10	19:49 (20) 06:05	07:01	17:39 (3) 06:57	15:18 (19) 07:56	15:48	44 14:20 (23)
23	21:17	45 20:35 (18) 20:13	18:56	32 18:11 (3) 16:45	29 15:47 (19) 07:53	15:49	44 14:20 (23)
24	05:12	19:48 (20) 06:07	07:03	17:39 (3) 06:59	15:18 (19) 07:58	15:49	44 14:20 (23)
25	21:16	46 20:34 (18) 20:11	18:54	31 18:10 (3) 16:43	29 15:47 (19) 07:52	15:50	43 14:21 (23)
26	05:14	19:48 (20) 06:08	07:04	17:39 (3) 07:01	15:19 (19) 08:00	15:49	44 14:20 (23)
27	21:14	47 20:35 (18) 20:08	18:51	31 18:10 (3) 16:41	28 15:47 (19) 07:51	15:51	42 14:21 (23)
28	05:15	19:47 (20) 06:10	07:06	17:39 (3) 07:03	15:19 (19) 08:01	15:49	44 14:20 (23)
29	21:12	47 20:34 (18) 20:06	18:49	30 18:09 (3) 16:39	28 15:47 (19) 07:51	15:52	41 14:21 (23)
30	05:17	19:47 (20) 06:12	07:05	17:39 (3) 07:05	15:19 (19) 08:02	15:49	44 14:20 (23)
31	21:10	48 20:35 (18) 20:03	18:46	30 18:09 (3) 16:37	28 15:47 (19) 07:51	15:53	39 14:21 (23)
Sonnenscheinstunden	514	461	383	328	257	231	
astr.max.mögl.Beschattung	508	449	416	502	137	1089	
Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.63	0.64	0.68	0.69	0.70	0.62	
Gesamte Reduktion	0.25	0.28	0.25	0.21	0.13	0.08	
Met.wahrsch.Beschattung	129	125	103	104	18	85	

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 49

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: W - IO23

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:28	12:46 (1) 07:57	06:59	06:43	18:12 (3) 05:33	04:42	19:53 (20)		
2	15:54	46 14:21 (23) 16:46	17:43	19:42	6 18:18 (3) 20:39	21:29	33 20:30 (18)		
3	08:28	12:47 (1) 07:55	06:56	06:40	05:31	04:41	19:54 (20)		
4	15:55	43 14:21 (23) 16:48	17:45	19:44	20:40	21:31	30 20:30 (18)		
5	08:28	12:48 (1) 07:54	06:54	06:38	05:29	04:40	19:55 (20)		
6	15:57	42 14:21 (23) 16:50	17:47	19:46	20:42	21:32	26 20:29 (18)		
7	08:27	12:49 (1) 07:52	06:52	06:35	05:26	19:59 (20) 04:40	19:56 (20)		
8	15:58	39 14:21 (23) 16:52	17:49	19:48	20:44	5 20:04 (20) 21:33	22 20:28 (18)		
9	08:27	12:49 (1) 07:50	06:49	06:33	05:24	19:55 (20) 04:39	19:57 (20)		
10	15:59	36 14:19 (23) 16:54	17:51	19:50	20:46	13 20:08 (20) 21:34	17 20:26 (18)		
11	08:27	12:50 (1) 07:48	06:47	17:24 (26) 06:31	05:22	19:53 (20) 04:38	19:59 (20)		
12	16:00	27 13:17 (1) 16:56	7 16:10 (19) 17:53	1 17:25 (26) 19:52	20:48	17 20:10 (20) 21:35	9 20:08 (20)		
13	08:26	12:52 (1) 07:46	06:45	06:28	05:20	19:51 (20) 04:37	20:00 (20)		
14	16:02	26 13:18 (1) 16:58	14 16:13 (19) 17:55	7 17:28 (26) 19:54	20:50	20 20:11 (20) 21:36	7 20:07 (20)		
15	08:26	12:53 (1) 07:44	06:42	06:26	05:19	19:50 (20) 04:37			
16	16:03	24 13:17 (1) 17:00	18 16:15 (19) 17:57	10 17:29 (26) 19:55	20:51	22 20:12 (20) 21:37			
17	08:25	12:54 (1) 07:42	06:40	06:23	05:17	19:50 (20) 04:36			
18	16:05	23 13:17 (1) 17:03	22 16:17 (19) 17:59	14 17:32 (26) 19:57	20:53	23 20:13 (20) 21:38			
19	08:24	12:55 (1) 07:40	06:37	06:21	05:15	19:48 (20) 04:36			
20	16:06	21 13:16 (1) 17:05	24 16:18 (19) 18:00	16 17:33 (26) 19:59	20:55	29 20:24 (18) 21:39			
21	08:24	12:57 (1) 07:38	06:35	06:18	05:13	19:48 (20) 04:35			
22	16:08	18 13:15 (1) 17:07	25 16:19 (19) 18:02	19 17:36 (26) 20:01	20:57	34 20:25 (18) 21:40			
23	08:23	12:59 (1) 07:36	06:32	06:16	05:11	19:48 (20) 04:35			
24	16:09	15 13:14 (1) 17:09	27 16:20 (19) 18:04	23 17:35 (26) 20:03	20:59	38 20:27 (18) 21:41			
25	08:22	13:01 (1) 07:34	06:30	06:09	05:09	19:47 (20) 04:34			
26	16:11	11 13:12 (1) 17:11	28 16:21 (19) 18:06	25 17:35 (26) 20:05	21:00	41 20:28 (18) 21:41			
27	08:21	13:02 (1) 07:32	06:27	06:11	05:07	19:46 (20) 04:34			
28	16:13	17:13	30 16:22 (19) 18:08	25 17:33 (26) 20:07	21:02	44 20:30 (18) 21:42			
29	08:20	13:03 (1) 07:30	06:25	06:09	05:06	19:47 (20) 04:34			
30	16:14	17:15	30 16:21 (19) 18:10	27 17:33 (3) 20:09	21:04	45 20:32 (18) 21:43			
31	08:19	13:04 (1) 07:28	06:23	06:06	05:04	19:46 (20) 04:34			
32	16:16	17:17	30 16:21 (19) 18:12	29 17:34 (3) 20:10	21:05	46 20:32 (18) 21:43			
33	08:18	13:05 (1) 07:26	06:20	06:04	05:02	19:47 (20) 04:34			
34	16:18	17:19	30 16:22 (19) 18:14	31 17:35 (3) 20:12	21:07	45 20:32 (18) 21:44			
35	08:17	13:06 (1) 07:24	06:18	06:02	05:01	19:46 (20) 04:34			
36	16:19	17:21	30 16:22 (19) 18:16	32 17:34 (3) 20:14	21:09	46 20:32 (18) 21:44			
37	08:16	13:07 (1) 07:22	06:15	05:59	04:59	19:47 (20) 04:34			
38	16:21	17:23	30 16:21 (19) 18:18	33 17:35 (3) 20:16	21:10	46 20:33 (18) 21:45			
39	08:15	13:08 (1) 07:19	06:13	05:57	04:58	19:47 (20) 04:34			
40	16:23	17:25	29 16:21 (19) 18:20	34 17:35 (3) 20:18	21:12	46 20:33 (18) 21:45			
41	08:14	13:09 (1) 07:17	06:10	05:55	04:56	19:47 (20) 04:34			
42	16:25	17:27	27 16:20 (19) 18:22	34 17:35 (3) 20:20	21:14	46 20:33 (18) 21:45			
43	08:12	13:10 (1) 07:15	06:08	05:52	04:55	19:47 (20) 04:34			
44	16:27	17:29	26 16:19 (19) 18:23	34 17:34 (3) 20:22	21:15	46 20:33 (18) 21:45			
45	08:11	13:11 (1) 07:13	06:05	05:50	04:53	19:48 (20) 04:34			
46	16:29	17:31	24 16:18 (19) 18:25	33 17:34 (3) 20:24	21:17	45 20:33 (18) 21:45			
47	08:10	13:12 (1) 07:10	06:03	05:48	04:52	19:48 (20) 04:34			
48	16:31	17:33	21 16:17 (19) 18:27	33 17:33 (3) 20:26	21:18	44 20:32 (18) 21:46			
49	08:08	13:13 (1) 07:08	06:00	05:46	04:50	19:48 (20) 04:35			
50	16:32	17:35	18 16:15 (19) 18:29	32 17:33 (3) 20:27	21:20	44 20:32 (18) 21:46			
51	08:07	13:14 (1) 07:06	05:58	05:44	04:49	19:49 (20) 04:35			
52	16:34	17:37	12 16:12 (19) 18:31	30 17:31 (3) 20:29	21:21	43 20:32 (18) 21:46			
53	08:05	13:15 (1) 07:03	05:55	05:41	04:48	19:49 (20) 04:36			
54	16:36	17:39	18 16:16 (19) 18:33	29 17:31 (3) 20:31	21:23	43 20:32 (18) 21:45			
55	08:04	13:16 (1) 07:01	05:53	05:39	04:47	19:50 (20) 04:36			
56	16:38	17:41	17 16:15 (19) 18:35	27 17:29 (3) 20:33	21:24	42 20:32 (18) 21:45			
57	08:02	13:17 (1) 06:59	05:50	05:37	04:45	19:51 (20) 04:37			
58	16:40	17:43	16 16:14 (19) 18:37	24 18:28 (3) 20:35	21:26	40 20:32 (18) 21:45			
59	08:00	13:18 (1) 06:56	05:48	05:35	04:44	19:51 (20) 04:37			
60	16:42	17:45	15 16:13 (19) 18:39	23 18:26 (3) 20:37	21:27	38 20:31 (18) 21:45			
61	07:59	13:19 (1) 06:54	05:45	05:32	04:43	19:52 (20)			
62	16:44	17:47	14 16:12 (19) 18:41	22 18:23 (3) 20:39	21:28	35 20:31 (18)			
63	Sonnenscheinstunden	248	272	367	421	496	512		
64	astr.max.mögl.Beschattung	371	502	637	6	1026	144		
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45		
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91		
67	Reduktion Windrichtung	0.62	0.70	0.68	0.68	0.63	0.63		
68	Gesamte Reduktion	0.10	0.15	0.19	0.25	0.29	0.26		
69	Met.wahrsch.Beschattung	36	76	123	2	299	37		

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 50

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: W - IO23

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	05:19	19:58 (20) 06:14	07:08	17:51 (3) 07:07	15:24 (19) 08:03	
2	21:45	21:09	20:37 (18) 20:01	18:46	18:15 (26) 16:35	15:47 (19) 15:50	
3	04:39	05:20	19:58 (20) 06:16	07:10	17:54 (3) 07:09	15:25 (19) 08:05	
4	21:44	21:07	20:35 (18) 19:59	18:44	18:14 (26) 16:33	15:46 (19) 15:49	
5	04:40	05:22	19:59 (20) 06:17	07:12	17:55 (26) 07:11	15:27 (19) 08:06	
6	21:44	21:05	20:24 (20) 19:56	18:41	17:18 (26) 16:31	15:44 (19) 15:48	
7	04:40	05:24	19:59 (20) 06:19	07:14	17:55 (26) 07:13	15:29 (19) 08:08	
8	21:43	21:03	20:22 (20) 19:54	18:39	15:18 (26) 16:29	13:15 (26) 16:29	
9	04:41	20:07 (20) 05:26	20:01 (20) 06:21	07:15	17:55 (26) 07:15	15:33 (19) 08:09	
10	21:43	20:12 (20) 21:01	20:22 (20) 19:51	18:37	12:18 (26) 16:27	6 15:39 (19) 15:47	
11	04:42	20:06 (20) 05:27	20:02 (20) 06:23	07:17	17:56 (26) 07:17	15:30 (19) 08:10	
12	21:42	8 20:14 (20) 20:59	19 20:21 (20) 19:49	18:34	9 18:05 (26) 16:25	15:46 27 13:03 (1)	
13	04:43	20:05 (20) 05:29	20:03 (20) 06:25	07:19	17:58 (26) 07:19	15:46 27 13:03 (1)	
14	21:41	13 20:32 (18) 20:57	15 20:18 (20) 19:46	18:32	4 18:02 (26) 16:23	15:46 34 14:06 (23)	
15	04:44	20:04 (20) 05:31	20:05 (20) 06:26	07:21	17:59 (26) 07:21	15:46 34 14:06 (23)	
16	21:41	20 20:35 (18) 20:55	11 20:16 (20) 19:44	18:29	17:59 (26) 07:21	15:45 39 14:08 (23)	
17	04:45	20:03 (20) 05:33	06:28	07:23	17:59 (26) 07:23	15:45 39 14:08 (23)	
18	21:40	24 20:36 (18) 20:53	19:41	18:27	17:59 (26) 07:23	15:45 39 14:08 (23)	
19	04:46	20:02 (20) 05:34	06:30	07:25	17:59 (26) 07:25	15:45 39 14:08 (23)	
20	21:39	28 20:37 (18) 20:51	19:39	18:24	17:59 (26) 07:25	15:45 39 14:08 (23)	
21	04:48	20:02 (20) 05:36	06:32	18:06 (3) 07:27	17:59 (26) 07:27	15:45 39 14:08 (23)	
22	21:38	31 20:38 (18) 20:49	19:36	3 18:09 (3) 18:22	17:59 (26) 07:27	15:45 39 14:08 (23)	
23	04:49	20:01 (20) 05:38	06:34	18:00 (3) 07:28	17:59 (26) 07:29	15:45 39 14:08 (23)	
24	21:37	34 20:39 (18) 20:47	19:34	15 18:15 (3) 18:20	17:59 (26) 07:29	15:45 39 14:08 (23)	
25	04:50	20:00 (20) 05:40	06:35	17:57 (3) 07:30	17:59 (26) 07:31	15:45 39 14:08 (23)	
26	21:36	36 20:39 (18) 20:45	19:31	19 18:16 (3) 18:17	17:59 (26) 07:31	15:45 39 14:08 (23)	
27	04:51	20:00 (20) 05:41	06:37	17:55 (3) 07:32	17:59 (26) 07:33	15:45 39 14:08 (23)	
28	21:35	39 20:40 (18) 20:43	19:29	23 18:18 (3) 18:15	17:59 (26) 07:33	15:45 39 14:08 (23)	
29	04:53	19:59 (20) 05:43	06:39	17:53 (3) 07:34	16:35 (19) 07:35	15:45 39 14:08 (23)	
30	21:34	40 20:40 (18) 20:40	19:26	26 18:19 (3) 18:12	7 16:42 (19) 16:09	15:44 50 14:14 (23)	
31	04:54	19:59 (20) 05:45	06:41	17:52 (3) 07:36	16:31 (19) 07:37	15:44 50 14:14 (23)	
32	21:33	43 20:42 (18) 20:38	19:24	28 18:20 (3) 18:10	15 16:46 (19) 16:08	15:44 51 14:15 (23)	
33	04:55	19:59 (20) 05:47	06:43	17:50 (3) 07:38	16:28 (19) 07:38	15:44 51 14:15 (23)	
34	21:32	43 20:42 (18) 20:36	19:21	30 18:20 (3) 18:08	20 16:48 (19) 16:06	15:44 52 14:16 (23)	
35	04:57	19:58 (20) 05:49	06:44	17:49 (3) 07:40	16:27 (19) 07:40	15:44 52 14:16 (23)	
36	21:30	44 20:42 (18) 20:34	19:19	31 18:20 (3) 18:05	22 16:49 (19) 16:05	15:44 52 14:17 (23)	
37	04:58	19:58 (20) 05:50	06:46	17:48 (3) 07:42	16:25 (19) 07:42	15:44 52 14:17 (23)	
38	21:29	45 20:43 (18) 20:32	19:16	33 18:21 (3) 18:03	25 16:50 (19) 16:03	15:44 52 14:17 (23)	
39	04:59	19:58 (20) 05:52	06:48	17:47 (3) 07:44	16:24 (19) 07:44	15:44 52 14:17 (23)	
40	21:28	45 20:43 (18) 20:29	19:14	34 18:21 (3) 18:01	26 16:50 (19) 16:02	15:44 52 14:17 (23)	
41	05:01	19:57 (20) 05:54	06:50	17:46 (3) 07:46	16:23 (19) 07:46	15:44 52 14:17 (23)	
42	21:26	46 20:43 (18) 20:27	19:11	34 18:20 (3) 17:59	28 16:51 (19) 16:01	15:44 52 14:18 (23)	
43	05:02	19:58 (20) 05:56	06:52	17:46 (3) 07:48	16:22 (19) 07:48	15:44 52 14:18 (23)	
44	21:25	45 20:43 (18) 20:25	19:09	34 18:20 (3) 17:56	29 16:51 (19) 15:59	15:44 52 14:18 (23)	
45	05:04	19:57 (20) 05:58	06:53	17:46 (3) 07:50	16:22 (19) 07:50	15:44 52 14:18 (23)	
46	21:23	46 20:43 (18) 20:22	19:06	33 18:19 (3) 17:54	29 16:51 (19) 15:58	15:44 52 14:19 (23)	
47	05:06	19:56 (20) 05:59	06:55	17:46 (3) 07:51	16:21 (19) 07:51	15:44 52 14:19 (23)	
48	21:22	47 20:43 (18) 20:20	19:04	33 18:19 (3) 17:52	30 16:51 (19) 15:57	15:44 52 14:19 (23)	
49	05:07	19:57 (20) 06:01	06:57	17:46 (3) 06:53	15:21 (19) 07:53	15:44 52 14:19 (23)	
50	21:20	46 20:43 (18) 20:18	19:01	32 18:18 (3) 16:50	30 15:51 (19) 15:56	15:44 52 14:19 (23)	
51	05:09	19:56 (20) 06:03	06:59	17:45 (3) 06:55	15:21 (19) 07:55	15:44 52 14:20 (23)	
52	21:19	46 20:42 (18) 20:15	18:59	32 18:17 (3) 16:48	30 15:51 (19) 15:56	15:44 52 14:20 (23)	
53	05:10	19:57 (20) 06:05	07:01	17:46 (3) 06:57	15:21 (19) 07:56	15:44 52 14:20 (23)	
54	21:17	46 20:43 (18) 20:13	18:56	30 18:16 (3) 16:45	29 15:50 (19) 15:53	15:44 52 14:20 (23)	
55	05:12	19:56 (20) 06:07	07:03	17:47 (3) 06:59	15:21 (19) 07:58	15:44 52 14:20 (23)	
56	21:16	46 20:42 (18) 20:11	18:54	27 18:14 (3) 16:43	29 15:50 (19) 15:52	15:44 50 14:21 (23)	
57	05:14	19:57 (20) 06:08	07:04	17:48 (3) 07:01	15:22 (19) 08:00	15:44 50 14:21 (23)	
58	21:14	44 20:41 (18) 20:08	18:51	26 18:14 (26) 16:41	28 15:50 (19) 15:51	11 12:53 (1) 15:51	
59	05:15	19:57 (20) 06:10	07:06	17:49 (3) 07:03	15:23 (19) 08:01	12:41 (1) 08:28	
60	21:12	42 20:39 (18) 20:06	18:49	25 18:14 (26) 16:39	27 15:50 (19) 15:51	15 12:56 (1) 15:52	
61	05:17	19:57 (20) 06:12	07:05	17:49 (3) 07:05	15:23 (19) 08:01	12:45 (1) 08:28	
62	21:10	41 20:38 (18) 20:03	18:47	26 18:14 (26) 16:37	26 15:49 (19) 15:51	15:53 47 14:21 (23)	
63	Sonnenscheinstunden	514	461	383	328	257	231
64	astr.max.mögl.Beschattung	993	184	548	531	106	1356
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.63	0.63	0.68	0.70	0.68	0.62
68	Gesamte Reduktion	0.25	0.28	0.25	0.21	0.13	0.08
69	Met.wahrsch.Beschattung	251	51	136	110	14	106

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 51
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: X - IO24

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	12:47 (1) 07:57	06:59	16:05 (19) 06:43	18:11 (3) 05:33	04:42	19:59 (20)	
2	15:54	59 14:30 (23) 16:46	17:43	21 16:26 (19) 19:42	28 18:39 (3) 20:39	21:29	41 20:40 (18)	
3	08:28	12:48 (1) 07:55	06:56	16:07 (19) 06:40	18:11 (3) 05:31	04:41	20:00 (20)	
4	15:57	57 14:30 (23) 16:48	17:45	16 16:23 (19) 19:44	26 18:37 (3) 20:40	21:31	40 20:40 (18)	
5	08:27	12:48 (1) 07:54	06:54	16:10 (19) 06:38	18:13 (3) 05:29	04:40	20:00 (20)	
6	15:57	57 14:30 (23) 16:50	17:47	10 16:20 (19) 19:46	23 18:36 (3) 20:42	21:32	40 20:40 (18)	
7	08:27	12:49 (1) 07:52	06:52	16:35	18:14 (3) 05:26	04:40	20:00 (20)	
8	15:58	56 14:31 (23) 16:52	17:49	19 18:33 (3) 20:44	21:33	39 20:39 (18)		
9	08:27	12:50 (1) 07:50	06:49	16:33	18:17 (3) 05:24	04:39	20:00 (20)	
10	15:59	53 14:30 (23) 16:54	17:51	13 18:30 (3) 20:46	21:34	39 20:39 (18)		
11	08:27	12:50 (1) 07:48	06:47	16:31	18:30 (3) 05:22	04:38	20:01 (20)	
12	16:00	52 14:30 (23) 16:56	17:53	19:52	20:48	21:35	38 20:39 (18)	
13	08:26	12:51 (1) 07:46	06:45	16:28	18:30 (3) 05:20	04:37	20:01 (20)	
14	16:02	50 14:30 (23) 16:58	17:55	19:54	20:50	21:36	38 20:39 (18)	
15	08:26	12:52 (1) 07:44	06:42	16:26	18:30 (3) 05:19	04:37	20:02 (20)	
16	16:03	46 14:29 (23) 17:00	17:57	19:55	20:51	21:37	37 20:39 (18)	
17	08:25	12:53 (1) 07:42	06:40	17:27 (26) 06:23	19:57	20:52	20:02 (20)	
18	16:05	44 14:29 (23) 17:03	17:59	5 17:32 (26) 19:57	20:53	21:38	35 20:38 (18)	
19	08:24	12:54 (1) 07:40	06:37	17:24 (26) 06:21	19:55	20:50	20:03 (20)	
20	16:06	41 14:28 (23) 17:05	18:00	9 17:33 (26) 19:59	20:55	12 20:17 (20) 21:39	34 20:38 (18)	
21	08:24	12:55 (1) 07:38	16:12 (19) 06:35	17:23 (26) 06:18	19:56	20:51	20:04 (20)	
22	16:08	34 14:25 (23) 17:07	18:02	13 17:36 (26) 20:01	20:57	15 20:18 (20) 21:40	32 20:38 (18)	
23	08:23	12:56 (1) 07:36	16:09 (19) 06:32	17:22 (26) 06:16	19:54	20:50	20:04 (20)	
24	16:09	28 13:24 (1) 17:09	18:04	15 17:37 (26) 20:03	20:59	19 20:21 (20) 21:41	30 20:37 (18)	
25	08:22	12:57 (1) 07:34	16:07 (19) 06:30	17:22 (26) 06:14	19:59	20:01 (20) 21:34	29:05 (20)	
26	16:11	27 13:24 (1) 17:11	19:16 (19) 18:06	18:14 (26) 20:05	21:00	20 20:21 (20) 21:41	28 20:37 (18)	
27	08:21	12:59 (1) 07:32	16:06 (19) 06:27	17:21 (26) 06:11	19:57	20:02 (20) 21:34	20:05 (20)	
28	16:13	24 13:23 (1) 17:13	18:08	19 17:40 (26) 20:07	21:02	27 20:30 (18) 21:42	29 20:37 (18)	
29	08:20	13:00 (1) 07:30	16:04 (19) 06:25	17:21 (26) 06:09	19:56	20:03 (20) 21:34	20:06 (20)	
30	16:14	23 13:23 (1) 17:15	18:10	19 17:40 (26) 20:09	21:04	32 20:32 (18) 21:43	27 20:37 (18)	
31	08:19	13:03 (1) 07:28	16:03 (19) 06:23	17:21 (26) 06:06	19:54	20:04 (20) 21:34	20:06 (20)	
32	16:16	19 13:22 (1) 17:17	18:12	18 17:39 (26) 20:10	21:05	35 20:33 (18) 21:43	26 20:37 (18)	
33	08:18	13:05 (1) 07:26	16:02 (19) 06:20	17:20 (3) 06:04	19:52	20:04 (20) 21:34	20:07 (20)	
34	16:18	15 13:20 (1) 17:19	18:14	18 17:38 (3) 20:12	21:07	37 20:35 (18) 21:44	24 20:37 (18)	
35	08:17	13:08 (1) 07:24	16:02 (19) 06:18	17:17 (3) 06:02	19:51	20:05 (20) 21:34	20:07 (20)	
36	16:19	9 13:17 (1) 17:21	18:16	23 17:40 (3) 20:14	21:09	39 20:36 (18) 21:44	24 20:37 (18)	
37	08:16	13:10 (1) 07:22	16:01 (19) 06:15	17:15 (3) 05:59	19:50	20:06 (20) 21:34	20:07 (20)	
38	16:21	17:23	30 16:31 (19) 18:18	26 17:41 (3) 20:16	21:10	41 20:38 (18) 21:44	22 20:36 (18)	
39	08:15	13:11 (1) 07:20	16:01 (19) 06:13	17:14 (3) 05:57	19:50	20:07 (20) 21:34	20:07 (20)	
40	16:23	17:25	30 16:31 (19) 18:20	29 17:42 (3) 20:18	21:12	42 20:39 (18) 21:45	22 20:36 (18)	
41	08:14	13:12 (1) 07:17	16:01 (19) 06:10	17:13 (3) 05:55	19:50	20:08 (20) 21:34	20:07 (20)	
42	16:25	17:27	31 16:32 (19) 18:22	30 17:43 (3) 20:20	21:14	42 20:39 (18) 21:45	22 20:36 (18)	
43	08:12	13:13 (1) 07:15	16:00 (19) 06:08	17:11 (3) 05:52	19:49	20:09 (20) 21:34	20:07 (20)	
44	16:27	17:29	31 16:31 (19) 18:23	32 17:43 (3) 20:22	21:15	43 20:40 (18) 21:45	22 20:36 (18)	
45	08:11	13:14 (1) 07:13	16:01 (19) 06:05	17:11 (3) 05:50	19:48	20:10 (20) 21:34	20:08 (20)	
46	16:29	17:31	30 16:31 (19) 18:25	33 17:44 (3) 20:24	21:17	43 20:40 (18) 21:45	22 20:37 (18)	
47	08:10	13:15 (1) 07:11	16:01 (19) 06:03	17:10 (3) 05:48	19:47	20:11 (20) 21:34	20:08 (20)	
48	16:31	17:33	30 16:31 (19) 18:27	33 17:43 (3) 20:26	21:18	43 20:39 (18) 21:46	24 20:38 (18)	
49	08:08	13:16 (1) 07:09	16:01 (19) 06:00	17:10 (3) 05:46	19:46	20:12 (20) 21:34	20:08 (20)	
50	16:32	17:35	29 16:30 (19) 18:29	34 17:44 (3) 20:27	21:20	43 20:40 (18) 21:46	24 20:38 (18)	
51	08:07	13:17 (1) 07:06	16:02 (19) 05:58	17:09 (3) 05:44	19:45	20:13 (20) 21:34	20:08 (20)	
52	16:34	17:37	28 16:30 (19) 18:31	34 17:43 (3) 20:29	21:21	43 20:40 (18) 21:46	26 20:39 (18)	
53	08:05	13:18 (1) 07:03	16:02 (19) 05:55	17:08 (3) 05:41	19:44	20:14 (20) 21:34	20:08 (20)	
54	16:36	17:39	26 16:28 (19) 18:33	34 17:43 (3) 20:31	21:23	43 20:40 (18) 21:45	27 20:39 (18)	
55	08:04	13:19 (1) 07:01	16:04 (19) 05:53	17:09 (3) 05:39	19:43	20:15 (20) 21:34	20:08 (20)	
56	16:38	17:41	23 16:27 (19) 18:35	33 17:42 (3) 20:33	21:24	42 20:40 (18) 21:45	28 20:40 (18)	
57	08:02	13:20 (1) 06:59	16:05 (19) 05:51	17:08 (3) 05:37	19:42	20:16 (20) 21:34	20:08 (20)	
58	16:40	17:43	33 16:29 (19) 18:37	33 17:42 (3) 20:35	21:26	42 20:40 (18) 21:45	28 20:40 (18)	
59	08:00	13:21 (1) 06:56	16:06 (19) 05:48	17:07 (3) 05:35	19:41	20:17 (20) 21:34	20:08 (20)	
60	16:42	17:45	31 16:29 (19) 18:39	31 17:41 (3) 20:37	21:27	42 20:40 (18) 21:45	30 20:41 (18)	
61	07:59	13:22 (1) 06:53	16:07 (19) 05:45	17:06 (3) 05:33	19:40	20:18 (20) 21:34	20:08 (20)	
62	16:44	17:47	30 16:28 (19) 18:41	30 17:40 (3) 20:39	21:28	42 20:40 (18) 21:45	30 20:41 (18)	
63	Sonnenscheinstunden	248	272	367	421	496	512	898
64	astr.max.mögl.Beschattung	694	461	616	109	787	898	898
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45	0.45
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.62	0.70	0.68	0.68	0.63	0.63	0.63
68	Gesamte Reduktion	0.10	0.15	0.19	0.25	0.29	0.26	0.26
69	Met.wahrsch.Beschattung	68	70	119	28	228	231	231

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) Schattende (WEA mit letztem Schatten)
	Minuten mit Schatten	

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 52

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: X - IO24

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember		
1	04:38	20:08 (20) 05:19	20:13 (20) 06:14	07:08	18:02 (26) 07:07	08:03	12:37 (1)	
2	21:45	32 20:42 (18) 21:09	20:30 (20) 20:01	18:46	16 18:18 (26) 16:35	15:50	33 14:07 (23)	
3	04:39	20:08 (20) 05:20	20:14 (20) 06:16	07:10	18:02 (26) 07:09	08:05	12:37 (1)	
4	21:44	33 20:42 (18) 21:07	20:28 (20) 19:59	18:44	13 18:15 (26) 16:33	15:49	40 14:11 (23)	
5	04:40	20:08 (20) 05:22	20:17 (20) 06:17	07:12	18:02 (26) 07:11	08:06	12:37 (1)	
6	21:44	35 20:43 (18) 21:05	20:26 (20) 19:56	18:41	10 18:12 (26) 16:31	15:48	44 14:13 (23)	
7	04:40	20:08 (20) 05:24	20:08 (20) 06:19	07:14	18:03 (26) 07:13	08:08	12:36 (1)	
8	21:43	36 20:44 (18) 21:03	19:54	18:39	7 18:10 (26) 16:29	15:48	46 14:13 (23)	
9	04:41	20:08 (20) 05:26	20:02	07:15	18:06 (26) 07:15	08:09	12:37 (1)	
10	21:43	37 20:45 (18) 21:01	19:51	18:37	1 18:07 (26) 16:27	15:47	49 14:15 (23)	
11	04:42	20:08 (20) 05:27	20:03	07:17	18:02 (26) 07:17	08:10	12:36 (1)	
12	21:42	37 20:45 (18) 20:59	19:49	18:34	16:25	15:46	52 14:16 (23)	
13	04:43	20:08 (20) 05:29	20:05	07:19	18:02 (26) 07:19	08:12	12:37 (1)	
14	21:41	38 20:46 (18) 20:57	19:46	12 18:25 (3) 18:32	16:23	15:46	53 14:17 (23)	
15	04:44	20:08 (20) 05:31	20:06	07:21	18:10 (3) 07:21	08:13	12:36 (1)	
16	21:41	39 20:47 (18) 20:55	19:44	18 18:28 (3) 18:29	16:21	15:45	56 14:18 (23)	
17	04:45	20:07 (20) 05:33	20:08	07:23	18:06 (3) 07:23	08:14	12:37 (1)	
18	21:40	40 20:47 (18) 20:53	19:41	23 18:29 (3) 18:27	16:20	15:45	56 14:19 (23)	
19	04:46	20:07 (20) 05:34	20:09	07:25	18:05 (3) 07:25	08:16	12:37 (1)	
20	21:39	41 20:48 (18) 20:51	19:39	25 18:30 (3) 18:24	16:18	15:45	58 14:20 (23)	
21	04:48	20:07 (20) 05:36	20:10	07:27	18:03 (3) 07:27	08:17	12:37 (1)	
22	21:38	41 20:48 (18) 20:49	19:36	28 18:31 (3) 18:22	13 16:56 (19) 16:16	15:44	59 14:20 (23)	
23	04:49	20:07 (20) 05:38	20:11	07:28	18:02 (3) 07:28	08:18	12:37 (1)	
24	21:37	41 20:48 (18) 20:47	19:34	30 18:32 (3) 18:20	18 16:58 (19) 16:14	15:44	59 14:20 (23)	
25	04:50	20:07 (20) 05:40	20:12	07:30	18:00 (3) 07:30	08:19	12:37 (1)	
26	21:36	41 20:48 (18) 20:45	19:31	32 18:32 (3) 18:17	22 17:00 (19) 16:13	15:44	61 14:21 (23)	
27	04:51	20:06 (20) 05:41	20:13	07:32	18:00 (3) 07:32	08:20	12:38 (1)	
28	21:35	43 20:49 (18) 20:43	19:29	32 18:32 (3) 18:15	25 17:01 (19) 16:11	15:44	60 14:22 (23)	
29	04:53	20:06 (20) 05:43	20:14	07:34	17:59 (3) 07:34	08:21	12:38 (1)	
30	21:34	43 20:49 (18) 20:40	19:26	33 18:32 (3) 18:12	26 17:01 (19) 16:09	15:44	61 14:22 (23)	
31	04:54	20:07 (20) 05:45	20:15	07:36	17:59 (3) 07:36	08:22	12:38 (1)	
32	21:33	43 20:50 (18) 20:38	19:24	33 18:32 (3) 18:10	28 16:34 (19) 16:08	15:44	62 14:23 (23)	
33	04:55	20:07 (20) 05:47	20:16	07:38	17:57 (3) 07:38	08:23	12:39 (1)	
34	21:32	43 20:50 (18) 20:36	19:21	34 18:31 (3) 18:08	29 17:02 (19) 16:06	15:44	62 14:24 (23)	
35	04:57	20:06 (20) 05:49	20:17	07:40	17:57 (3) 07:40	08:23	12:40 (1)	
36	21:30	43 20:49 (18) 20:34	19:19	34 18:31 (3) 18:05	31 17:03 (19) 16:05	15:45	61 14:24 (23)	
37	04:58	20:07 (20) 05:50	20:18	07:42	17:57 (3) 07:42	08:24	12:40 (1)	
38	21:29	43 20:50 (18) 20:32	19:16	34 18:31 (3) 18:03	31 17:03 (19) 16:03	15:45	63 14:25 (23)	
39	04:59	20:07 (20) 05:52	20:19	07:44	17:57 (3) 07:44	08:25	12:40 (1)	
40	21:28	43 20:50 (18) 20:29	19:14	33 18:30 (3) 18:01	30 17:02 (19) 16:02	15:45	63 14:25 (23)	
41	05:01	20:06 (20) 05:54	20:20	07:46	17:57 (3) 07:46	08:25	12:41 (1)	
42	21:26	43 20:49 (18) 20:27	19:11	32 18:29 (3) 17:59	31 17:02 (19) 16:01	15:46	63 14:26 (23)	
43	05:02	20:07 (20) 05:56	20:21	07:48	17:57 (3) 07:48	08:26	12:41 (1)	
44	21:25	43 20:50 (18) 20:25	19:09	31 18:28 (3) 17:56	31 17:02 (19) 15:59	15:46	62 14:26 (23)	
45	05:04	20:07 (20) 05:58	20:22	07:50	17:58 (3) 07:50	08:27	12:42 (1)	
46	21:23	42 20:49 (18) 20:22	19:06	29 18:27 (3) 17:54	30 17:01 (19) 15:58	15:47	63 14:27 (23)	
47	05:06	20:07 (20) 05:59	20:23	07:51	17:59 (3) 07:51	08:27	12:42 (1)	
48	21:22	41 20:48 (18) 20:20	19:04	26 18:25 (3) 17:52	29 17:01 (19) 15:57	9 12:45 (1) 15:47	63 14:27 (23)	
49	05:07	20:08 (20) 06:01	20:24	07:53	18:00 (3) 06:53	15:32 (19) 07:53	12:42 (1) 08:27	12:42 (1)
50	21:20	39 20:47 (18) 20:18	19:01	24 18:24 (3) 16:50	28 16:00 (19) 15:56	15 12:57 (1) 15:48	63 14:27 (23)	
51	05:09	20:08 (20) 06:03	20:25	07:55	18:01 (3) 06:55	15:33 (19) 07:55	12:41 (1) 08:28	12:43 (1)
52	21:19	37 20:45 (18) 20:15	18:59	20 18:21 (3) 16:48	26 15:59 (19) 15:55	19 13:00 (1) 15:48	61 14:27 (23)	
53	05:10	20:09 (20) 06:05	20:26	07:57	18:03 (3) 06:57	15:33 (19) 07:56	12:40 (1) 08:28	12:43 (1)
54	21:17	35 20:44 (18) 20:13	18:56	17 18:20 (26) 16:45	25 15:58 (19) 15:53	22 13:02 (1) 15:49	62 14:28 (23)	
55	05:12	20:09 (20) 06:07	20:27	07:59	18:02 (26) 06:59	15:34 (19) 07:58	12:39 (1) 08:28	12:45 (1)
56	21:16	33 20:42 (18) 20:11	18:54	19 18:21 (26) 16:43	22 15:56 (19) 15:52	24 13:03 (1) 15:50	61 14:29 (23)	
57	05:14	20:10 (20) 06:08	20:28	07:01	18:02 (26) 07:01	15:37 (19) 08:00	12:38 (1) 08:28	12:44 (1)
58	21:14	29 20:41 (18) 20:08	18:51	19 18:21 (26) 16:41	18 15:55 (19) 15:51	27 13:05 (1) 15:51	61 14:28 (23)	
59	05:15	20:10 (20) 06:10	20:29	07:06	18:02 (26) 07:03	15:39 (19) 08:01	12:38 (1) 08:28	12:45 (1)
60	21:12	20:32 (20) 20:06	18:49	18 18:20 (26) 16:39	14 15:53 (19) 15:51	28 13:06 (1) 15:52	61 14:29 (23)	
61	05:17	20:11 (20) 06:12	20:30	07:05	18:02 (26) 07:05	15:43 (19)	08:28	12:46 (1)
62	21:10	20 20:31 (20) 20:03	18:47	17 16:37	6 15:49 (19)	257	15:53	59 14:29 (23)
63	Sonnenscheinstunden	514	461	383	328	257	231	
64	astr.max.mögl.Beschattung	1176	40	636	560	144	1777	
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14	
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
67	Reduktion Windrichtung	0.63	0.63	0.63	0.70	0.81	0.63	
68	Gesamte Reduktion	0.25	0.28	0.25	0.21	0.11	0.08	
69	Met.wahrsch.Beschattung	296	11	158	117	16	139	

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)

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 53
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: Y - IO25

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	12:59 (1) 07:57	06:59	16:13 (19) 06:43	18:17 (3) 05:33	04:42	20:03 (20)	
2	08:28	71 14:42 (23) 16:46	17:43	28 16:41 (19) 19:42	31 18:48 (3) 20:39	21:29	38 20:41 (18)	
3	08:28	15:55 66 14:43 (23) 16:48	17:45	27 16:40 (19) 19:44	30 18:47 (3) 20:40	21:31	38 20:04 (20)	
4	08:27	15:57 65 14:43 (23) 16:50	17:47	25 16:39 (19) 19:46	28 18:46 (3) 20:42	21:32	38 20:42 (18)	
5	08:27	15:58 63 14:43 (23) 16:52	17:49	22 16:37 (19) 19:48	26 18:44 (3) 20:44	21:33	37 20:04 (20)	
6	08:27	15:59 63 14:43 (23) 16:54	17:51	20 16:36 (19) 19:50	23 18:43 (3) 20:46	21:34	37 20:41 (18)	
7	08:26	16:00 63 14:43 (23) 16:56	17:53	15 16:33 (19) 19:52	20 18:41 (3) 20:48	21:35	36 20:05 (20)	
8	08:26	16:02 62 14:44 (23) 16:58	17:55	6 16:29 (19) 19:54	15 18:38 (3) 20:50	21:36	35 20:41 (18)	
9	08:26	16:03 61 14:44 (23) 17:00	17:57	19:55	8 18:35 (3) 20:51	21:37	35 20:06 (20)	
10	08:25	16:05 59 14:43 (23) 17:03	17:59	19:57	20:53	21:38	34 20:08 (20)	
11	08:24	16:06 57 14:43 (23) 17:05	18:00	19:59	20:55	21:39	33 20:40 (18)	
12	08:23	16:08 55 14:43 (23) 17:07	18:02	5 17:31 (26) 06:18	05:13	20:09 (20) 04:35	20:08 (20)	
13	08:22	16:11 49 14:42 (23) 17:11	18:06	9 17:28 (26) 06:16	05:11	20:08 (20) 04:35	20:08 (20)	
14	08:21	16:13 47 14:42 (23) 17:13	18:08	13 17:27 (26) 06:14	05:09	20:06 (20) 04:34	29 20:39 (18)	
15	08:20	16:14 43 14:41 (23) 17:15	18:10	17 17:26 (26) 06:09	05:06	20:04 (20) 04:34	20:10 (20)	
16	08:19	16:16 37 14:39 (23) 17:17	18:12	18 17:25 (26) 06:06	05:04	20:03 (20) 04:34	26 20:39 (18)	
17	08:18	16:18 28 13:40 (1) 17:19	18:14	18 17:43 (26) 10:12	21:07	32 20:35 (18) 21:44	23 20:38 (18)	
18	08:17	16:19 26 13:39 (1) 17:21	18:16	17 17:42 (26) 10:14	21:09	34 20:36 (18) 21:44	22 20:38 (18)	
19	08:16	16:21 23 13:38 (1) 17:23	18:18	16 17:42 (26) 10:16	21:10	36 20:38 (18) 21:44	21 20:38 (18)	
20	08:15	16:23 21 13:37 (1) 17:25	18:20	19 17:41 (26) 10:18	21:12	37 20:42 (18) 21:45	21 20:38 (18)	
21	08:14	16:25 16 13:35 (1) 17:27	18:22	22 17:40 (26) 10:20	21:14	39 20:40 (18) 21:45	21 20:38 (18)	
22	08:12	16:27 10 13:33 (1) 17:29	18:24	26 17:39 (26) 10:22	21:15	40 20:41 (18) 21:45	21 20:38 (18)	
23	08:11	16:29 9 13:32 (1) 17:31	18:25	28 17:38 (26) 10:24	21:17	40 20:41 (18) 21:45	21 20:38 (18)	
24	08:10	16:31 9 13:31 (1) 17:33	18:26	29 17:37 (26) 10:26	21:18	40 20:41 (18) 21:46	21 20:38 (18)	
25	08:08	16:32 9 13:30 (1) 17:35	18:27	31 17:36 (26) 10:28	21:19	40 20:41 (18) 21:46	21 20:38 (18)	
26	08:07	16:34 9 13:29 (1) 17:37	18:28	32 17:35 (26) 10:30	21:20	40 20:41 (18) 21:46	21 20:38 (18)	
27	08:05	16:36 9 13:28 (1) 17:39	18:29	32 17:34 (26) 10:32	21:21	41 20:42 (18) 21:46	25 20:41 (18)	
28	08:04	16:38 9 13:27 (1) 17:41	18:30	32 17:33 (26) 10:34	21:22	41 20:42 (18) 21:46	25 20:41 (18)	
29	08:02	16:40 9 13:26 (1) 17:43	18:31	32 17:32 (26) 10:36	21:23	41 20:42 (18) 21:46	25 20:41 (18)	
30	08:00	16:42 9 13:25 (1) 17:45	18:32	32 17:31 (26) 10:38	21:24	40 20:42 (18) 21:45	27 20:42 (18)	
31	07:59	16:44 9 13:24 (1) 17:47	18:33	32 17:30 (26) 10:40	21:25	40 20:42 (18) 21:45	29 20:43 (18)	
16:44			19:40	32 18:49 (3)	21:28	40 20:42 (18)		
Sonnenscheinstunden	248	272	327	367	421	496	512	
astr.max.mögl.Beschattung	1038				181		696	854
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.31	0.41	0.51	0.51	0.45
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Reduktion Windrichtung	0.63	0.70	0.69	0.68	0.68	0.63	0.63	0.63
Gesamte Reduktion	0.10	0.15	0.19	0.19	0.25	0.29	0.29	0.26
Met.wahrsch.Beschattung	104	49	121	121	46	202	220	

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 54
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: Y - IO25

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember		
1	04:38	20:12 (20) 05:19	20:19 (20) 06:14	07:08	18:08 (26) 07:07	08:03	12:47 (1)	
2	21:45	31 20:44 (18) 21:09	13 20:32 (20) 20:01	18:46	10 18:18 (26) 16:35	15:50	54 14:25 (23)	
3	04:39	20:11 (20) 05:20	20:21 (20) 06:16	07:10	16:09 (26) 07:09	08:05	12:47 (1)	
4	21:44	33 20:44 (18) 21:07	7 20:28 (20) 19:59	18:44	6 18:15 (26) 16:33	15:49	57 14:26 (23)	
5	04:40	20:12 (20) 05:22	06:17	07:12	18:10 (26) 07:11	08:06	12:47 (1)	
6	21:44	33 20:45 (18) 21:05	19:56	18:41	2 18:12 (26) 16:31	15:48	60 14:28 (23)	
7	04:40	20:12 (20) 05:24	06:19	18:24 (3) 07:14	07:13	08:08	12:47 (1)	
8	21:43	34 20:46 (18) 21:03	19:54	8 18:32 (3) 18:39	16:29	15:48	61 14:28 (23)	
9	04:41	20:12 (20) 05:26	06:21	18:19 (3) 07:15	07:15	08:09	12:47 (1)	
10	21:43	34 20:46 (18) 21:01	19:51	15 18:34 (3) 18:37	16:27	15:47	62 14:29 (23)	
11	04:42	20:12 (20) 05:27	06:23	18:17 (3) 07:17	07:17	08:10	12:47 (1)	
12	21:42	35 20:47 (18) 20:59	19:49	20 18:37 (3) 18:34	16:25	15:46	63 14:29 (23)	
13	04:43	20:12 (20) 05:29	06:25	18:15 (3) 07:19	16:56 (19) 07:19	08:12	12:48 (1)	
14	21:41	36 20:48 (18) 20:57	19:46	23 18:38 (3) 18:32	11 17:07 (19) 16:23	15:46	63 14:30 (23)	
15	04:44	20:12 (20) 05:31	06:26	18:13 (3) 07:21	16:53 (19) 07:21	08:13	12:48 (1)	
16	21:41	36 20:48 (18) 20:55	19:44	26 18:39 (3) 18:29	17 17:10 (19) 16:21	15:45	63 14:30 (23)	
17	04:45	20:11 (20) 05:33	06:28	18:11 (3) 07:23	16:51 (19) 07:23	08:14	12:50 (1)	
18	21:40	38 20:49 (18) 20:53	19:41	28 18:39 (3) 18:27	20 17:11 (19) 16:20	15:45	65 14:32 (23)	
19	04:46	20:11 (20) 05:34	06:30	18:10 (3) 07:25	16:49 (19) 07:25	08:16	12:49 (1)	
20	21:39	38 20:49 (18) 20:51	19:39	30 18:40 (3) 18:24	24 17:13 (19) 16:18	15:45	65 14:32 (23)	
21	04:48	20:11 (20) 05:36	06:32	18:10 (3) 07:27	16:48 (19) 07:27	08:17	12:49 (1)	
22	21:38	39 20:50 (18) 20:49	19:36	30 18:40 (3) 18:22	25 17:13 (19) 16:16	15:44	70 14:32 (23)	
23	04:49	20:11 (20) 05:38	06:34	18:09 (3) 07:28	16:47 (19) 07:29	08:18	12:49 (1)	
24	21:37	39 20:50 (18) 20:47	19:34	32 18:41 (3) 18:20	27 17:14 (19) 16:14	15:44	73 14:33 (23)	
25	04:50	20:11 (20) 05:40	06:35	18:08 (3) 07:30	16:46 (19) 07:31	08:19	12:50 (1)	
26	21:36	39 20:50 (18) 20:45	19:31	32 18:40 (3) 18:17	28 17:14 (19) 16:13	15:44	78 14:34 (27)	
27	04:51	20:10 (20) 05:41	06:37	18:07 (3) 07:32	16:45 (19) 07:33	08:20	12:49 (1)	
28	21:35	40 20:50 (18) 20:43	19:29	33 18:40 (3) 18:15	29 17:14 (19) 16:11	15:44	79 14:35 (27)	
29	04:53	20:10 (20) 05:43	06:39	18:07 (3) 07:34	16:45 (19) 07:35	08:21	12:50 (1)	
30	21:34	40 20:50 (18) 20:40	19:26	33 18:40 (3) 18:12	29 17:14 (19) 16:09	15:44	81 14:36 (27)	
31	04:54	20:11 (20) 05:45	06:41	18:07 (3) 07:36	16:44 (19) 07:37	08:22	12:50 (1)	
1	21:33	40 20:51 (18) 20:38	19:24	33 18:40 (3) 18:10	30 17:14 (19) 16:08	15:44	83 14:37 (27)	
2	04:55	20:11 (20) 05:47	06:43	18:06 (3) 07:38	16:44 (19) 07:38	08:23	12:51 (1)	
3	21:32	40 20:51 (18) 20:36	19:21	32 18:38 (3) 18:08	30 17:14 (19) 16:06	15:44	83 14:38 (27)	
4	04:57	20:10 (20) 05:49	06:44	18:07 (3) 07:40	16:44 (19) 07:40	08:23	12:52 (1)	
5	21:30	41 20:51 (18) 20:34	19:19	30 18:37 (3) 18:05	30 17:14 (19) 16:05	15:45	83 14:39 (27)	
6	04:58	20:11 (20) 05:50	06:46	18:07 (3) 07:42	16:44 (19) 07:42	08:24	12:52 (1)	
7	21:29	41 20:52 (18) 20:32	19:16	30 18:37 (3) 18:03	29 17:13 (19) 16:03	15:45	85 14:40 (27)	
8	04:59	20:11 (20) 05:52	06:48	18:06 (3) 07:44	16:44 (19) 07:44	08:25	12:52 (1)	
9	21:28	40 20:51 (18) 20:29	19:14	28 18:36 (3) 18:01	28 17:12 (19) 16:02	10 12:57 (1) 15:45	85 14:39 (27)	
10	05:01	20:11 (20) 05:54	06:50	18:08 (3) 07:46	16:45 (19) 07:46	12:55 (1) 08:25	12:53 (1)	
11	21:26	40 20:51 (18) 20:27	19:11	25 18:33 (3) 17:59	26 17:11 (19) 16:01	16 13:11 (1) 15:46	84 14:40 (27)	
12	05:02	20:12 (20) 05:56	06:52	18:09 (3) 07:48	16:46 (19) 07:48	12:53 (1) 08:26	12:53 (1)	
13	21:25	39 20:51 (18) 20:25	19:09	23 18:32 (3) 17:56	24 17:10 (19) 15:59	21 13:14 (1) 15:46	84 14:40 (27)	
14	05:04	20:11 (20) 05:58	06:53	18:10 (3) 07:50	16:46 (19) 07:49	12:52 (1) 08:27	12:54 (1)	
15	21:23	39 20:50 (18) 20:22	19:06	20 18:30 (3) 17:54	23 17:09 (19) 15:58	23 13:15 (1) 15:47	85 14:41 (27)	
16	05:06	20:11 (20) 05:59	06:55	18:10 (26) 07:51	16:48 (19) 07:51	12:50 (1) 08:27	12:54 (1)	
17	21:22	37 20:48 (18) 20:20	19:04	17 18:27 (3) 17:52	19 17:07 (19) 15:57	26 13:16 (1) 15:47	84 14:41 (27)	
18	05:07	20:12 (20) 06:01	06:57	18:09 (26) 06:53	15:50 (19) 07:53	12:49 (1) 08:27	12:54 (1)	
19	21:20	35 20:47 (18) 20:18	19:01	17 18:26 (26) 16:50	15 16:05 (19) 15:56	28 13:17 (1) 15:48	84 14:42 (27)	
20	05:09	20:12 (20) 06:03	06:59	18:07 (26) 06:55	15:53 (19) 07:55	12:48 (1) 08:28	12:55 (1)	
21	21:19	33 20:45 (18) 20:15	18:59	18 18:25 (26) 16:48	9 16:02 (19) 15:55	37 14:17 (23) 15:48	83 14:42 (27)	
22	05:10	20:13 (20) 06:05	07:01	18:07 (26) 06:57	07:56	12:48 (1) 08:28	12:55 (1)	
23	21:17	31 20:44 (18) 20:13	18:56	18 18:25 (26) 16:45	15:53	43 14:20 (23) 15:49	82 14:42 (27)	
24	05:12	20:13 (20) 06:07	07:03	18:07 (26) 06:59	07:58	12:48 (1) 08:28	12:57 (1)	
25	21:16	29 20:42 (18) 20:11	18:54	18 18:25 (26) 16:43	15:52	47 14:22 (23) 15:50	81 14:43 (27)	
26	05:14	20:15 (20) 06:08	07:04	18:07 (26) 07:01	08:00	12:48 (1) 08:28	12:56 (1)	
27	21:14	21 20:41 (18) 20:08	18:51	16 18:23 (26) 16:41	15:51	49 14:23 (23) 15:51	80 14:42 (27)	
28	05:15	20:15 (20) 06:10	07:06	18:07 (26) 07:03	08:01	12:48 (1) 08:28	12:57 (1)	
29	21:12	19 20:34 (20) 20:06	18:49	13 18:20 (26) 16:39	15:51	52 14:25 (23) 15:52	78 14:42 (27)	
30	05:17	20:17 (20) 06:12		07:05		08:28	12:58 (1)	
31	21:10	16 20:33 (20) 20:03		16:37		15:53	75 14:42 (27)	
Sonnenscheinstunden		514	461	383	328	257	231	
astr.max.mögl.Beschattung		1086		648	491	352	2313	
Red.Sonnenscheinwahrsch.		0.44	0.48	0.40	0.33	0.21	0.14	
Reduktion Betriebsdauer		0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung		0.63	0.63	0.68	0.70	0.63	0.64	
Gesamte Reduktion		0.25	0.28	0.25	0.21	0.12	0.08	
Met.wahrsch.Beschattung		274	6	161	102	42	185	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 55
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersiezug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: Z - IO26

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	12:11 (1) 07:57	06:59	15:51 (19) 06:43	18:06 (3) 05:33	04:42	20:16 (20)	
2	15:54	55 14:06 (23) 16:46	17:43	25 16:16 (19) 19:42	38 18:44 (3) 20:39	21:29	37 20:53 (18)	
3	08:28	12:12 (1) 07:55	06:56	15:52 (19) 06:40	18:05 (3) 05:31	04:41	20:16 (20)	
4	15:55	54 14:07 (23) 16:48	17:45	22 16:14 (19) 19:44	38 18:43 (3) 20:40	21:31	38 20:54 (18)	
5	08:28	12:12 (1) 07:54	06:54	15:54 (19) 06:38	18:06 (3) 05:29	04:40	20:16 (20)	
6	15:57	52 14:06 (23) 16:50	17:47	18 16:12 (19) 19:46	37 18:43 (3) 20:42	21:32	39 20:55 (18)	
7	08:27	12:14 (1) 07:52	06:52	15:57 (19) 06:35	18:06 (3) 05:26	04:40	20:15 (20)	
8	15:58	49 14:06 (23) 16:52	17:49	10 16:07 (19) 19:48	35 18:41 (3) 20:44	21:33	40 20:55 (18)	
9	08:27	12:14 (1) 07:50	06:49	15:51 (19) 06:33	18:07 (3) 05:24	04:39	20:15 (20)	
10	15:59	46 14:04 (23) 16:54	17:51	17 16:11 (19) 19:50	34 18:41 (3) 20:46	21:34	40 20:55 (18)	
11	08:27	12:14 (1) 07:48	06:47	15:51 (19) 06:31	18:07 (3) 05:22	04:38	20:15 (20)	
12	16:00	40 14:02 (23) 16:56	17:53	19 16:13 (19) 19:52	32 18:39 (3) 20:48	21:35	41 20:56 (18)	
13	08:26	12:16 (1) 07:46	06:45	15:51 (19) 06:28	18:08 (3) 05:20	04:37	20:15 (20)	
14	16:02	36 12:12 (1) 07:44	17:55	18 16:13 (19) 19:54	30 18:38 (3) 20:50	21:36	40 20:55 (18)	
15	08:26	12:16 (1) 07:44	06:42	15:51 (19) 06:26	18:10 (3) 05:19	04:37	20:15 (20)	
16	16:03	36 12:12 (1) 07:42	17:57	19 16:13 (19) 19:55	27 18:37 (3) 20:51	21:37	41 20:56 (18)	
17	08:25	12:17 (1) 07:42	15:57 (19) 06:40	17:30 (26) 06:23	18:11 (3) 05:17	04:36	20:15 (20)	
18	16:05	34 12:51 (1) 17:03	13 16:10 (19) 17:59	2 17:32 (26) 19:57	23 18:34 (3) 20:53	21:38	41 20:56 (18)	
19	08:24	12:18 (1) 07:40	15:55 (19) 06:37	17:26 (26) 06:21	18:13 (3) 05:15	04:36	20:15 (20)	
20	16:06	33 12:51 (1) 17:05	18 16:13 (19) 18:01	7 17:33 (26) 19:59	19 18:32 (3) 20:55	21:39	42 20:57 (18)	
21	08:24	12:19 (1) 07:38	15:53 (19) 06:35	17:24 (26) 06:18	18:16 (3) 05:13	04:35	20:16 (20)	
22	16:08	32 12:51 (1) 17:07	22 16:15 (19) 18:02	12 17:36 (26) 20:01	11 18:27 (3) 20:57	21:40	41 20:57 (18)	
23	08:23	12:20 (1) 07:36	15:51 (19) 06:32	17:22 (26) 06:16	05:11	04:35	20:15 (20)	
24	16:09	30 12:50 (1) 17:09	25 16:16 (19) 18:04	15 17:37 (26) 20:03	20:59	21:41	42 20:57 (18)	
25	08:22	12:21 (1) 07:34	15:50 (19) 06:30	17:22 (26) 06:14	05:09	04:34	20:15 (20)	
26	16:11	29 12:50 (1) 17:11	28 16:18 (19) 18:06	18 17:40 (26) 20:05	21:00	21:41	42 20:57 (18)	
27	08:21	12:23 (1) 07:32	15:49 (19) 06:27	17:20 (26) 06:11	05:07	04:34	20:16 (20)	
28	16:13	26 12:49 (1) 17:13	30 16:19 (19) 18:08	20 17:40 (26) 20:07	21:02	21:42	42 20:58 (18)	
29	08:20	12:25 (1) 07:30	15:48 (19) 06:25	17:20 (26) 06:09	05:06	04:34	20:16 (20)	
30	16:14	24 12:49 (1) 17:15	31 16:19 (19) 18:10	21 17:41 (26) 20:09	21:04	21:43	42 20:58 (18)	
31	08:19	12:27 (1) 07:28	15:47 (19) 06:23	17:20 (26) 06:06	05:04	04:34	20:16 (20)	
32	16:16	21 12:48 (1) 17:17	33 16:20 (19) 18:12	20 17:40 (26) 20:10	21:05	21:43	42 20:58 (18)	
33	08:18	12:29 (1) 07:26	15:47 (19) 06:20	17:20 (26) 06:04	05:02	04:34	20:17 (20)	
34	16:18	18 12:47 (1) 17:19	34 16:21 (19) 18:14	20 17:40 (26) 20:12	21:07	21:44	42 20:59 (18)	
35	08:17	12:31 (1) 07:24	15:47 (19) 06:18	17:20 (26) 06:02	05:01	04:34	20:17 (20)	
36	16:19	13 12:44 (1) 17:21	35 16:22 (19) 18:16	18 17:38 (26) 20:14	21:09	21:44	42 20:59 (18)	
37	08:16	07:22	15:46 (19) 06:15	17:20 (3) 05:59	04:59	04:34	20:17 (20)	
38	16:21	17:23	35 16:21 (19) 18:18	18 17:38 (26) 20:16	21:10	21:45	42 20:59 (18)	
39	08:15	07:19	15:46 (19) 06:13	17:16 (3) 05:57	04:58	04:34	20:17 (20)	
40	16:23	17:25	36 16:22 (19) 18:20	23 17:39 (3) 20:18	21:12	21:45	42 20:59 (18)	
41	08:14	07:17	15:46 (19) 06:10	17:15 (3) 05:55	04:56	04:34	20:17 (20)	
42	16:25	17:27	36 16:22 (19) 18:22	26 17:41 (3) 20:20	21:14	21:45	42 20:59 (18)	
43	08:12	07:15	15:46 (19) 06:08	17:12 (3) 05:53	04:55	04:34	20:17 (20)	
44	16:27	17:29	35 16:21 (19) 18:23	30 17:42 (3) 20:22	21:15	21:45	42 20:59 (18)	
45	08:11	07:13	15:46 (19) 06:05	17:11 (3) 05:50	04:53	20:26 (20) 04:34	20:18 (20)	
46	16:29	17:31	35 16:21 (19) 18:25	32 17:43 (3) 20:24	21:17	5 20:31 (20) 21:45	42 21:00 (18)	
47	08:10	07:10	15:47 (19) 06:03	17:09 (3) 05:48	04:52	20:22 (20) 04:34	20:18 (20)	
48	16:31	17:33	34 16:21 (19) 18:27	35 17:44 (3) 20:26	21:18	11 20:33 (20) 21:46	42 21:00 (18)	
49	08:08	07:08	15:46 (19) 06:00	17:09 (3) 05:46	04:50	20:21 (20) 04:35	20:18 (20)	
50	16:32	17:35	34 16:20 (19) 18:29	36 17:45 (3) 20:27	21:20	21 20:46 (18) 21:46	42 21:00 (18)	
51	08:07	07:06	15:47 (19) 05:58	17:07 (3) 05:44	04:49	20:19 (20) 04:35	20:18 (20)	
52	16:34	17:37	32 16:19 (19) 18:31	37 17:44 (3) 20:29	21:21	27 20:47 (18) 21:46	42 21:00 (18)	
53	08:05	07:03	15:48 (19) 05:55	17:07 (3) 05:41	04:48	20:19 (20) 04:36	20:18 (20)	
54	16:36	17:39	30 16:18 (19) 18:33	38 17:45 (3) 20:31	21:23	29 20:48 (18) 21:45	42 21:00 (18)	
55	08:04	07:01	15:49 (19) 05:53	17:06 (3) 05:39	04:47	20:18 (20) 04:36	20:19 (20)	
56	16:38	17:41	28 16:17 (19) 18:35	38 17:44 (3) 20:33	21:24	32 20:50 (18) 21:45	42 21:01 (18)	
57	08:02		06:50	18:06 (3) 05:37	04:45	20:17 (20) 04:37	20:19 (20)	
58	16:40		19:37	39 18:45 (3) 20:35	21:26	34 20:51 (18) 21:45	41 21:00 (18)	
59	08:00		06:48	18:06 (3) 05:35	04:44	20:17 (20) 04:37	20:19 (20)	
60	16:42		19:39	39 18:45 (3) 20:37	21:27	35 20:52 (18) 21:45	42 21:01 (18)	
61	07:59		06:45	18:05 (3) 05:33	04:43	20:16 (20) 04:37	20:19 (20)	
62	16:44		19:40	39 18:44 (3) 20:39	21:28	37 20:53 (18) 21:45	42 21:01 (18)	
63	Sonnenscheinstunden	248	272	367	421	496	512	
64	astr.max.mögl.Beschattung	628	604	658	324	231	1237	
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45	
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
67	Reduktion Windrichtung	0.61	0.70	0.68	0.68	0.62	0.62	
68	Gesamte Reduktion	0.10	0.15	0.19	0.25	0.29	0.25	
69	Met.wahrsch.Beschattung	60	91	127	82	66	314	

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 56

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

Berechnet:
12/10/2015 15:41/2.9.285
André Gefke / andre.gefke@i17-wind.de

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: Z - IO26

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Ok	Nov	Dez
1.39	2.32	3.70	5.75	8.12	7.70	7.33	7.20	5.12	3.48	1.79	1.03

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
344	328	399	568	526	526	738	987	1,017	1,220	930	354	7,936

: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	20:20 (20) 05:19	06:14	18:16 (3) 07:08	18:02 (26) 07:07	15:25 (19) 08:03	12:01 (1)
2	21:45	41 21:01 (18) 21:09	20:01	11 18:27 (3) 18:46	16 18:18 (26) 16:35	17 15:42 (19) 15:50	32 12:33 (1)
3	04:39	20:19 (20) 05:20	06:16	18:11 (3) 07:10	18:02 (26) 07:09	15:27 (19) 08:14	12:01 (1)
2	21:44	42 21:01 (18) 21:07	19:59	19 18:30 (3) 18:44	13 18:15 (26) 16:33	12 15:39 (19) 15:49	33 12:34 (1)
3	04:40	20:20 (20) 05:22	06:17	18:09 (3) 07:12	18:03 (26) 07:11		12:01 (1)
2	21:44	41 21:01 (18) 21:05	19:56	23 18:32 (3) 18:41	9 18:12 (26) 16:31		15:48 34 12:35 (1)
4	04:40	20:21 (20) 05:24	06:19	18:07 (3) 07:14	18:05 (26) 07:13		12:01 (1)
2	21:43	41 21:02 (18) 21:03	19:54	27 18:34 (3) 18:39	5 18:10 (26) 16:29		15:48 35 12:36 (1)
5	04:41	20:21 (20) 05:26	06:21	18:04 (3) 07:15		07:15	12:01 (1)
9	21:43	41 21:02 (18) 21:01	19:51	30 18:34 (3) 18:37		16:27	15:47 36 12:37 (1)
6	04:42	20:22 (20) 05:27	06:23	18:03 (3) 07:17		07:17	12:00 (1)
2	21:42	40 21:02 (18) 20:59	19:49	32 18:35 (3) 18:34		16:25	15:46 38 13:47 (23)
7	04:43	20:22 (20) 05:29	06:25	18:02 (3) 07:19		07:19	12:01 (1)
2	21:41	40 21:02 (18) 20:57	19:46	34 18:36 (3) 18:32		16:23	15:46 45 13:51 (23)
8	04:44	20:22 (20) 05:31	06:26	18:01 (3) 07:21		07:21	12:01 (1)
2	21:41	40 21:02 (18) 20:55	19:44	35 18:36 (3) 18:29		16:21	15:45 49 13:53 (23)
9	04:45	20:23 (20) 05:33	06:28	17:59 (3) 07:23		07:23	12:01 (1)
1	21:40	39 21:02 (18) 20:53	19:41	37 18:36 (3) 18:27		16:20	15:45 52 13:55 (23)
10	04:46	20:23 (20) 05:34	06:30	17:59 (3) 07:25		16:30 (19) 07:25	12:01 (1)
2	21:39	39 21:02 (18) 20:51	19:39	37 18:36 (3) 18:24	14 16:44 (19) 16:18		15:45 54 13:56 (23)
11	04:48	20:24 (20) 05:36	06:32	17:58 (3) 07:27		16:27 (19) 07:27	12:01 (1)
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12	04:49	20:24 (20) 05:38	06:34	17:58 (3) 07:28		16:25 (19) 07:29	12:01 (1)
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13	04:50	20:25 (20) 05:40	06:35	17:57 (3) 07:30		16:23 (19) 07:31	12:01 (1)
2	21:36	36 21:01 (18) 20:45	19:31	38 18:35 (3) 18:17	27 16:50 (19) 16:13		15:44 57 13:58 (23)
14	04:51	20:25 (20) 05:41	06:37	17:56 (3) 07:32		16:22 (19) 07:33	12:02 (1)
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15	04:53	20:26 (20) 05:43	06:39	17:56 (3) 07:34		16:20 (19) 07:35	12:02 (1)
2	21:34	33 20:59 (18) 20:40	19:26	39 18:35 (3) 18:12	31 16:51 (19) 16:09		15:44 59 13:59 (23)
16	04:54	20:26 (20) 05:45	06:41	17:57 (3) 07:36		16:19 (19) 07:37	12:03 (1)
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17	04:55	20:28 (20) 05:47	06:43	17:56 (3) 07:38		16:18 (19) 07:38	12:03 (1)
2	21:32	29 20:57 (18) 20:36	19:21	37 18:33 (3) 18:08	34 16:52 (19) 16:06		15:44 61 14:01 (23)
18	04:57	20:29 (20) 05:49	06:44	17:56 (3) 07:40		16:18 (19) 07:40	12:04 (1)
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19	04:58	20:32 (20) 05:50	06:46	17:57 (3) 07:42		16:17 (19) 07:42	12:05 (1)
2	21:29	17 20:55 (18) 20:32	19:16	34 18:31 (3) 18:03	35 16:52 (19) 16:03		15:45 61 14:03 (23)
20	05:00	20:34 (20) 05:52	06:48	17:58 (3) 07:44		16:17 (19) 07:44	12:04 (1)
2	21:28	8 20:42 (20) 20:29	19:14	32 18:30 (3) 18:01	35 16:52 (19) 16:02		15:45 62 14:03 (23)
21	05:01	05:54	06:50	17:58 (3) 07:46		16:16 (19) 07:46	12:05 (1)
2	21:26	20:27	19:11	30 18:28 (3) 17:59	36 16:52 (19) 16:01		15:46 62 14:04 (23)
22	05:02	05:56	06:52	17:59 (3) 07:48		16:16 (19) 07:48	12:05 (1)
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23	05:04	05:58	06:53	18:00 (3) 07:50		16:16 (19) 07:50	12:06 (1)
2	21:23	20:22	19:06	24 18:24 (3) 17:54	35 16:51 (19) 15:58		15:47 62 14:05 (23)
24	05:06	05:59	06:55	18:02 (3) 07:51		16:16 (19) 07:51	12:06 (1)
2	21:22	20:20	19:04	20 18:22 (3) 17:52	35 16:51 (19) 15:57	12 12:21 (1) 15:47	62 14:05 (23)
25	05:07	06:01	06:57	18:04 (26) 06:53		15:17 (19) 07:53	12:06 (1) 15:47
2	21:20	20:18	19:01	18 18:22 (26) 16:50	33 15:50 (19) 15:56	18 12:24 (1) 15:48	61 14:05 (23)
26	05:09	06:03	06:59	18:02 (26) 06:55		15:17 (19) 07:55	12:05 (1) 15:48
2	21:19	20:15	18:59	19 18:21 (26) 16:48	32 15:49 (19) 15:55	21 12:25 (1) 15:48	60 14:05 (23)
27	05:10	06:05	07:01	18:02 (26) 06:57		15:18 (19) 07:56	12:04 (1) 15:49
2	21:17	20:13	18:56	20 18:22 (26) 16:45	31 15:49 (19) 15:53	24 12:28 (1) 15:49	61 14:05 (23)
28	05:12	06:07	07:03	18:01 (26) 06:59		15:19 (19) 07:58	12:03 (1) 15:50
2	21:16	20:11	18:54	21 18:22 (26) 16:43	29 15:48 (19) 15:52	26 12:29 (1) 15:50	59 14:06 (23)
29	05:14	06:08	07:04	18:01 (26) 07:01		15:20 (19) 08:00	12:03 (1) 15:51
2	21:14	20:08	18:51	20 18:21 (26) 16:41	27 15:47 (19) 15:51	28 12:31 (1) 15:51	58 14:06 (23)
30	05:15	06:10	07:06	18:01 (26) 07:03		15:21 (19) 08:01	12:02 (1) 15:52
2	21:12	20:06	18:49	19 18:20 (26) 16:39	25 15:48 (19) 15:51	30 12:32 (1) 15:52	58 14:06 (23)
31	05:17	06:12		07:05		15:23 (19)	12:02 (1) 15:53
2	21:10	20:03		16:37	21 15:44 (19)		56 14:06 (23)
Sonnenscheinstunden 514 461 383 328 257 231 1659							
astr.max.mögl.Beschattung 693 698 188 1659							
Red.Sonnenscheinwahrsch. 0.44 0.33 0.21 0.14							
Reduktion Betriebsdauer 0.91 0.91 0.91 0.91							
Reduktion Windrichtung 0.62 0.70 0.62 0.62							
Gesamte Reduktion 0.25 0.21 0.12 0.08							
Met.wahrsch.Beschattung 172 145 22 128							

Tabellen-Layout: Die Daten für jeden Tag 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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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 57

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AA - IO27

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	12:41 (1) 07:57	06:59	16:11 (19) 06:43	18:22 (3) 05:33	04:42	20:16 (20)
2	15:54	78 14:36 (23) 16:46	17:43	33 16:44 (19) 19:42	35 18:57 (3) 20:39	21:29	37 20:53 (18)
3	08:28	12:42 (1) 07:55	06:56	16:11 (19) 06:40	18:21 (3) 05:31	04:41	20:17 (20)
4	15:57	74 14:37 (23) 16:48	17:45	32 16:43 (19) 19:44	35 18:56 (3) 20:40	21:31	37 20:54 (18)
5	08:27	12:43 (1) 07:54	06:54	16:11 (19) 06:38	18:21 (3) 05:29	04:40	20:16 (20)
6	15:57	70 14:36 (23) 16:50	17:47	32 16:43 (19) 19:46	35 18:56 (3) 20:42	21:32	38 20:54 (18)
7	08:27	12:43 (1) 07:52	06:52	16:11 (19) 06:35	18:20 (3) 05:26	04:40	20:16 (20)
8	15:58	69 14:37 (23) 16:52	17:49	31 16:42 (19) 19:48	35 18:55 (3) 20:44	21:33	38 20:54 (18)
9	08:27	12:43 (1) 07:50	06:49	16:12 (19) 06:33	18:21 (3) 05:24	04:39	20:16 (20)
10	15:59	69 14:37 (23) 16:54	17:51	30 16:42 (19) 19:50	34 18:55 (3) 20:46	21:34	38 20:54 (18)
11	08:27	12:45 (1) 07:48	06:47	16:12 (19) 06:31	18:20 (3) 05:22	04:38	20:16 (20)
12	15:57	68 14:37 (23) 16:56	17:53	28 16:40 (19) 19:52	34 18:54 (3) 20:48	21:35	38 20:54 (18)
13	08:26	12:44 (1) 07:46	06:45	16:14 (19) 06:28	18:21 (3) 05:20	04:37	20:16 (20)
14	15:57	68 14:38 (23) 16:58	17:55	25 16:39 (19) 19:54	32 18:53 (3) 20:50	21:36	38 20:54 (18)
15	08:26	12:45 (1) 07:44	06:42	16:14 (19) 06:26	18:22 (3) 05:19	04:37	20:17 (20)
16	15:57	66 14:37 (23) 17:01	17:57	23 16:37 (19) 19:55	31 18:53 (3) 20:51	21:37	38 20:55 (18)
17	08:25	12:45 (1) 07:42	06:40	16:15 (19) 06:23	18:22 (3) 05:17	04:36	20:16 (20)
18	15:57	65 14:37 (23) 17:03	17:59	19 16:36 (19) 19:57	29 18:51 (3) 20:53	21:38	38 20:54 (18)
19	08:24	12:46 (1) 07:40	06:37	16:19 (19) 06:21	18:23 (3) 05:15	04:36	20:17 (20)
20	15:57	63 14:37 (23) 17:05	18:00	13 16:32 (19) 19:59	27 18:50 (3) 20:55	21:39	38 20:55 (18)
21	08:24	12:46 (1) 07:38	06:35	16:18	18:24 (3) 05:13	04:35	20:17 (20)
22	15:58	62 14:37 (23) 17:07	18:02	20:01	24 18:48 (3) 20:57	21:40	39 20:56 (18)
23	08:23	12:47 (1) 07:36	06:32	16:16	18:26 (3) 05:11	04:35	20:17 (20)
24	15:59	60 14:37 (23) 17:09	18:04	20:03	20 18:46 (3) 20:59	21:41	38 20:55 (18)
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31	08:19	12:51 (1) 07:28	06:23	17:28 (26) 06:06	18:33 (3) 05:04	04:34	20:18 (20)
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36	15:59	34 13:27 (1) 17:21	18:16	20 17:47 (26) 20:14	12 18:48 (3) 21:09	21:44	38 20:57 (18)
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40	15:57	29 13:25 (1) 17:25	21 16:39 (19) 18:20	19 17:46 (26) 20:18	12 18:48 (3) 21:12	21:45	38 20:57 (18)
41	08:14	12:58 (1) 07:17	16:17 (19) 06:10	17:28 (26) 05:55	18:38 (3) 05:00	04:34	20:19 (20)
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43	08:12	13:00 (1) 07:15	16:15 (19) 06:08	17:29 (26) 05:52	18:39 (3) 05:00	04:34	20:19 (20)
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45	08:11	13:02 (1) 07:13	16:14 (19) 06:05	17:31 (26) 05:50	18:40 (3) 05:00	04:34	20:20 (20)
46	15:57	20 13:22 (1) 17:31	28 16:42 (19) 18:25	16 17:47 (26) 20:24	12 18:48 (3) 21:17	21:45	38 20:58 (18)
47	08:10	13:05 (1) 07:10	16:13 (19) 06:03	17:32 (3) 05:48	18:41 (3) 05:00	04:34	20:20 (20)
48	15:57	14 13:19 (1) 17:33	31 16:44 (19) 18:27	18 17:50 (3) 20:26	12 18:48 (3) 21:18	21:46	38 20:58 (18)
49	08:08	13:19 (1) 07:08	16:12 (19) 06:00	17:30 (3) 05:46	18:42 (3) 05:00	04:35	20:19 (20)
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58	15:57	16:40	32 16:43 (19) 18:34	30 17:54 (3) 20:32	12 18:48 (3) 21:25	21:46	39 20:59 (18)
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63	07:58	13:28 (1) 06:54	16:07 (19) 05:45	17:20 (3) 05:31	18:49 (3) 05:00	04:36	20:21 (20)
64	15:57	16:46	34 16:45 (19) 18:38	34 17:58 (3) 20:36	12 18:48 (3) 21:28	21:46	38 20:59 (18)
65	07:57	13:29 (1) 06:52	16:06 (19) 05:43	17:19 (3) 05:29	18:50 (3) 05:00	04:36	20:21 (20)
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67	07:56	13:30 (1) 06:50	16:05 (19) 05:41	17:18 (3) 05:27	18:51 (3) 05:00	04:36	20:21 (20)
68	15:57	16:50	34 16:47 (19) 18:40	36 18:00 (3) 20:38	12 18:48 (3) 21:30	21:46	38 20:59 (18)
69	07:55	13:31 (1) 06:48	16:04 (19) 05:39	17:17 (3) 05:25	18:52 (3) 05:00	04:36	20:21 (20)
70	15:57	16:52	34 16:48 (19) 18:41	37 18:01 (3) 20:39	12 18:48 (3) 21:31	21:46	38 20:59 (18)
71	07:54	13:32 (1) 06:46	16:03 (19) 05:37	17:16 (3) 05:23	18:53 (3) 05:00	04:36	20:21 (20)
72	15:57	16:54	34 16:49 (19) 18:42	38 18:02 (3) 20:40	12 18:48 (3) 21:32	21:46	38 20:59 (18)
73	07:53	13:33 (1) 06:44	16:02 (19) 05:35	17:15 (3) 05:21	18:54 (3) 05:00	04:36	20:21 (20)
74	15:57	16:56	34 16:50 (19) 18:43	39 18:03 (3) 20:41	12 18:48 (3) 21:33	21:46	38 20:59 (18)
75	07:52	13:34 (1) 06:42	16:01 (19) 05:33	17:14 (3) 05:19	18:55 (3) 05:00	04:36	20:21 (20)
76	15:57	16:58	34 16:51 (19) 18:44	40 18:04 (3) 20:42	12 18:48 (3) 21:34	21:46	38 20:59 (18)
77	07:51	13:35 (1) 06:40	16:00 (19) 05:31	17:13 (3) 05:17	18:56 (3) 05:00	04:36	20:21 (20)
78	15:57	17:00	34 16:52 (19) 18:45	41 18:05 (3) 20:43	12 18:48 (3) 21:35	21:46	38 20:59 (18)
79	07:50	13:36 (1) 06:38	15:59 (19) 05:29	17:12 (3) 05:15	18:57 (3) 05:00	04:36	20:21 (20)
80	15:57	17:02	34 16:53 (19) 18:46	42 18:06 (3) 20:44	12 18:48 (3) 21:36	21:46	38 20:59 (18)
81	07:49	13:37 (1) 06:36	15:58 (19) 05:27	17:11 (3) 05:13	18:58 (3) 05:00	04:36	20:21 (20)
82	15:57	17:04	34 16:54 (19) 18:47	43 18:07 (3) 20:45	12 18:48 (3) 21:37	21:46	38 20:59 (18)
83	07:48	13:38 (1) 06:34	15:57 (19) 05:25	17:10 (3) 05:11	18:59 (3) 05:00	04:36	20:21 (20)
84	15:57	17:06	34 16:55 (19) 18:48	44 18:08 (3) 20:46	12 18:48 (3) 21:38	21:46	38 20:59 (18)
85	07:47	13:39 (1) 06:32	15:56 (19) 05:23	17:09 (3) 05:09	19:00 (3) 05:00	04:36	20:21 (20)
86	15:57	17:08	34 16:56 (19) 18:49	45 18:09 (3) 20:47	12 18:48 (3) 21:39	21:46	38 20:59 (18)
87	07:46	13:40 (1) 06:30	15:55 (19) 05:21	17:08 (3) 05:07	19:01 (3) 05:00	04:36	20:21 (20)
88	15:57	17:10	34 16:57 (19) 18:50	46 18:10 (3) 20:48	12 18:48 (3) 21:40	21:46	38 20:59 (18)
89	07:45	13:41 (1) 06:28	15:54 (19) 05:19	17:07 (3) 05:05	19:02 (3) 05:00	04:36	20:21 (20)
90	15:57	17:12	34 16:58 (19) 18:51	47 18:11 (3) 20:49	12 18:48 (3) 21:41	21:46	38 20:59 (18)
91	07:44	13:42 (1) 06:26	15:53 (19) 05:17	17:06 (3) 05:03	19:03 (3) 05:00	04:36	20:21 (20)
92	15:57	17:14	34 16:59 (19)				

Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:53 / 58
Lizenzierter Anwender:
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-
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Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AA - IO27

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:38	20:21 (20)	05:19		06:14	18:24 (3)	07:08	18:15 (26)	07:07		08:03	12:29 (1)	
2	21:45	39 21:00 (18)	21:09		20:01	24 18:48 (3)	18:46	3 18:18 (26)	16:35		15:50	61 14:19 (23)	
3	04:39	20:21 (20)	05:20		06:16	18:21 (3)	07:10		07:09		08:05	12:29 (1)	
4	21:44	38 20:59 (18)	21:07		19:59	27 18:48 (3)	18:44		16:33		15:49	63 14:25 (23)	
5	04:40	20:22 (20)	05:22		06:17	18:20 (3)	07:12		16:59 (19)	07:11		08:06	12:29 (1)
6	21:44	39 21:00 (18)	21:05		19:56	29 18:49 (3)	18:41	9 17:08 (19)	16:31		15:48	65 14:21 (23)	
7	04:40	20:22 (20)	05:24		06:19	18:19 (3)	07:14		16:55 (19)	07:13		08:08	12:29 (1)
8	21:43	38 21:00 (18)	21:03		19:54	31 18:50 (3)	18:39	16 17:11 (19)	16:29		15:48	65 14:21 (23)	
9	04:41	20:22 (20)	05:26		06:21	18:17 (3)	07:15		16:52 (19)	07:15		08:09	12:29 (1)
10	21:43	38 21:00 (18)	21:01		19:51	32 18:49 (3)	18:37	21 17:13 (19)	16:27		15:47	68 14:23 (23)	
11	04:42	20:23 (20)	05:27		06:23	18:16 (3)	07:17		16:50 (19)	07:17		08:10	12:29 (1)
12	21:42	38 21:01 (18)	20:59		19:49	34 18:50 (3)	18:34	25 17:15 (19)	16:25		15:46	68 14:23 (23)	
13	04:43	20:23 (20)	05:29		06:25	18:16 (3)	07:19		16:49 (19)	07:19		08:12	12:30 (1)
14	21:41	38 21:01 (18)	20:57		19:46	34 18:50 (3)	18:32	27 17:16 (19)	16:23		15:46	69 14:24 (23)	
15	04:44	20:23 (20)	05:31		06:26	18:15 (3)	07:21		16:48 (19)	07:21		08:13	12:30 (1)
16	21:41	38 21:01 (18)	20:55		19:44	35 18:50 (3)	18:29	28 17:16 (19)	16:21		15:45	69 14:24 (23)	
17	04:45	20:24 (20)	05:33		06:28	18:14 (3)	07:23		16:47 (19)	07:23		08:14	12:31 (1)
18	21:40	37 21:01 (18)	20:53		19:41	35 18:49 (3)	18:27	30 17:17 (19)	16:20		15:45	70 14:25 (23)	
19	04:46	20:24 (20)	05:34		06:30	18:14 (3)	07:25		16:46 (19)	07:25		08:16	12:31 (1)
20	21:39	37 21:01 (18)	20:51		19:39	35 18:49 (3)	18:24	31 17:17 (19)	16:18		15:45	73 14:26 (23)	
21	04:48	20:24 (20)	05:36		06:32	18:14 (3)	07:27		16:45 (19)	07:27		08:17	12:31 (1)
22	21:38	37 21:01 (18)	20:49		19:36	35 18:49 (3)	18:22	32 17:17 (19)	16:16		15:44	78 14:26 (23)	
23	04:49	20:24 (20)	05:38		06:34	18:14 (3)	07:28		16:45 (19)	07:29		08:18	12:31 (1)
24	21:37	37 21:01 (18)	20:47		19:34	34 18:48 (3)	18:20	32 17:17 (19)	16:14		15:44	84 14:29 (27)	
25	04:50	20:25 (20)	05:40		06:35	18:13 (3)	07:30		16:44 (19)	07:31		08:19	12:34 (1)
26	21:36	36 21:01 (18)	20:45		19:31	34 18:47 (3)	18:17	33 17:17 (19)	16:13		15:44	85 14:30 (27)	
27	04:51	20:25 (20)	05:41		06:37	18:14 (3)	07:32		16:44 (19)	07:33		08:20	12:32 (1)
28	21:35	35 21:00 (18)	20:43		19:29	32 18:46 (3)	18:15	33 17:17 (19)	16:11		15:44	86 14:31 (27)	
29	04:53	20:25 (20)	05:43		06:39	18:14 (3)	07:34		16:44 (19)	07:35		08:21	12:32 (1)
30	21:34	34 20:59 (18)	20:40		19:26	31 18:45 (3)	18:12	33 17:17 (19)	16:09		15:44	89 14:32 (27)	
31	04:54	20:26 (20)	05:45		06:41	18:15 (3)	07:36		16:44 (19)	07:37		08:22	12:33 (1)
1	21:33	32 20:59 (18)	20:38		19:24	29 18:44 (3)	18:10	32 17:16 (19)	16:08		15:44	90 14:33 (27)	
2	04:55	20:27 (20)	05:47		06:43	18:15 (3)	07:38		16:45 (19)	07:38		08:23	12:33 (1)
3	21:32	30 20:57 (18)	20:36		19:21	27 18:42 (3)	18:08	30 17:15 (19)	16:06		15:44	92 14:34 (27)	
4	04:57	20:28 (20)	05:49		06:44	18:17 (3)	07:40		16:45 (19)	07:40	12:39 (1)	08:23	12:34 (1)
5	21:30	28 20:56 (18)	20:34		19:19	23 18:40 (3)	18:05	29 17:14 (19)	16:05	14 12:53 (1)	15:45	92 14:35 (27)	
6	04:58	20:29 (20)	05:50		06:46	18:19 (3)	07:42		16:46 (19)	07:42	12:36 (1)	08:24	12:35 (1)
7	21:29	26 20:55 (18)	20:32		19:16	19 18:38 (3)	18:03	27 17:13 (19)	16:03	20 12:56 (1)	15:45	93 14:36 (27)	
8	05:00	20:30 (20)	05:52		06:48	18:18 (26)	07:44		16:46 (19)	07:44	12:34 (1)	08:25	12:34 (1)
9	21:28	24 20:54 (18)	20:29		19:14	17 18:35 (3)	18:01	26 17:12 (19)	16:02	24 12:58 (1)	15:45	94 14:36 (27)	
10	05:01	20:31 (20)	05:54		06:50	18:15 (26)	07:46		16:47 (19)	07:46	12:34 (1)	08:25	12:35 (1)
11	21:26	18 20:52 (18)	20:27		19:11	13 18:28 (26)	17:59	24 17:11 (19)	16:01	26 13:00 (1)	15:46	93 14:37 (27)	
12	05:02	20:33 (20)	05:56		06:52	18:13 (26)	07:48		16:49 (19)	07:48	12:33 (1)	08:26	12:35 (1)
13	21:25	12 20:45 (20)	20:25		19:09	16 18:29 (26)	17:56	20 17:09 (19)	15:59	29 13:02 (1)	15:46	93 14:37 (27)	
14	05:04	20:35 (20)	05:58		06:53	18:12 (26)	07:50		16:51 (19)	07:49	12:32 (1)	08:27	12:36 (1)
15	21:23	7 20:42 (20)	20:22		19:06	18 18:30 (26)	17:54	15 17:06 (19)	15:58	31 13:03 (1)	15:47	93 14:38 (27)	
16	05:06	20:37 (20)	05:59		06:55	18:12 (26)	07:51		16:55 (19)	07:51	12:30 (1)	08:27	12:37 (1)
17	21:22	20:20			19:04	18 18:30 (26)	17:52	7 17:02 (19)	15:57	34 13:04 (1)	15:47	93 14:38 (27)	
18	05:07	20:21			06:57	18:11 (26)	06:53		07:53	12:30 (1)	08:27	12:37 (1)	
19	21:20	20:18			19:01	19 18:30 (26)	16:50		15:56	35 13:05 (1)	15:48	93 14:38 (27)	
20	05:09	20:22			06:59	18:10 (26)	06:55		07:55	12:30 (1)	08:28	12:37 (1)	
21	21:19	20:15			19:00	19 18:29 (26)	16:48		15:55	45 14:12 (23)	15:48	92 14:38 (27)	
22	05:10	20:23			07:01	18:10 (26)	06:57		07:56	12:29 (1)	08:28	12:37 (1)	
23	21:17	20:13			18:56	17 18:27 (26)	16:45		15:53	51 14:14 (23)	15:49	91 14:38 (27)	
24	05:12	20:11			07:03	18:10 (26)	06:59		07:58	12:29 (1)	08:28	12:39 (1)	
25	21:16	20:08			18:54	15 18:25 (26)	16:43		15:52	54 14:16 (23)	15:50	90 14:39 (27)	
26	05:14	20:08			07:04	18:11 (26)	07:01		08:00	12:29 (1)	08:28	12:38 (1)	
27	21:14	20:08	8 18:40 (3)		18:51	12 18:23 (26)	16:41		15:51	57 14:17 (23)	15:51	88 14:38 (27)	
28	05:15	20:06			07:06	18:12 (26)	07:03		08:01	12:29 (1)	08:28	12:39 (1)	
29	21:12	20:06	16 18:44 (3)		18:49	8 18:20 (26)	16:39		15:51	60 14:19 (23)	15:52	87 14:38 (27)	
30	05:17	20:05			07:05						08:28	12:40 (1)	
31	21:10	20:03	21 18:46 (3)				16:37				15:53	83 14:38 (27)	
Sonnenscheinstunden	514	461	383		752	563	328	257	480		2550		
astr.max.mögl.Beschattung	736	45	752		563	480	2550		2550				
Red.Sonnenscheinwahrsch.	0.44	0.48	0.40		0.33	0.21	0.14		0.21		0.14		
Reduktion Betriebsdauer	0.91	0.91	0.91		0.91	0.91	0.91		0.91		0.91		
Reduktion Windrichtung	0.62	0.68	0.68		0.70	0.62	0.63		0.62		0.63		
Gesamte Reduktion	0.25	0.30	0.25		0.21	0.12	0.08		0.12		0.08		
Met.wahrsch.Beschattung	183	13	185		117	56	201		201		201		

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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Lizenzierter Anwender:
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Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AB - IO28

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	12:56 (1) 07:57	06:59	16:24 (19) 06:43	18:30 (3) 05:33	04:42	20:17 (20)
2	15:54	93 14:49 (27) 16:46	17:43	30 16:54 (19) 19:42	32 19:02 (3) 20:39	21:29	35 20:52 (18)
3	08:28	12:56 (1) 07:55	06:56	16:23 (19) 06:40	18:29 (3) 05:31	04:41	20:18 (20)
4	15:57	92 14:49 (27) 16:48	17:45	31 16:54 (19) 19:44	32 19:01 (3) 20:40	21:31	35 20:53 (18)
5	08:27	12:57 (1) 07:54	06:54	16:23 (19) 06:38	18:28 (3) 05:29	04:40	20:17 (20)
6	15:57	89 14:49 (23) 16:50	17:47	31 16:54 (19) 19:46	34 19:02 (3) 20:42	21:32	36 20:53 (18)
7	08:27	12:58 (1) 07:52	06:52	16:22 (19) 06:35	18:27 (3) 05:26	04:40	20:17 (20)
8	15:58	88 14:50 (23) 16:52	17:49	32 16:54 (19) 19:48	34 19:01 (3) 20:44	21:33	36 20:53 (18)
9	08:27	12:58 (1) 07:50	06:49	16:22 (19) 06:33	18:28 (3) 05:24	04:39	20:17 (20)
10	15:59	86 14:50 (23) 16:54	17:51	32 16:54 (19) 19:50	33 19:01 (3) 20:46	21:34	36 20:53 (18)
11	08:27	12:58 (1) 07:48	06:47	16:22 (19) 06:31	18:27 (3) 05:22	04:38	20:18 (20)
12	16:00	84 14:50 (23) 16:56	17:53	31 16:53 (19) 19:52	33 19:00 (3) 20:48	21:35	36 20:54 (18)
13	08:26	13:00 (1) 07:46	06:45	16:23 (19) 06:28	18:27 (3) 05:20	04:37	20:17 (20)
14	16:02	80 14:51 (23) 16:58	17:55	30 16:53 (19) 19:54	33 19:00 (3) 20:50	21:36	37 20:54 (18)
15	08:26	13:00 (1) 07:44	06:42	16:22 (19) 06:26	18:28 (3) 05:19	04:37	20:18 (20)
16	16:03	72 14:51 (23) 17:01	17:57	29 16:51 (19) 19:55	32 19:00 (3) 20:51	21:37	36 20:54 (18)
17	08:25	13:00 (1) 07:42	06:40	16:24 (19) 06:23	18:28 (3) 05:17	04:36	20:18 (20)
18	16:05	72 14:51 (23) 17:03	17:59	28 16:51 (19) 19:57	30 18:58 (3) 20:53	21:38	36 20:54 (18)
19	08:24	13:01 (1) 07:40	06:37	16:24 (19) 06:21	18:28 (3) 05:15	04:36	20:18 (20)
20	16:06	71 14:51 (23) 17:05	18:00	25 16:49 (19) 19:59	29 18:57 (3) 20:55	21:39	37 20:55 (18)
21	08:24	13:01 (1) 07:38	06:35	16:25 (19) 06:18	18:29 (3) 05:13	04:35	20:19 (20)
22	16:08	70 14:51 (23) 17:07	18:02	23 16:48 (19) 20:01	27 18:56 (3) 20:57	21:40	36 20:55 (18)
23	08:23	13:02 (1) 07:36	06:32	16:26 (19) 06:16	18:30 (3) 05:11	04:35	20:18 (20)
24	16:09	69 14:51 (23) 17:09	18:04	20 16:46 (19) 20:03	24 18:54 (3) 20:59	21:41	36 20:54 (18)
25	08:22	13:03 (1) 07:34	06:30	16:29 (19) 06:14	18:32 (3) 05:09	04:34	20:19 (20)
26	16:11	68 14:51 (23) 17:11	18:06	14 16:43 (19) 20:05	21 18:53 (3) 21:00	21:41	36 20:55 (18)
27	08:21	13:03 (1) 07:32	06:27	16:34 (19) 06:11	18:33 (3) 05:07	04:34	20:19 (20)
28	16:13	67 14:51 (23) 17:13	18:08	6 17:41 (26) 20:07	17 18:50 (3) 21:02	21:42	36 20:55 (18)
29	08:20	13:04 (1) 07:30	06:25	17:36 (26) 06:09	18:36 (3) 05:06	04:34	20:19 (20)
30	16:14	65 14:51 (23) 17:15	18:10	7 17:43 (26) 20:09	11 18:47 (3) 21:04	21:43	36 20:55 (18)
31	08:19	13:05 (1) 07:28	06:23	17:34 (26) 06:06	18:37 (3) 05:04	04:34	20:20 (20)
32	16:16	62 14:51 (23) 17:17	18:12	11 17:45 (26) 20:10	12 20:26 (20) 21:05	21:43	36 20:56 (18)
33	08:18	13:06 (1) 07:26	06:20	17:33 (26) 06:04	18:38 (3) 05:02	04:34	20:20 (20)
34	16:18	60 14:51 (23) 17:19	18:14	14 17:47 (26) 20:12	15 20:27 (20) 21:07	21:44	36 20:56 (18)
35	08:17	13:06 (1) 07:24	06:18	17:32 (26) 06:02	18:39 (3) 05:01	04:34	20:20 (20)
36	16:19	58 14:50 (23) 17:21	18:16	17 17:49 (26) 20:14	18 20:28 (20) 21:09	21:44	36 20:56 (18)
37	08:16	13:08 (1) 07:22	06:15	17:32 (26) 05:59	18 20:42 (18) 21:04	04:34	20:20 (20)
38	16:21	55 14:50 (23) 17:23	18:18	18 17:50 (26) 20:16	19 20:29 (20) 21:10	21:44	36 20:56 (18)
39	08:15	13:08 (1) 07:19	06:13	17:31 (26) 05:57	18 20:44 (18) 21:05	04:34	20:20 (20)
40	16:23	50 14:48 (23) 17:25	18:20	19 17:50 (26) 20:18	20 20:34 (20) 21:05	21:45	36 20:56 (18)
41	08:14	13:10 (1) 07:17	06:10	17:31 (26) 05:55	18 20:23 (20) 21:04	04:34	20:21 (20)
42	16:25	43 14:46 (23) 17:27	18:22	19 17:50 (26) 20:20	20 20:35 (20) 21:05	21:45	35 20:56 (18)
43	08:12	13:11 (1) 07:15	16:35 (19) 06:08	17:31 (26) 05:52	18 20:22 (20) 21:04	04:34	20:20 (20)
44	16:27	35 13:46 (1) 17:29	8 16:43 (19) 18:23	17 17:48 (26) 20:22	18 20:42 (18) 21:05	21:45	36 20:56 (18)
45	08:11	13:12 (1) 07:13	16:32 (19) 06:05	17:32 (26) 05:50	18 20:21 (20) 21:04	04:34	20:21 (20)
46	16:29	32 13:44 (1) 17:31	15 16:47 (19) 18:25	15 17:47 (26) 20:24	16 20:44 (18) 21:05	21:45	36 20:57 (18)
47	08:10	13:14 (1) 07:10	16:30 (19) 06:03	17:33 (26) 05:48	18 20:19 (20) 21:04	04:34	20:21 (20)
48	16:31	29 13:43 (1) 17:33	20 16:50 (19) 18:27	12 17:45 (26) 20:26	13 20:44 (18) 21:06	21:46	36 20:57 (18)
49	08:08	13:16 (1) 07:08	16:28 (19) 06:00	17:36 (26) 05:46	18 20:19 (20) 21:03	04:35	20:21 (20)
50	16:32	27 13:43 (1) 17:35	23 16:51 (19) 18:29	15 17:52 (3) 20:27	16 20:46 (18) 21:06	21:46	36 20:57 (18)
51	08:07	13:18 (1) 07:06	16:27 (19) 05:58	17:39 (3) 05:44	18 20:18 (20) 21:02	04:35	20:22 (20)
52	16:34	23 13:41 (1) 17:37	25 16:52 (19) 18:31	16 17:55 (3) 20:29	17 20:47 (18) 21:06	21:46	36 20:58 (18)
53	08:05	13:20 (1) 07:03	16:25 (19) 05:55	17:36 (3) 05:41	18 20:18 (20) 21:03	04:36	20:22 (20)
54	16:36	18 13:38 (1) 17:39	27 16:52 (19) 18:33	21 17:57 (3) 20:31	22 20:48 (18) 21:05	21:45	36 20:58 (18)
55	08:04	13:24 (1) 07:01	16:24 (19) 05:53	17:34 (3) 05:39	18 20:18 (20) 21:03	04:36	20:22 (20)
56	16:38	12 13:36 (1) 17:41	29 16:53 (19) 18:35	24 17:58 (3) 20:33	25 20:50 (18) 21:05	21:45	36 20:58 (18)
57	08:02		06:50	18:33 (3) 05:37	19 20:18 (20) 21:02	04:37	20:22 (20)
58	16:40		19:37	19:00 (3) 20:35	20 20:51 (18) 21:04	21:45	36 20:58 (18)
59	08:00		06:48	18:32 (3) 05:35	19 20:17 (20) 21:01	04:37	20:22 (20)
60	16:42		19:39	19:01 (3) 20:37	20 20:52 (18) 21:04	21:45	37 20:59 (18)
61	07:59		06:45	18:30 (3)	19 20:17 (20)	04:43	
62	16:44		19:40	19:01 (3)	20 20:52 (18)	21:45	
63	Sonnenscheinstunden	248	272	367	421	496	512
64	astr.max.mögl.Beschattung	1670	147	674	422	307	1080
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.64	0.70	0.89	0.68	0.62	0.62
68	Gesamte Reduktion	0.10	0.15	0.19	0.25	0.29	0.25
69	Met.wahrsch.Beschattung	167	22	131	106	88	275

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 60

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AB - IO28

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:38		20:23 (20)	05:19	06:14		18:29 (3)	07:08	17:07 (19)	07:07	08:03	12:43 (1)	
2	21:44	36	20:59 (18)	21:09	20:01	27	18:56 (3)	18:46	18	17:25 (19)	16:35	14:33 (23)	
3	04:39		20:22 (20)	05:20	06:16		18:26 (3)	07:10		17:05 (19)	07:09	12:44 (1)	
4	21:44	37	20:59 (18)	21:07	19:59	29	18:55 (3)	18:44	21	17:26 (19)	16:33	14:34 (23)	
5	04:40		20:23 (20)	05:22	06:17		18:26 (3)	07:12		17:02 (19)	07:11	12:44 (1)	
6	21:44	36	20:59 (18)	21:05	19:56	30	18:56 (3)	18:41	25	17:27 (19)	16:31	14:35 (23)	
7	04:40		20:23 (20)	05:24	06:19		18:25 (3)	07:14		17:01 (19)	07:13	12:44 (1)	
8	21:43	37	21:00 (18)	21:03	19:54	32	18:57 (3)	18:39	27	17:28 (19)	16:29	14:35 (23)	
9	04:41		20:24 (20)	05:26	06:21		18:23 (3)	07:15		17:00 (19)	07:15	12:45 (1)	
10	21:43	36	21:00 (18)	21:01	19:51	33	18:56 (3)	18:37	28	17:28 (19)	16:27	14:36 (23)	
11	04:42		20:24 (20)	05:27	06:23		18:23 (3)	07:17		16:59 (19)	07:17	12:44 (1)	
12	21:42	36	21:00 (18)	20:59	19:49	33	18:56 (3)	18:34	30	17:29 (19)	16:25	14:36 (23)	
13	04:43		20:24 (20)	05:29	06:25		18:23 (3)	07:19		16:58 (19)	07:19	12:45 (1)	
14	21:41	37	21:01 (18)	20:57	19:46	33	18:56 (3)	18:32	31	17:29 (19)	16:23	14:37 (23)	
15	04:44		20:25 (20)	05:31	06:26		18:23 (3)	07:21		16:58 (19)	07:21	12:45 (1)	
16	21:41	36	21:01 (18)	20:55	19:44	33	18:56 (3)	18:29	31	17:29 (19)	16:21	14:37 (23)	
17	04:45		20:25 (20)	05:33	06:28		18:22 (3)	07:23		16:57 (19)	07:23	12:44 (1)	
18	21:40	36	21:01 (18)	20:53	19:41	33	18:55 (3)	18:27	32	17:29 (19)	16:20	14:38 (23)	
19	04:46		20:25 (20)	05:34	06:30		18:22 (3)	07:25		16:57 (19)	07:25	12:46 (1)	
20	21:39	36	21:01 (18)	20:51	19:39	33	18:55 (3)	18:24	32	17:29 (19)	16:18	14:39 (27)	
21	04:48		20:25 (20)	05:36	06:32		18:22 (3)	07:27		16:57 (19)	07:27	12:47 (1)	
22	21:38	36	21:01 (18)	20:49	19:36	32	18:54 (3)	18:22	31	17:28 (19)	16:16	14:39 (27)	
23	04:49		20:25 (20)	05:38	06:34		18:22 (3)	07:28		16:57 (19)	07:29	12:47 (1)	
24	21:37	36	21:01 (18)	20:47	19:34	31	18:53 (3)	18:20	31	17:28 (19)	16:14	14:40 (27)	
25	04:50		20:26 (20)	05:40	06:35		18:22 (3)	07:30		16:57 (19)	07:31	12:44 (1)	
26	21:36	35	21:01 (18)	20:45	19:31	29	18:51 (3)	18:17	30	17:27 (19)	16:13	14:41 (27)	
27	04:51		20:26 (20)	05:41	06:37		18:23 (3)	07:32		16:58 (19)	07:33	12:48 (1)	
28	21:35	34	21:00 (18)	20:43	19:29	27	18:50 (3)	18:15	28	17:26 (19)	16:11	14:41 (27)	
29	04:53		20:26 (20)	05:43	06:39		18:24 (3)	07:34		16:58 (19)	07:35	12:48 (1)	
30	21:34	33	20:59 (18)	20:40	19:26	25	18:49 (3)	18:12	27	17:25 (19)	16:09	14:42 (27)	
31	04:54		20:27 (20)	05:45	06:41		18:25 (3)	07:36		16:59 (19)	07:37	12:49 (1)	
32	21:33	32	20:59 (18)	20:38	19:24	22	18:47 (3)	18:10	25	17:24 (19)	16:08	14:43 (27)	
33	04:55		20:28 (20)	05:47	06:43		18:27 (3)	07:38		17:00 (19)	07:38	12:49 (1)	
34	21:32	29	20:57 (18)	20:36	19:21	17	18:44 (3)	18:08	22	17:22 (19)	16:06	14:44 (27)	
35	04:57		20:28 (20)	05:49	06:44		18:25 (26)	07:40		17:02 (19)	07:40	12:50 (1)	
36	21:30	28	20:56 (18)	20:34	19:19	13	18:40 (3)	18:05	18	17:20 (19)	16:05	14:44 (27)	
37	04:58		20:30 (20)	05:50	06:46		18:21 (26)	07:42		17:04 (19)	07:42	12:51 (1)	
38	21:29	25	20:55 (18)	20:32	19:16	11	18:32 (26)	18:03	13	17:17 (19)	16:03	14:45 (27)	
39	05:00		20:30 (20)	05:52	06:48		18:19 (26)	07:44		17:04 (19)	07:44	12:50 (1)	
40	21:28	24	20:54 (18)	20:29	19:14	15	18:34 (26)	18:01		16:02 (34)	13:20 (1)	14:45 (27)	
41	05:01		20:31 (20)	05:54	06:50		18:17 (26)	07:46		17:04 (19)	07:46	12:51 (1)	
42	21:26	20	20:52 (18)	20:27	19:11	16	18:33 (26)	17:59		16:01 (43)	14:22 (23)	14:46 (27)	
43	05:02		20:33 (20)	05:56	06:52		18:16 (26)	07:48		17:04 (19)	07:48	12:51 (1)	
44	21:25	14	20:47 (20)	20:25	19:09	18	18:34 (26)	17:56		15:59 (50)	14:25 (23)	14:46 (27)	
45	05:04		20:34 (20)	05:58	06:53		18:16 (26)	07:50		17:04 (19)	07:49	12:52 (1)	
46	21:23	11	20:45 (20)	20:22	19:06	18	18:34 (26)	17:54		15:58 (55)	14:27 (23)	14:47 (27)	
47	05:06		20:37 (20)	05:59	06:55		18:15 (26)	07:51		17:05 (19)	07:51	12:53 (1)	
48	21:22	4	20:41 (20)	20:20	19:04	19	18:34 (26)	17:52		15:57 (57)	14:27 (23)	14:47 (27)	
49	05:07		20:38 (20)	06:01	06:57		18:15 (26)	06:53		17:05 (19)	07:53	12:53 (1)	
50	21:20		20:18		19:01	18	18:33 (26)	16:50		15:56 (60)	14:28 (23)	14:48 (27)	
51	05:09		06:03		06:59		18:15 (26)	06:55		17:05 (19)	07:55	12:53 (1)	
52	21:19		20:15		18:59	15	18:30 (26)	16:48		15:55 (62)	14:29 (23)	14:48 (27)	
53	05:10		06:05		07:01		18:15 (26)	06:57		17:06 (19)	07:56	12:53 (1)	
54	21:17		20:13		18:56	12	18:27 (26)	16:45		15:53 (64)	14:30 (23)	14:48 (27)	
55	05:12		06:07		07:03		18:16 (26)	06:59		17:06 (19)	07:58	12:55 (1)	
56	21:16		20:11	11	18:49 (3)	18:54	9	18:25 (26)	16:43		15:52 (67)	14:31 (23)	14:49 (27)
57	05:14		06:08		07:04		18:18 (26)	07:01		17:07 (19)	07:59	12:54 (1)	
58	21:14		20:08	17	18:51 (3)	18:51	5	18:23 (26)	16:41		15:51 (67)	14:32 (23)	14:48 (27)
59	05:15		06:10		07:06		18:13 (26)	07:03		17:08 (19)	08:01	12:54 (1)	
60	21:12		20:06	22	18:53 (3)	18:49	11	17:22 (19)	16:39		15:51 (69)	14:33 (23)	14:49 (27)
61	05:17		06:12		07:05		18:13 (26)	07:05		17:09 (19)	08:02	12:56 (1)	
62	21:10		20:03	24	18:54 (3)			16:37			15:53 (93)	14:49 (27)	
63	Sonnenscheinstunden	514	461		383			328		257		231	
64	astr.max.mögl.Beschattung	724	74		679			500		770		2815	
65	Red.Sonnenscheinwahrsch.	0.44	0.48		0.40			0.33		0.21		0.14	
66	Reduktion Betriebsdauer	0.91		0.91		0.91		0.91		0.91		0.91	
67	Reduktion Windrichtung	0.62		0.68		0.68		0.70		0.63		0.64	
68	Gesamte Reduktion	0.25		0.30		0.25		0.21		0.12		0.08	
69	Met.wahrsch.Beschattung	181		22		168		104		92		226	

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 61

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AC - IO29

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni					
1	08:28	13:20 (1) 07:57	06:59	16:35 (19) 06:43	18:34 (3) 05:33	04:42	20:12 (20)				
15:54	88	15:00 (23) 15:46	17:43	26	17:01 (19) 19:42	30	19:04 (3) 20:39	21:29	36	20:48 (18)	
2	08:28	13:20 (1) 07:55	06:56	16:34 (19) 06:40	18:32 (3) 05:31	04:41	20:13 (20)				
15:55	89	15:00 (23) 16:48	17:45	27	17:01 (19) 19:44	31	19:03 (3) 20:40	21:31	36	20:48 (18)	
3	08:28	13:21 (1) 07:54	06:54	16:34 (19) 06:38	18:32 (3) 05:29	04:40	20:13 (20)				
15:57	88	15:01 (23) 16:50	17:47	28	17:02 (19) 19:46	31	19:03 (3) 20:42	21:32	35	20:48 (18)	
4	08:27	13:21 (1) 07:52	06:52	16:32 (19) 06:35	18:31 (3) 05:26	04:40	20:13 (20)				
15:58	89	15:02 (23) 16:52	17:49	29	17:01 (19) 19:48	32	19:03 (3) 20:44	21:33	35	20:48 (18)	
5	08:27	13:21 (1) 07:50	06:49	16:32 (19) 06:33	18:32 (3) 05:24	04:39	20:13 (20)				
15:59	89	15:03 (23) 16:54	17:51	30	17:02 (19) 19:50	31	19:03 (3) 20:46	21:34	35	20:48 (18)	
6	08:27	13:21 (1) 07:48	06:47	16:32 (19) 06:31	18:31 (3) 05:22	04:38	20:14 (20)				
16:00	89	15:03 (23) 16:56	17:53	29	17:01 (19) 19:52	31	19:02 (3) 20:48	21:35	34	20:48 (18)	
7	08:26	13:23 (1) 07:46	06:45	16:32 (19) 06:28	18:31 (3) 05:20	04:37	20:14 (20)				
16:02	86	15:04 (23) 16:58	17:55	29	17:01 (19) 19:54	30	19:01 (3) 20:50	21:36	34	20:48 (18)	
8	08:26	13:23 (1) 07:44	06:42	16:32 (19) 06:26	18:32 (3) 05:19	04:37	20:15 (20)				
16:03	86	15:04 (23) 17:00	17:57	28	17:00 (19) 19:55	29	19:01 (3) 20:51	21:37	33	20:48 (18)	
9	08:25	13:23 (1) 07:42	06:40	16:32 (19) 06:23	18:32 (3) 05:17	04:36	20:15 (20)				
16:05	84	15:04 (23) 17:03	17:59	28	17:00 (19) 19:57	27	18:59 (3) 20:53	21:38	33	20:48 (18)	
10	08:24	13:23 (1) 07:40	06:37	16:32 (19) 06:21	18:33 (3) 05:15	04:36	20:15 (20)				
16:06	84	15:05 (23) 17:05	18:00	27	16:59 (19) 19:59	25	18:58 (3) 20:55	21:39	33	20:48 (18)	
11	08:24	13:24 (1) 07:38	06:35	16:33 (19) 06:18	18:34 (3) 05:13	04:35	20:16 (20)				
16:08	79	15:05 (23) 17:07	18:02	25	16:58 (19) 20:01	22	18:56 (3) 20:57	21:40	32	20:48 (18)	
12	08:23	13:24 (1) 07:36	06:32	16:34 (19) 06:16	18:35 (3) 05:11	04:35	20:16 (20)				
16:09	73	15:05 (23) 17:09	18:04	22	16:56 (19) 20:03	20	18:55 (3) 20:59	21:41	32	20:48 (18)	
13	08:22	13:25 (1) 07:34	06:30	16:36 (19) 06:14	18:36 (3) 05:09	04:34	20:16 (20)				
16:11	71	15:06 (23) 17:11	18:06	19	16:55 (19) 20:05	15	18:53 (3) 21:00	21:41	32	20:48 (18)	
14	08:21	13:25 (1) 07:32	06:27	16:37 (19) 06:11	18:40 (3) 05:07	04:34	20:17 (20)				
16:13	70	15:06 (23) 17:13	18:08	14	16:51 (19) 20:07	8	18:48 (3) 21:02	21:42	31	20:48 (18)	
15	08:20	13:26 (1) 07:30	06:25	16:42 (19) 06:09	18:49 (3) 05:06	04:34	20:17 (20)				
16:14	69	15:07 (23) 17:15	18:10	9	17:43 (26) 20:09	1	20:21 (20) 21:43	21:43	31	20:48 (18)	
16	08:19	13:27 (1) 07:28	06:23	16:46 (19) 06:06	18:50 (3) 05:04	04:34	20:18 (20)				
16:16	69	15:07 (23) 17:17	18:12	9	17:45 (26) 20:10	11	20:29 (20) 21:43	21:43	30	20:48 (18)	
17	08:18	13:28 (1) 07:26	06:20	17:36 (26) 06:04	19:02 (3) 05:02	04:34	20:18 (20)				
16:18	67	15:07 (23) 17:19	18:14	11	17:47 (26) 20:12	14	20:31 (20) 21:44	21:44	30	20:48 (18)	
18	08:17	13:28 (1) 07:24	06:18	17:34 (26) 06:02	19:03 (3) 05:01	04:34	20:18 (20)				
16:19	65	15:06 (23) 17:21	18:16	15	17:49 (26) 20:14	18	20:36 (18) 21:44	21:44	30	20:48 (18)	
19	08:16	13:29 (1) 07:22	06:15	17:34 (26) 05:59	19:04 (3) 05:00	04:34	20:18 (20)				
16:21	64	15:07 (23) 17:23	18:18	17	17:51 (26) 20:16	21	20:38 (18) 21:44	21:44	30	20:48 (18)	
20	08:15	13:29 (1) 07:19	06:13	17:33 (26) 05:57	19:05 (3) 04:58	04:34	20:14 (20)				
16:23	62	15:06 (23) 17:25	18:20	18	17:51 (26) 20:18	21	20:39 (18) 21:45	21:45	30	20:48 (18)	
21	08:14	13:31 (1) 07:17	06:10	17:34 (26) 05:55	19:06 (3) 04:56	04:34	20:13 (20)				
16:25	58	15:06 (23) 17:27	18:22	17	17:51 (26) 20:20	21	20:40 (18) 21:45	21:45	29	20:48 (18)	
22	08:12	13:32 (1) 07:15	06:08	17:33 (26) 05:52	19:07 (3) 04:55	04:34	20:13 (20)				
16:27	56	15:06 (23) 17:29	18:23	17	17:50 (26) 20:22	21	20:42 (18) 21:45	21:45	29	20:48 (18)	
23	08:11	13:32 (1) 07:13	06:05	17:34 (26) 05:50	19:08 (3) 04:53	04:34	20:13 (20)				
16:29	53	15:04 (23) 17:31	18:25	15	17:49 (26) 20:24	21	20:44 (18) 21:45	21:45	30	20:48 (18)	
24	08:10	13:33 (1) 07:10	06:03	17:35 (26) 05:48	19:09 (3) 04:52	04:34	20:12 (20)				
16:31	47	15:02 (23) 17:33	18:27	12	17:47 (26) 20:26	21	20:44 (18) 21:46	21:46	30	20:48 (18)	
25	08:08	13:35 (1) 07:08	06:00	17:38 (26) 05:46	19:10 (3) 04:50	04:34	20:12 (20)				
16:32	40	15:01 (23) 17:35	18:29	12	17:53 (3) 20:27	21	20:46 (18) 21:46	21:46	30	20:48 (18)	
26	08:07	13:36 (1) 07:06	05:58	17:42 (3) 05:44	19:11 (3) 04:49	04:34	20:12 (20)				
16:34	32	14:08 (1) 17:37	18:31	15	17:57 (3) 20:29	21	20:47 (18) 21:46	21:46	30	20:50 (18)	
27	08:05	13:37 (1) 07:03	05:55	17:40 (3) 05:41	19:12 (3) 04:48	04:34	20:12 (20)				
16:36	29	14:06 (1) 17:39	21	16:58 (19) 18:33	19	17:59 (3) 20:31	21	20:47 (18) 21:45	31	20:50 (18)	
28	08:04	13:40 (1) 07:01	05:53	17:37 (3) 05:39	19:13 (3) 04:47	04:34	20:12 (20)				
16:38	26	14:06 (1) 17:41	23	16:59 (19) 18:35	23	18:00 (3) 20:33	21	20:48 (18) 21:45	31	20:51 (18)	
29	08:02	13:42 (1)	05:50	18:36 (3) 05:37	19:14 (3) 04:45	04:34	20:12 (20)				
16:40	22	14:04 (1)	19:37	26	19:02 (3) 20:35	21	20:48 (18) 21:45	21:45	32	20:51 (18)	
30	08:00	13:44 (1)	05:48	18:36 (3) 05:35	19:15 (3) 04:44	04:34	20:12 (20)				
16:42	18	14:02 (1)	19:39	27	19:03 (3) 20:37	21	20:48 (18) 21:45	21:45	32	20:52 (18)	
31	07:59	13:48 (1)	05:45	18:34 (3)	19:16 (3) 04:43	04:34	20:12 (20)				
16:44	10	13:58 (1)	19:40	29	19:03 (3)	21	20:48 (18)	21:46	36	20:48 (18)	
Sonnenscheinstunden	248	272	367	421	496	512					
astr.max.mögl.Beschattung	1952				362		464			956	
Red.Sonnenscheinwahrsch.	0.17		0.24		0.31		0.41			0.45	
Reduktion Betriebsdauer	0.91		0.91		0.91		0.91			0.91	
Reduktion Windrichtung	0.65		0.69		0.69		0.68			0.63	
Gesamte Reduktion	0.10		0.15		0.20		0.25			0.29	
Met.wahrsch.Beschattung	202		11		127		91			135	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 62

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

-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AC - IO29

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:38	20:20 (20)	05:19		06:14	18:33 (3)	07:08		17:15 (19)	07:07	08:03	13:06 (1)
2	21:44	32 20:52 (18)	21:09		20:01	18:56 (3)	18:46	20	17:35 (19)	16:35	15:50	78 14:47 (23)
3	04:39	20:20 (20)	05:20		06:16	18:31 (3)	07:10		17:13 (19)	07:09	08:05	13:06 (1)
4	21:44	32 20:52 (18)	21:07		19:59	18:56 (3)	18:44	23	17:36 (19)	16:33	15:49	84 14:48 (23)
5	04:40	20:20 (20)	05:22		06:17	18:30 (3)	07:12		17:11 (19)	07:11	08:06	13:07 (1)
6	21:44	33 20:53 (18)	21:05		19:56	18:57 (3)	18:41	25	17:36 (19)	16:31	15:48	85 14:49 (23)
7	04:40	20:20 (20)	05:24		06:19	18:29 (3)	07:14		17:10 (19)	07:13	08:08	13:07 (1)
8	21:43	33 20:53 (18)	21:03		19:54	18:58 (3)	18:39	27	17:37 (19)	16:29	15:48	86 14:48 (23)
9	04:41	20:20 (20)	05:26		06:21	18:28 (3)	07:15		17:09 (19)	07:15	08:09	13:08 (1)
10	21:43	34 20:54 (18)	21:01		19:51	18:57 (3)	18:37	28	17:37 (19)	16:27	15:47	87 14:49 (23)
11	04:42	20:20 (20)	05:27		06:23	18:27 (3)	07:17		17:08 (19)	07:17	08:10	13:08 (1)
12	21:42	35 20:55 (18)	20:59		19:49	18:58 (3)	18:34	29	17:37 (19)	16:25	15:46	88 14:49 (23)
13	04:43	20:21 (20)	05:29		06:25	18:27 (3)	07:19		17:08 (19)	07:19	08:12	13:08 (1)
14	21:41	34 20:55 (18)	20:57		19:46	18:58 (3)	18:32	29	17:37 (19)	16:23	15:46	89 14:50 (23)
15	04:44	20:21 (20)	05:31		06:26	18:26 (3)	07:21		17:08 (19)	07:21	08:13	13:09 (1)
16	21:41	34 20:55 (18)	20:55		19:44	18:58 (3)	18:29	29	17:37 (19)	16:21	15:45	89 14:50 (23)
17	04:45	20:21 (20)	05:33		06:28	18:25 (3)	07:23		17:07 (19)	07:23	08:14	13:10 (1)
18	21:40	35 20:56 (18)	20:53		19:41	18:57 (3)	18:27	30	17:37 (19)	16:20	15:45	88 14:50 (23)
19	04:46	20:21 (20)	05:34		06:30	18:25 (3)	07:25		17:08 (19)	07:25	08:16	13:10 (1)
20	21:39	35 20:56 (18)	20:51		19:39	18:56 (3)	18:24	28	17:36 (19)	16:18	15:45	89 14:50 (23)
21	04:48	20:21 (20)	05:36		06:32	18:26 (3)	07:27		17:08 (19)	07:27	08:17	13:10 (1)
22	21:38	35 20:56 (18)	20:49		19:36	18:56 (3)	18:22	27	17:35 (19)	16:16	10 13:30 (1)	15:44 88 14:50 (23)
23	04:49	20:21 (20)	05:38		06:34	18:26 (3)	07:28		17:08 (19)	07:29	08:18	13:10 (1)
24	21:37	35 20:56 (18)	20:47		19:34	18:55 (3)	18:20	26	17:34 (19)	16:14	18 13:34 (1)	15:44 90 14:51 (23)
25	04:50	20:21 (20)	05:40		06:35	18:26 (3)	07:30		17:09 (19)	07:31	08:19	13:11 (1)
26	21:36	35 20:56 (18)	20:45		19:31	18:53 (3)	18:17	24	17:33 (19)	16:13	23 13:36 (1)	15:44 88 14:51 (23)
27	04:51	20:21 (20)	05:41		06:37	18:27 (3)	07:32		17:10 (19)	07:33	08:20	13:11 (1)
28	21:35	35 20:56 (18)	20:43		19:29	18:52 (3)	18:15	22	17:32 (19)	16:11	26 13:38 (1)	15:44 89 14:51 (23)
29	04:53	20:21 (20)	05:43		06:39	18:28 (3)	07:34		17:11 (19)	07:35	08:21	13:12 (1)
30	21:34	35 20:56 (18)	20:40		19:26	18:51 (3)	18:12	19	17:30 (19)	16:09	29 13:39 (1)	15:44 88 14:52 (27)
31	04:54	20:21 (20)	05:45		06:41	18:29 (3)	07:36		17:13 (19)	07:37	08:22	13:12 (1)
1	21:33	36 20:57 (18)	20:38		19:24	18:49 (3)	18:10	15	17:28 (19)	16:08	32 13:41 (1)	15:44 89 14:52 (23)
2	04:55	20:21 (20)	05:47		06:43	18:30 (3)	07:38		17:17 (19)	07:38	08:23	13:13 (1)
3	21:32	36 20:57 (18)	20:36		19:21	18:46 (3)	18:08	7 17:24 (19)	16:06	40 14:34 (23)	15:44 89 14:53 (27)	
4	04:57	20:21 (20)	05:49		06:44	18:26 (26)	07:40		16:05	47 14:36 (23)	15:45 88 14:54 (27)	
5	21:30	35 20:56 (18)	20:34		19:19	18:42 (3)	18:05		16:05	47 14:36 (23)	15:45 88 14:54 (27)	
6	04:58	20:22 (20)	05:50		06:46	18:23 (26)	07:42		16:05	47 14:36 (23)	15:45 88 14:54 (27)	
7	21:29	33 20:55 (18)	20:32		19:16	18:34 (26)	18:03		16:03	53 14:38 (23)	15:45 88 14:54 (23)	
8	04:59	20:22 (20)	05:52		06:48	18:21 (26)	07:44		16:04	53 14:38 (23)	15:45 88 14:54 (23)	
9	21:28	32 20:54 (18)	20:29		19:14	18:35 (26)	18:01		16:02	57 14:40 (23)	15:45 88 14:54 (27)	
10	05:01	20:22 (20)	05:54		06:50	18:19 (26)	07:46		16:02	57 14:40 (23)	15:45 88 14:54 (27)	
11	21:26	30 20:52 (18)	20:27		19:11	18:35 (26)	17:59		16:01	58 14:42 (23)	15:46 88 14:55 (27)	
12	05:02	20:24 (20)	05:56		06:52	18:18 (26)	07:48		16:01	58 14:42 (23)	15:46 88 14:55 (27)	
13	21:25	28 20:52 (18)	20:25		19:09	18:36 (26)	17:56		15:59	62 14:43 (23)	15:46 88 14:55 (27)	
14	05:04	20:24 (20)	05:58		06:53	18:18 (26)	07:50		15:59	62 14:43 (23)	15:46 88 14:55 (27)	
15	21:23	26 20:50 (18)	20:22		19:06	18:36 (26)	17:54		15:58	64 14:44 (23)	15:47 88 14:56 (27)	
16	05:06	20:24 (20)	05:59		06:55	18:18 (26)	07:51		15:58	64 14:44 (23)	15:47 88 14:56 (27)	
17	21:22	24 20:48 (18)	20:20		19:04	18:35 (26)	17:52		15:57	64 14:43 (23)	15:47 88 14:56 (23)	
18	05:07	20:25 (20)	06:01		06:57	18:18 (26)	06:53		15:57	64 14:43 (23)	15:47 88 14:56 (23)	
19	21:20	22 20:47 (18)	20:18		19:01	18:33 (26)	16:50		15:56	67 14:44 (23)	15:48 87 14:56 (23)	
20	05:09	20:26 (20)	06:03		06:59	18:17 (26)	06:55		15:55	67 14:44 (23)	15:48 87 14:56 (23)	
21	21:19	16 20:42 (20)	20:15		18:59	18:30 (26)	16:48		15:55	68 14:45 (23)	15:48 88 14:57 (27)	
22	05:10	20:28 (20)	06:05		07:01	18:18 (26)	06:57		15:54	68 14:45 (23)	15:48 88 14:57 (27)	
23	21:17	13 20:41 (20)	20:13		18:56	18:27 (26)	16:45		15:53	69 14:46 (23)	15:49 89 14:57 (23)	
24	05:12	20:29 (20)	06:07		07:03	18:19 (26)	06:59		15:53	69 14:46 (23)	15:49 89 14:57 (23)	
25	21:16	10 20:39 (20)	20:11		18:54	18:25 (26)	16:43		15:52	69 14:46 (23)	15:50 88 14:58 (23)	
26	05:14		06:08	18:41 (3)	07:04	17:20 (19)	07:01		15:51	71 14:47 (23)	15:51 88 14:58 (23)	
27	21:14		20:08	8 18:49 (3)	18:51	18:23 (26)	16:41		15:51	71 14:47 (23)	15:51 88 14:58 (23)	
28	05:15		06:10	18:37 (3)	07:06	17:17 (19)	07:03		15:51	73 14:48 (23)	15:52 90 14:59 (23)	
29	21:12		20:06	16 18:53 (3)	18:49	17:34 (19)	16:39		15:51	73 14:48 (23)	15:52 90 14:59 (23)	
30	05:17		06:12	18:35 (3)		07:05			15:51	73 14:48 (23)	15:52 90 14:59 (23)	
31	21:10		20:03	20 18:55 (3)		16:37			15:51	73 14:48 (23)	15:52 90 14:59 (23)	
Sonnenscheinstunden	514		461		383		328		257		231	
astr.max.mögl.Beschattung	853		44		640		408		1000		2718	
Red.Sonnenscheinwahrsch.	0.44		0.48		0.40		0.33		0.21		0.14	
Reduktion Betriebsdauer	0.91		0.91		0.91		0.91		0.91		0.91	
Reduktion Windrichtung	0.63		0.68		0.68		0.69		0.65		0.66	
Gesamte Reduktion	0.25		0.30		0.25		0.21		0.12		0.08	
Met.wahrsch.Beschattung	215		13		159		84		124		225	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt: 151008_Miltzow_III-VII	Ausdruck/Seite: 12/10/2015 15:53 / 63 Lizenzierter Anwender: I17-Wind GmbH & Co. KG Am Westersielzug 11 DE-25840 Friedrichstadt - André Gefke / andre.gefke@i17-wind.de Berechnet: 12/10/2015 15:41/2.9.285
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SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AD - IO30

Voraussetzungen für Berechnung des Schattenwurfs
 Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
 1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
 344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
 : Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	13:30 (1) 07:57	13:58 (1) 06:59	16:39 (19) 06:43	18:34 (3) 05:33	10:42	20:10 (20)
2	08:28	13:30 (1) 07:55	14:06 (1) 17:43	17:03 (19) 19:42	19:04 (3) 20:39	12:29	20:45 (18)
3	08:28	13:30 (1) 07:54	17:45	16:37 (19) 19:44	18:33 (3) 05:31	10:41	20:11 (20)
4	08:27	13:31 (1) 07:52	17:47	16:37 (19) 06:38	18:33 (3) 05:29	10:40	20:12 (20)
5	08:27	13:31 (1) 07:50	17:49	17:04 (19) 19:46	19:03 (3) 20:42	12:32	20:45 (18)
6	08:27	13:31 (1) 07:48	17:51	16:36 (19) 06:35	18:32 (3) 05:26	10:40	20:12 (20)
7	08:26	13:32 (1) 07:46	17:52	17:03 (19) 19:48	19:02 (3) 20:44	12:33	20:44 (18)
8	08:26	13:33 (1) 07:44	17:55	16:36 (19) 06:33	18:33 (3) 05:24	10:43	20:12 (20)
9	08:26	13:33 (1) 07:42	17:57	17:04 (19) 19:50	19:02 (3) 20:46	12:34	20:44 (18)
10	08:24	13:33 (1) 07:40	17:59	16:35 (19) 06:31	18:32 (3) 05:22	10:43	20:12 (20)
11	08:24	13:33 (1) 07:38	18:00	17:03 (19) 19:52	19:01 (3) 20:48	12:35	20:44 (18)
12	08:23	13:34 (1) 07:36	18:02	16:35 (19) 06:28	18:33 (3) 05:20	10:43	20:13 (20)
13	08:22	13:34 (1) 07:34	18:06	17:03 (19) 19:54	19:01 (3) 20:50	12:36	20:44 (18)
14	08:21	13:35 (1) 07:32	18:10	16:35 (19) 06:26	18:34 (3) 05:19	10:43	20:14 (20)
15	08:20	13:36 (1) 07:30	18:12	17:03 (19) 19:55	19:00 (3) 20:51	12:37	20:44 (18)
16	08:19	13:36 (1) 07:28	18:14	16:34 (19) 06:23	18:34 (3) 05:17	10:43	20:14 (20)
17	08:18	13:37 (1) 07:26	18:16	17:02 (19) 19:57	18:32 (3) 05:15	10:43	20:15 (20)
18	08:17	13:37 (1) 07:24	18:18	16:35 (19) 06:21	18:35 (3) 05:15	10:43	20:15 (20)
19	08:16	13:38 (1) 07:22	18:20	17:01 (19) 19:59	18:57 (3) 20:55	12:39	20:43 (18)
20	08:15	13:38 (1) 07:19	18:22	16:37 (19) 06:18	18:36 (3) 05:13	10:43	20:15 (20)
21	08:14	13:40 (1) 07:17	18:23	17:00 (19) 20:01	19:55 (3) 20:57	12:40	20:43 (18)
22	08:12	13:41 (1) 07:15	18:25	16:37 (19) 06:16	18:38 (3) 05:11	10:43	20:15 (20)
23	08:11	13:41 (1) 07:13	18:26	17:51 (20) 20:03	15 18:53 (3) 20:59	21:41	20:43 (18)
24	08:10	13:42 (1) 07:10	18:27	16:39 (19) 06:14	18:42 (3) 05:09	10:43	20:16 (20)
25	08:08	13:44 (1) 07:08	18:29	18:06 (19) 20:05	7 18:49 (3) 21:00	12:41	20:43 (18)
26	08:07	13:44 (1) 07:06	18:31	16:40 (19) 06:11	19:07	12:42	20:43 (18)
27	08:05	13:45 (1) 07:03	18:32	16:54 (19) 20:07	12:02	12 20:15 (20) 10:43	20:17 (20)
28	08:04	13:46 (1) 07:01	18:33	16:45 (19) 06:09	19:06	12 20:27 (20) 10:42	20:17 (20)
29	08:02	13:49 (1)	18:34	16:45 (19) 06:09	19:06	12 20:14 (20) 10:43	20:17 (20)
30	08:00	14:15 (1)	18:35	17:43 (26) 20:09	19:06	15 20:14 (20) 10:43	20:17 (20)
31	07:59	14:13 (1)	18:36	17:37 (26) 06:06	19:06	15 20:29 (20) 10:43	20:18 (20)
16:44	17 14:11 (1)	18:37	17:45 (26) 20:10	19:06	18 20:12 (20) 10:43	22 20:42 (18)	
16:44	17 14:11 (1)	18:38	17:36 (26) 06:04	19:06	18 20:12 (20) 10:43	22 20:18 (20)	
16:44	17 14:11 (1)	18:39	17:47 (26) 20:12	19:06	23 20:35 (18) 12:44	21 20:42 (18)	
16:44	17 14:11 (1)	18:40	17:35 (26) 06:02	19:06	23 20:10 (20) 10:43	21 20:18 (20)	
16:44	17 14:11 (1)	18:41	17:49 (26) 20:14	19:06	26 20:36 (18) 12:44	20 20:42 (18)	
16:44	17 14:11 (1)	18:42	17:35 (26) 05:59	19:06	26 20:10 (20) 10:43	20 20:19 (20)	
16:44	17 14:11 (1)	18:43	17:51 (26) 20:16	19:06	28 20:38 (18) 12:44	18 20:41 (18)	
16:44	17 14:11 (1)	18:44	17:34 (26) 05:57	19:06	28 20:10 (20) 10:43	20 20:19 (20)	
16:44	17 14:11 (1)	18:45	17:51 (26) 20:18	19:06	29 20:39 (18) 12:45	17 20:41 (18)	
16:44	17 14:11 (1)	18:46	17:34 (26) 05:55	19:06	29 20:09 (20) 10:43	20 20:19 (20)	
16:44	17 14:11 (1)	18:47	17:51 (26) 20:20	19:06	31 20:40 (18) 12:45	17 20:41 (18)	
16:44	17 14:11 (1)	18:48	17:34 (26) 05:52	19:06	31 20:09 (20) 10:43	20 20:19 (20)	
16:44	17 14:11 (1)	18:49	17:50 (26) 20:22	19:06	33 20:42 (18) 12:45	17 20:41 (18)	
16:44	17 14:11 (1)	18:50	17:35 (26) 05:50	19:06	33 20:12 (20) 10:43	20 20:20 (20)	
16:44	17 14:11 (1)	18:51	17:49 (26) 20:24	19:06	34 20:44 (18) 12:45	17 20:42 (18)	
16:44	17 14:11 (1)	18:52	17:36 (26) 05:48	19:06	34 20:09 (20) 10:43	20 20:19 (20)	
16:44	17 14:11 (1)	18:53	17:47 (26) 20:25	19:06	35 20:44 (18) 12:46	19 20:42 (18)	
16:44	17 14:11 (1)	18:54	17:39 (26) 05:46	19:06	35 20:09 (20) 10:43	20 20:19 (20)	
16:44	17 14:11 (1)	18:55	17:55 (3) 20:27	19:06	35 20:44 (18) 12:46	21 20:43 (18)	
16:44	17 14:11 (1)	18:56	17:42 (3) 05:44	19:06	36 20:09 (20) 10:43	20 20:20 (20)	
16:44	17 14:11 (1)	18:57	17:58 (3) 20:29	19:06	36 20:45 (18) 12:46	21 20:44 (18)	
16:44	17 14:11 (1)	18:58	17:40 (3) 05:41	19:06	36 20:09 (20) 10:43	20 20:19 (20)	
16:44	17 14:11 (1)	18:59	18:00 (3) 20:31	19:06	36 20:45 (18) 12:45	23 20:44 (18)	
16:44	17 14:11 (1)	19:00	17:38 (3) 05:39	19:06	36 20:10 (20) 10:43	20 20:20 (20)	
16:44	17 14:11 (1)	19:01	18:01 (3) 20:33	19:06	35 20:45 (18) 12:45	24 20:45 (18)	
16:44	17 14:11 (1)	19:02	18:37 (3) 05:37	19:06	35 20:10 (20) 10:43	20 20:19 (20)	
16:44	17 14:11 (1)	19:03	19:02 (3) 20:35	19:06	35 20:45 (18) 12:45	25 20:45 (18)	
16:44	17 14:11 (1)	19:04	18:36 (3) 05:35	19:06	35 20:10 (20) 10:43	20 20:19 (20)	
16:44	17 14:11 (1)	19:05	19:03 (3) 20:37	19:06	35 20:45 (18) 12:45	28 20:47 (18)	
16:44	17 14:11 (1)	19:06	18:34 (3)	19:06	35 20:10 (20)		
16:44	17 14:11 (1)	19:07	19:03 (3)	19:06	35 20:45 (18)		
Sonnenscheinstunden	248	272	367	421	496	512	
astr.max.mögl.Beschattung	1971	61	632	319	539	753	
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.66	0.69	0.69	0.68	0.63	0.63	
Gesamte Reduktion	0.10	0.15	0.20	0.25	0.29	0.26	
Met.wahrsch.Beschattung	206	9	124	81	157	194	

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)

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 64
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AD - IO30

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:38	20:20 (20) 05:19			06:14	18:35 (3) 07:08	17:17 (19) 07:07			08:03	13:15 (1)	
2	21:44	28 20:48 (18) 21:09			20:01	18:55 (3) 18:46	21 17:38 (19) 16:35			10:50	81 14:52 (23)	
3	04:39	20:19 (20) 05:20			06:16	18:33 (3) 07:10	17:16 (19) 07:09			08:05	13:16 (1)	
4	21:44	28 20:47 (18) 21:07			19:59	18:55 (3) 18:44	23 17:39 (19) 16:33			10:59	82 14:53 (23)	
5	04:40	20:19 (20) 05:22			06:17	18:32 (3) 07:12	17:14 (19) 07:11			08:06	13:17 (1)	
6	21:44	29 20:48 (18) 21:05			19:56	18:56 (3) 18:41	25 17:39 (19) 16:31			10:58	81 14:53 (23)	
7	04:40	20:19 (20) 05:24			06:19	18:31 (3) 07:14	17:13 (19) 07:13			08:08	13:17 (1)	
8	21:43	30 20:49 (18) 21:03			19:54	18:57 (3) 18:39	26 17:39 (19) 16:29			10:58	82 14:53 (23)	
9	04:41	20:19 (20) 05:26			06:21	18:29 (3) 07:15	17:12 (19) 07:15			08:09	13:17 (1)	
10	21:43	31 20:50 (18) 21:01			19:51	18:57 (3) 18:37	27 17:39 (19) 16:27			10:57	83 14:54 (23)	
11	04:42	20:19 (20) 05:27			06:23	18:28 (3) 07:17	17:11 (19) 07:17			08:10	13:17 (1)	
12	21:42	32 20:51 (18) 20:59			19:49	18:57 (3) 18:34	28 17:39 (19) 16:25			10:56	83 14:53 (23)	
13	04:43	20:19 (20) 05:29			06:25	18:28 (3) 07:19	17:11 (19) 07:19			08:12	13:18 (1)	
14	21:41	32 20:51 (18) 20:57			19:46	18:57 (3) 18:32	28 17:39 (19) 16:23			10:56	83 14:54 (23)	
15	04:44	20:19 (20) 05:31			06:26	18:27 (3) 07:21	17:11 (19) 07:21			08:13	13:18 (1)	
16	21:41	33 20:52 (18) 20:55			19:44	18:58 (3) 18:29	28 17:39 (19) 16:21			10:55	83 14:54 (23)	
17	04:45	20:19 (20) 05:33			06:28	18:26 (3) 07:23	17:11 (19) 07:23			08:14	13:20 (1)	
18	21:40	33 20:52 (18) 20:53			19:41	18:57 (3) 18:27	28 17:39 (19) 16:20			10:55	83 14:55 (23)	
19	04:46	20:19 (20) 05:34			06:30	18:26 (3) 07:25	17:11 (19) 07:25			13:29 (1) 08:16	13:20 (1)	
20	21:39	34 20:53 (18) 20:51			19:39	18:56 (3) 18:24	27 17:38 (19) 16:18	9	13:38 (1) 15:45	82 14:55 (23)		
21	04:48	20:19 (20) 05:36			06:32	18:26 (3) 07:27	17:11 (19) 07:27			13:26 (1) 08:17	13:20 (1)	
22	21:38	34 20:53 (18) 20:49			19:36	18:56 (3) 18:22	26 17:37 (19) 16:16	17	13:43 (1) 15:44	82 14:55 (23)		
23	04:49	20:19 (20) 05:38			06:34	18:27 (3) 07:28	17:12 (19) 07:29			13:23 (1) 08:18	13:20 (1)	
24	21:37	34 20:53 (18) 20:47			19:34	18:55 (3) 18:20	24 17:36 (19) 16:14	22	13:45 (1) 15:44	82 14:55 (23)		
25	04:50	20:19 (20) 05:40			06:35	18:26 (3) 07:30	17:13 (19) 07:31			13:21 (1) 08:19	13:21 (1)	
26	21:36	34 20:53 (18) 20:45			19:31	18:54 (3) 18:17	22 17:35 (19) 16:13	26	13:47 (1) 15:44	81 14:55 (23)		
27	04:51	20:18 (20) 05:41			06:37	18:27 (3) 07:32	17:14 (19) 07:33			13:20 (1) 08:20	13:21 (1)	
28	21:35	35 20:53 (18) 20:43			19:29	18:53 (3) 18:15	20 17:34 (19) 16:11	28	13:48 (1) 15:44	81 14:55 (23)		
29	04:53	20:18 (20) 05:43			06:39	18:28 (3) 07:34	17:15 (19) 07:35			13:18 (1) 08:21	13:22 (1)	
30	21:34	35 20:53 (18) 20:40			19:26	18:51 (3) 18:12	16 17:31 (19) 16:09	32	13:50 (1) 15:44	79 14:55 (23)		
31	04:54	20:19 (20) 05:45			06:41	18:29 (3) 07:36	17:18 (19) 07:37			13:17 (1) 08:22	13:22 (1)	
1	21:33	35 20:54 (18) 20:38			19:24	18:50 (3) 18:10	10 17:28 (19) 16:08	42	14:40 (23) 15:44	81 14:56 (23)		
2	04:55	20:19 (20) 05:47			06:43	18:30 (3) 07:38	07:38			13:17 (1) 08:23	13:23 (1)	
3	21:32	35 20:54 (18) 20:36			19:21	18:47 (3) 18:08	16:06	48	14:42 (23) 15:44	80 14:56 (23)		
4	04:57	20:19 (20) 05:49			06:44	18:33 (3) 07:40	07:40			13:16 (1) 08:23	13:24 (1)	
5	21:30	35 20:54 (18) 20:34			19:19	18:44 (3) 18:05	16:05	53	14:44 (23) 15:45	79 14:57 (23)		
6	04:58	20:19 (20) 05:50			06:46	18:24 (26) 07:42	07:42			13:15 (1) 08:24	13:25 (1)	
7	21:29	36 20:55 (18) 20:32			19:16	18:34 (26) 18:03	16:03	56	14:45 (23) 15:45	79 14:58 (27)		
8	04:59	20:19 (20) 05:52			06:48	18:22 (26) 07:44	07:44			13:15 (1) 08:25	13:24 (1)	
9	21:28	35 20:54 (18) 20:29			19:14	18:35 (26) 18:01	16:02	59	14:46 (23) 15:45	80 14:58 (27)		
10	05:01	20:19 (20) 05:54			06:50	18:20 (26) 07:46	07:46			13:16 (1) 08:25	13:25 (1)	
11	21:26	33 20:52 (18) 20:27			19:11	18:35 (26) 17:59	16:01	61	14:48 (23) 15:46	79 14:58 (23)		
12	05:02	20:20 (20) 05:56			06:52	18:19 (26) 07:48	07:48			13:15 (1) 08:26	13:25 (1)	
13	21:25	32 20:52 (18) 20:25			19:09	18:36 (26) 17:56	15:59	64	14:49 (23) 15:46	79 14:58 (23)		
14	05:04	20:20 (20) 05:58			06:53	18:18 (26) 07:50	07:49			13:15 (1) 08:27	13:26 (1)	
15	21:23	30 20:50 (18) 20:22			19:06	18:36 (26) 17:54	15:58	66	14:50 (23) 15:47	80 15:00 (27)		
16	05:06	20:20 (20) 05:59			06:55	18:18 (26) 07:51	07:51			13:14 (1) 08:27	13:26 (1)	
17	21:22	28 20:48 (18) 20:20			19:04	18:35 (26) 17:52	15:57	67	14:49 (23) 15:47	80 15:00 (27)		
18	05:07	20:21 (20) 06:01			06:57	18:18 (26) 06:53	07:53			13:14 (1) 08:27	13:27 (1)	
19	21:20	26 20:47 (18) 20:18			19:01	18:33 (26) 16:50	15:56	67	14:50 (23) 15:48	79 15:00 (23)		
20	05:09	20:21 (20) 06:03			06:59	18:18 (26) 06:55	07:55			13:14 (1) 08:28	13:27 (1)	
21	21:19	24 20:45 (18) 20:15			18:59	18:30 (26) 16:48	15:55	68	14:50 (23) 15:48	79 15:00 (23)		
22	05:10	20:22 (20) 06:05			07:01	18:18 (26) 06:57	07:56			13:15 (1) 08:28	13:27 (1)	
23	21:17	21 20:44 (18) 20:13			18:56	18:27 (26) 16:45	15:53	69	14:51 (23) 15:49	81 15:01 (23)		
24	05:12	20:23 (20) 06:07			07:03	18:20 (26) 06:59	07:58			13:15 (1) 08:28	13:29 (1)	
25	21:16	17 20:40 (20) 20:11			18:54	18:25 (26) 16:43	15:52	69	14:51 (23) 15:50	80 15:02 (23)		
26	05:14	20:25 (20) 06:08			07:04	17:22 (19) 07:01	08:00			13:15 (1) 08:28	13:28 (1)	
27	21:14	14 20:39 (20) 20:08			18:51	18:23 (26) 16:41	15:51	76	14:52 (23) 15:51	81 15:02 (23)		
28	05:15	20:26 (20) 06:10			18:41 (3) 07:06	17:19 (19) 07:03	08:01			13:16 (1) 08:28	13:29 (1)	
29	21:12	10 20:36 (20) 20:06	8	18:49 (3) 18:49	17	17:36 (19) 16:39	15:51	79	14:53 (23) 15:52	81 15:03 (23)		
30	05:17	20:30 (20) 06:12			18:38 (3)	07:05				08:28	13:29 (1)	
31	21:10	4 20:34 (20) 20:03	15	18:53 (3)	16:37					15:53	81 15:03 (23)	
Sonnenscheinstunden		514	461	383	615	328	257	1078	257	231	2507	
astr.max.mögl.Beschattung		897	23	615	379	1078	257	2507	897	23	2507	
Red.Sonnenscheinwahrsch.		0.44	0.48	0.40	0.33	0.21	0.21	0.14	0.21	0.14	0.14	
Reduktion Betriebsdauer		0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung		0.63	0.68	0.68	0.69	0.66	0.66	0.66	0.66	0.66	0.66	
Gesamte Reduktion		0.25	0.30	0.25	0.21	0.13	0.13	0.08	0.13	0.08	0.08	
Met.wahrsch.Beschattung		227	7	153	78	135	257	2507	135	231	2507	

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 65

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AE - IO31

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni						
1	08:28	13:40 (1) 07:57	14:03 (1) 06:59	16:43 (19) 06:43	18:35 (3) 05:33	04:42	20:09 (20)					
15:54	75	15:08 (23) 15:46	16	14:19 (1) 17:43	21	17:04 (19) 19:42	29	19:04 (3) 20:39	21:29	32	20:41 (18)	
2	08:28	13:39 (1) 07:55	14:08 (1) 06:56	16:41 (19) 06:40	18:34 (3) 05:31	04:41	20:11 (20)					
15:55	76	15:08 (23) 16:48	7	14:15 (1) 17:45	24	17:05 (19) 19:44	29	19:03 (3) 20:40	21:31	31	20:42 (18)	
3	08:28	13:40 (1) 07:54	14:06 (1) 06:54	16:40 (19) 06:38	18:34 (3) 05:29	04:40	20:11 (20)					
15:57	76	15:09 (23) 16:50	17:47	26	17:06 (19) 19:46	29	19:03 (3) 20:42	21:32	30	20:41 (18)		
4	08:27	13:41 (1) 07:52	14:06 (1) 06:52	16:39 (19) 06:35	18:33 (3) 05:26	04:40	20:11 (20)					
15:58	76	15:11 (23) 16:52	17:49	26	17:05 (19) 19:48	29	19:02 (3) 20:44	21:33	29	20:40 (18)		
5	08:27	13:41 (1) 07:50	14:06 (1) 06:49	16:39 (19) 06:33	18:33 (3) 05:24	04:39	20:11 (20)					
15:59	76	15:11 (23) 16:54	17:51	27	17:06 (19) 19:50	29	19:02 (3) 20:46	21:34	28	20:39 (18)		
6	08:27	13:41 (1) 07:48	14:06 (1) 06:47	16:38 (19) 06:31	18:33 (3) 05:22	04:38	20:11 (20)					
16:00	76	15:11 (23) 16:56	17:53	27	17:05 (19) 19:52	28	19:01 (3) 20:48	21:35	26	20:40 (18)		
7	08:26	13:42 (1) 07:46	14:06 (1) 06:45	16:38 (19) 06:28	18:34 (3) 05:20	04:37	20:13 (20)					
16:02	77	15:13 (23) 16:58	17:55	28	17:06 (19) 19:54	26	19:00 (3) 20:50	21:36	24	20:39 (18)		
8	08:26	13:42 (1) 07:44	14:06 (1) 06:42	16:38 (19) 06:26	18:35 (3) 05:19	04:37	20:14 (20)					
16:03	76	15:13 (23) 17:00	17:57	27	17:05 (19) 19:55	24	18:59 (3) 20:51	21:37	20	20:38 (18)		
9	08:25	13:42 (1) 07:42	14:06 (1) 06:40	16:38 (19) 06:23	18:35 (3) 05:17	04:36	20:14 (20)					
16:05	77	15:14 (23) 17:03	17:59	27	17:05 (19) 19:57	22	18:57 (3) 20:53	21:38	16	20:38 (18)		
10	08:24	13:42 (1) 07:40	14:06 (1) 06:37	16:38 (19) 06:21	18:37 (3) 05:15	04:36	20:16 (20)					
16:06	77	15:14 (23) 17:05	18:00	25	17:03 (19) 19:59	19	18:56 (3) 20:55	21:39	11	20:27 (20)		
11	08:24	13:43 (1) 07:38	14:06 (1) 06:35	16:39 (19) 06:18	18:38 (3) 05:13	20:14 (20)	04:35	20:17 (20)				
16:08	76	15:15 (23) 17:07	18:02	24	17:03 (19) 20:01	15	18:53 (3) 20:57	8	20:22 (20)	10	20:27 (20)	
12	08:23	13:43 (1) 07:36	14:06 (1) 06:32	16:40 (19) 06:16	18:41 (3) 05:11	20:13 (20)	04:35	20:17 (20)				
16:09	76	15:15 (23) 17:09	18:04	21	17:01 (19) 20:03	9	18:50 (3) 20:59	12	20:25 (20)	9	20:26 (20)	
13	08:22	13:44 (1) 07:34	14:06 (1) 06:30	16:42 (19) 06:14	18:42 (3) 05:09	20:11 (20)	04:34	20:18 (20)				
16:11	75	15:16 (23) 17:11	18:06	18	17:00 (19) 20:05	21:00	15	20:26 (20)	21:41	8	20:26 (20)	
14	08:21	13:44 (1) 07:32	14:06 (1) 06:27	16:43 (19) 06:11	18:43 (3) 05:07	20:09 (20)	04:34	20:19 (20)				
16:13	73	15:16 (23) 17:13	18:08	14	16:57 (19) 20:07	21:02	18	20:27 (20)	21:42	7	20:26 (20)	
15	08:20	13:45 (1) 07:30	14:06 (1) 06:25	16:48 (19) 06:09	18:44 (3) 05:05	20:09 (20)	04:34	20:20 (20)				
16:14	68	15:17 (23) 17:15	18:10	8	17:43 (26) 20:09	21:04	22	20:32 (18)	21:43	5	20:25 (20)	
16	08:19	13:45 (1) 07:28	14:06 (1) 06:23	16:47 (19) 06:06	18:45 (3) 05:04	20:08 (20)	04:34	20:22 (20)				
16:16	68	15:17 (23) 17:17	18:12	8	17:45 (26) 20:10	21:05	25	20:33 (18)	21:43	2	20:24 (20)	
17	08:18	13:46 (1) 07:26	14:06 (1) 06:20	16:48 (19) 06:04	18:46 (3) 05:02	20:08 (20)	04:34	20:20 (20)				
16:18	68	15:18 (23) 17:19	18:14	10	17:47 (26) 20:12	21:07	27	20:35 (18)	21:44			
18	08:17	13:46 (1) 07:24	14:06 (1) 06:18	16:49 (19) 06:02	18:47 (3) 05:01	20:07 (20)	04:33	20:20 (20)				
16:19	67	15:17 (23) 17:21	18:16	14	17:49 (26) 20:14	21:09	29	20:36 (18)	21:44			
19	08:16	13:47 (1) 07:22	14:06 (1) 06:15	16:50 (19) 05:59	18:48 (3) 05:00	20:06 (20)	04:33	20:19 (20)				
16:21	66	15:18 (23) 17:23	18:18	16	17:51 (26) 20:16	21:10	31	20:38 (18)	21:44			
20	08:15	13:47 (1) 07:19	14:06 (1) 06:13	16:51 (19) 05:57	18:49 (3) 04:58	20:07 (20)	04:34	20:18 (20)				
16:23	64	15:17 (23) 17:25	18:20	18	17:52 (26) 20:18	21:12	32	20:39 (18)	21:45			
21	08:14	13:48 (1) 07:17	14:06 (1) 06:10	16:52 (19) 05:55	18:50 (3) 04:56	20:06 (20)	04:34	20:17 (20)				
16:25	64	15:18 (23) 17:27	18:22	17	17:52 (26) 20:20	21:14	34	20:40 (18)	21:45			
22	08:12	13:49 (1) 07:15	14:06 (1) 06:08	16:53 (19) 05:52	18:51 (3) 04:55	20:05 (20)	04:34	20:16 (20)				
16:27	61	15:18 (23) 17:29	18:23	15	17:50 (26) 20:22	21:15	35	20:42 (18)	21:45			
23	08:11	13:50 (1) 07:13	14:06 (1) 06:05	16:54 (19) 05:50	18:52 (3) 04:53	20:04 (20)	04:34	20:15 (20)				
16:29	59	15:17 (23) 17:31	18:25	13	17:49 (26) 20:24	21:17	35	20:42 (18)	21:45			
24	08:10	13:50 (1) 07:10	14:06 (1) 06:03	16:55 (19) 05:48	18:53 (3) 04:52	20:03 (20)	04:34	20:14 (20)				
16:31	56	15:16 (23) 17:33	18:27	10	17:47 (26) 20:25	21:18	36	20:42 (18)	21:46			
25	08:08	13:52 (1) 07:08	14:06 (1) 06:00	16:56 (19) 05:46	18:54 (3) 04:50	20:02 (20)	04:35	20:13 (20)				
16:32	52	15:16 (23) 17:35	18:29	14	17:57 (3) 20:27	21:20	35	20:42 (18)	21:46			
26	08:07	13:53 (1) 07:06	14:06 (1) 05:58	16:50 (19) 05:58	17:42 (3) 05:44	18:55 (3) 04:49	20:01 (20)	04:35				
16:34	48	15:15 (23) 17:37	18:31	17	17:59 (3) 20:29	21:21	35	20:42 (18)	21:46			
27	08:05	13:53 (1) 07:03	14:06 (1) 05:55	16:46 (19) 05:55	17:40 (3) 05:41	18:56 (3) 04:48	20:00 (20)	04:36				
16:36	43	15:13 (23) 17:39	14	17:00 (19) 18:33	21	18:01 (3) 20:31	21:23	35	20:42 (18)	21:45	4	20:27 (20)
28	08:04	13:56 (1) 07:01	14:06 (1) 05:53	16:44 (19) 05:53	17:38 (3) 05:39	18:57 (3) 04:47	20:00 (20)	04:36				
16:38	30	14:26 (1) 17:41	19	17:03 (19) 18:35	23	18:01 (3) 20:33	21:24	34	20:42 (18)	21:45	5	20:28 (20)
29	08:02	13:57 (1) 07:00	14:06 (1) 05:50	16:43 (19) 05:50	17:37 (3) 05:37	18:58 (3) 04:45	20:00 (20)	04:37				
16:40	28	14:25 (1) 17:40	19	17:04 (19) 18:36	25	19:02 (3) 20:35	21:26	34	20:42 (18)	21:45	7	20:29 (20)
30	08:00	13:58 (1) 07:00	14:06 (1) 05:48	16:42 (19) 05:48	17:36 (3) 05:35	18:59 (3) 04:44	20:00 (20)	04:37				
16:42	26	14:24 (1) 17:39	19	17:05 (19) 18:37	27	19:03 (3) 20:37	21:27	33	20:42 (18)	21:45	9	20:30 (20)
31	07:59	14:00 (1) 07:00	14:06 (1) 05:45	16:41 (19) 05:45	17:35 (3) 05:33	18:59 (3) 04:43	20:00 (20)	04:37				
16:44	22	14:22 (1) 17:36	19	17:06 (19) 18:38	28	19:03 (3) 20:39	21:28	32	20:41 (18)			
Sonnenscheinstunden	248	272	367	421	496	512						
astr.max.mögl.Beschattung	1952	64	619	288	597	313						
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45						
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91						
Reduktion Windrichtung	0.67	0.68	0.68	0.68	0.68	0.63						
Gesamte Reduktion	0.11	0.15	0.20	0.25	0.29	0.26						
Met.wahrsch.Beschattung	206	9	121	73	174	81						

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 66

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

André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AE - IO31

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember		
1	04:38	20:21 (20) 05:19		20:24 (20) 06:14		18:38 (3) 07:08		17:20 (19) 07:07		08:03		13:25 (1)	
2	21:44	10 20:31 (20) 21:09		11 20:35 (20) 20:01		15 18:53 (3) 18:46		20 17:40 (19) 16:35		15:50	76	14:57 (23)	
3	04:39	20:20 (20) 05:20		20:26 (20) 06:16		18:35 (3) 07:10		17:19 (19) 07:09		08:05		13:26 (1)	
4	21:44	11 20:31 (20) 21:07		5 20:31 (20) 19:59		19 18:54 (3) 18:44		22 17:41 (19) 16:33		15:49	76	14:57 (23)	
5	04:40	20:20 (20) 05:22		06:17		18:33 (3) 07:12		17:17 (19) 07:11		08:06		13:26 (1)	
6	21:44	12 20:32 (20) 21:05		19:56	22	18:55 (3) 18:41		24 17:41 (19) 16:31		15:48	77	14:58 (23)	
7	04:40	20:20 (20) 05:24		06:19		18:32 (3) 07:14		17:16 (19) 07:13		08:08		13:26 (1)	
8	21:43	18 20:43 (18) 21:03		19:54	24	18:56 (3) 18:39		25 17:41 (19) 16:29		15:48	76	14:57 (23)	
9	04:41	20:20 (20) 05:26		06:21		18:30 (3) 07:15		17:15 (19) 07:15		08:09		13:27 (1)	
10	21:43	21 20:44 (18) 21:01		19:51	26	18:56 (3) 18:37		27 17:42 (19) 16:27		15:47	77	14:58 (23)	
11	04:42	20:19 (20) 05:27		06:23		18:29 (3) 07:17		17:14 (19) 07:17		08:10		13:27 (1)	
12	21:42	25 20:46 (18) 20:59		19:49	28	18:57 (3) 18:34		28 17:42 (19) 16:25		15:46	76	14:57 (23)	
13	04:43	20:19 (20) 05:29		06:25		18:29 (3) 07:19		17:14 (19) 07:19		08:12		13:28 (1)	
14	21:41	28 20:47 (18) 20:57		19:46	28	18:57 (3) 18:32		28 17:42 (19) 16:23		15:46	76	14:58 (23)	
15	04:44	20:19 (20) 05:31		06:26		18:28 (3) 07:21		17:14 (19) 07:21		08:13		13:28 (1)	
16	21:41	28 20:47 (18) 20:55		19:44	29	18:57 (3) 18:29		27 17:41 (19) 16:21		15:45	76	14:58 (23)	
17	04:45	20:18 (20) 05:33		06:28		18:27 (3) 07:23		17:14 (19) 07:23		13:38 (1)	08:14	13:29 (1)	
18	21:40	30 20:48 (18) 20:53		19:41	29	18:58 (3) 18:27		27 17:41 (19) 16:20		9 13:47 (1)	15:45	77	14:59 (23)
19	04:46	20:18 (20) 05:34		06:30		18:27 (3) 07:25		17:14 (19) 07:25		13:34 (1)	08:16	13:29 (1)	
20	21:39	31 20:49 (18) 20:51		19:39	29	18:56 (3) 18:24		26 17:40 (19) 16:18		16 13:50 (1)	15:45	76	14:58 (23)
21	04:48	20:18 (20) 05:36		06:32		18:27 (3) 07:27		17:15 (19) 07:27		13:32 (1)	08:17	13:30 (1)	
22	21:38	31 20:49 (18) 20:49		19:36	29	18:56 (3) 18:22		24 17:39 (19) 16:16		22 13:54 (1)	15:44	75	14:58 (23)
23	04:49	20:18 (20) 05:38		06:34		18:27 (3) 07:28		17:15 (19) 07:29		13:30 (1)	08:18	13:30 (1)	
24	21:37	32 20:50 (18) 20:47		19:34	28	18:55 (3) 18:20		23 17:38 (19) 16:14		26 13:56 (1)	15:44	76	14:58 (23)
25	04:50	20:17 (20) 05:40		06:35		18:27 (3) 07:30		17:16 (19) 07:31		13:29 (1)	08:19	13:31 (1)	
26	21:36	33 20:50 (18) 20:45		19:31	27	18:54 (3) 18:17		21 17:37 (19) 16:13		28 13:57 (1)	15:44	74	14:58 (23)
27	04:51	20:17 (20) 05:41		06:37		18:27 (3) 07:32		17:18 (19) 07:33		13:27 (1)	08:20	13:31 (1)	
28	21:35	33 20:50 (18) 20:43		19:29	26	18:53 (3) 18:15		17 17:35 (19) 16:11		31 13:58 (1)	15:44	75	14:58 (23)
29	04:53	20:16 (20) 05:43		06:39		18:28 (3) 07:34		17:20 (19) 07:35		13:26 (1)	08:21	13:32 (1)	
30	21:34	34 20:50 (18) 20:40		19:26	24	18:52 (3) 18:12		12 17:32 (19) 16:09		43 14:46 (23)	15:44	75	14:59 (23)
31	04:54	20:17 (20) 05:45		06:41		18:29 (3) 07:36		17:25 (19) 07:37		13:26 (1)	08:22	13:32 (1)	
1	21:33	35 20:52 (18) 20:38		19:24	21	18:50 (3) 18:10		2 17:27 (19) 16:08		48 14:48 (23)	15:44	75	14:59 (23)
2	04:55	20:17 (20) 05:47		06:43		18:30 (3) 07:38		07:38		13:25 (1)	08:23	13:33 (1)	
3	21:32	35 20:52 (18) 20:36		19:21	18	18:48 (3) 18:08		16:06		52 14:49 (23)	15:44	73	14:59 (23)
4	04:57	20:16 (20) 05:49		06:44		18:32 (3) 07:40		07:40		13:24 (1)	08:23	13:34 (1)	
5	21:30	35 20:51 (18) 20:34		19:19	13	18:45 (3) 18:05		16:05		56 14:50 (23)	15:45	74	15:00 (23)
6	04:58	20:17 (20) 05:50		06:46		18:25 (26) 07:42		07:42		13:24 (1)	08:24	13:34 (1)	
7	21:29	35 20:52 (18) 20:32		19:16	9	18:34 (26) 18:03		16:03		59 14:51 (23)	15:45	75	15:01 (27)
8	04:59	20:17 (20) 05:52		06:48		18:23 (26) 07:44		07:44		13:23 (1)	08:25	13:34 (1)	
9	21:28	35 20:52 (18) 20:29		19:14	13	18:36 (26) 18:01		16:02		61 14:52 (23)	15:45	75	15:01 (27)
10	05:01	20:16 (20) 05:54		06:50		18:20 (26) 07:46		07:46		13:24 (1)	08:25	13:35 (1)	
11	21:26	36 20:52 (18) 20:27		19:11	15	18:35 (26) 17:59		16:01		64 14:54 (23)	15:46	75	15:02 (27)
12	05:02	20:17 (20) 05:56		06:52		18:19 (26) 07:48		07:48		13:24 (1)	08:26	13:35 (1)	
13	21:25	35 20:52 (18) 20:25		19:09	17	18:36 (26) 17:56		15:59		65 14:54 (23)	15:46	75	15:02 (27)
14	05:04	20:17 (20) 05:58		06:53		18:19 (26) 07:50		07:49		13:24 (1)	08:27	13:36 (1)	
15	21:23	33 20:50 (18) 20:22		19:06	17	18:36 (26) 17:54		15:58		66 14:55 (23)	15:47	75	15:03 (27)
16	05:06	20:17 (20) 05:59		06:55		18:19 (26) 07:51		07:51		13:23 (1)	08:27	13:36 (1)	
17	21:22	31 20:48 (18) 20:20		19:04	16	18:35 (26) 17:52		15:57		67 14:54 (23)	15:47	75	15:03 (27)
18	05:07	20:17 (20) 06:01		06:57		18:19 (26) 06:53		07:53		13:23 (1)	08:27	13:37 (1)	
19	21:20	30 20:47 (18) 20:18		19:01	14	18:33 (26) 16:50		15:56		67 14:55 (23)	15:48	74	15:03 (23)
20	05:09	20:17 (20) 06:03		06:59		18:18 (26) 06:55		07:55		13:24 (1)	08:28	13:37 (1)	
21	21:19	28 20:45 (18) 20:15		18:59	12	18:30 (26) 16:48		15:55		67 14:55 (23)	15:48	74	15:03 (23)
22	05:10	20:18 (20) 06:05		07:01		18:19 (26) 06:57		07:56		13:24 (1)	08:28	13:37 (1)	
23	21:17	26 20:44 (18) 20:13		18:56	8	18:27 (26) 16:45		15:53		68 14:56 (23)	15:49	75	15:04 (23)
24	05:12	20:18 (20) 06:07		07:03		18:20 (26) 06:59		07:58		13:24 (1)	08:28	13:38 (1)	
25	21:16	24 20:42 (18) 20:11		18:54	5	18:25 (26) 16:43		15:52		73 14:56 (23)	15:50	75	15:05 (23)
26	05:14	20:20 (20) 06:08		07:04		17:25 (19) 07:01		08:00		13:25 (1)	08:28	13:38 (1)	
27	21:14	19 20:41 (18) 20:08		18:51	12	18:23 (26) 16:41		15:51		75 14:57 (23)	15:51	74	15:05 (23)
28	05:15	20:20 (20) 06:10		07:06		17:22 (19) 07:03		08:01		13:25 (1)	08:28	13:38 (1)	
29	21:12	17 20:37 (20) 20:06		18:49	17	17:39 (19) 16:39		15:51		76 14:57 (23)	15:52	76	15:06 (23)
30	05:17	20:22 (20) 06:12		18:41 (3)		07:05				08:28		13:39 (1)	
31	21:10	14 20:36 (20) 20:03		9 18:50 (3)		16:37				15:53	75	15:07 (23)	
Sonnenscheinstunden	514	461	25	383	590	328	257	231					
astr.max.mögl.Beschattung	845	25	590	353	1139	2333							
Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14							
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91							
Reduktion Windrichtung	0.63	0.65	0.68	0.69	0.66	0.67							
Gesamte Reduktion	0.25	0.29	0.25	0.21	0.13	0.08							
Met.wahrsch.Beschattung	214	7	147	73	144	196							

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AF - IO32

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	13:57 (1) 07:57	14:13 (1) 06:59	16:53 (19) 06:43	18:38 (3) 05:33	04:42	20:10 (20)
15:54	65	15:12 (27) 15:46	14:41 (1) 17:43	17:07 (19) 19:42	19:06 (3) 20:39	21:29	24 20:36 (18)
2	08:28	13:57 (1) 07:55	14:15 (1) 06:56	16:50 (19) 06:40	18:37 (3) 05:31	04:41	20:12 (20)
15:55	65	15:12 (23) 16:48	14:39 (1) 17:45	17:08 (19) 19:44	19:05 (3) 20:40	21:31	21 20:36 (18)
3	08:28	13:58 (1) 07:54	14:17 (1) 06:54	16:49 (19) 06:38	18:37 (3) 05:29	04:40	20:13 (20)
15:57	66	15:14 (23) 16:50	14:37 (1) 17:47	17:10 (19) 19:46	19:05 (3) 20:42	21:32	16 20:35 (18)
4	08:27	13:58 (1) 07:52	14:21 (1) 06:52	16:47 (19) 06:35	18:36 (3) 05:26	04:40	20:14 (20)
15:58	67	15:16 (23) 16:52	14:36 (1) 17:49	17:10 (19) 19:48	19:04 (3) 20:44	21:33	8 20:22 (20)
5	08:27	13:58 (1) 07:50	14:27 (1) 06:49	16:47 (19) 06:33	18:37 (3) 05:24	04:39	20:16 (20)
15:59	67	15:16 (23) 16:54	14:30 (1) 17:51	17:11 (19) 19:50	19:04 (3) 20:46	21:34	4 20:20 (20)
6	08:27	13:58 (1) 07:48	14:30 (1) 06:47	16:45 (19) 06:31	18:36 (3) 05:22	04:38	
16:00	68	15:17 (23) 16:56	17:53	26 17:11 (19) 19:52	27 19:03 (3) 20:48	21:35	
7	08:26	13:59 (1) 07:46	16:45	26 16:45 (19) 06:28	18:37 (3) 05:20	04:37	
16:02	69	15:19 (23) 16:58	17:55	26 17:11 (19) 19:54	25 19:02 (3) 20:50	21:36	
8	08:26	13:59 (1) 07:44	16:42	26 16:44 (19) 06:26	18:38 (3) 05:19	04:37	
16:03	70	15:20 (23) 17:00	17:57	27 17:11 (19) 19:55	23 19:01 (3) 20:51	21:37	
9	08:25	13:59 (1) 07:42	16:40	27 16:50 (19) 06:23	18:38 (3) 05:17	04:36	20:13 (20)
16:05	70	15:21 (23) 17:03	17:59	26 17:11 (19) 19:57	21 18:59 (3) 20:53	8 20:21 (20)	21:38
10	08:24	13:59 (1) 07:40	16:37	26 16:44 (19) 06:21	18:40 (3) 05:15	04:36	
16:06	70	15:21 (23) 17:05	18:00	26 17:10 (19) 19:59	18 18:58 (3) 20:55	13 20:23 (20)	21:39
11	08:24	13:59 (1) 07:38	16:35	26 16:45 (19) 06:18	18:41 (3) 05:13	20:09 (20)	04:35
16:08	70	15:22 (23) 17:07	18:02	24 17:09 (19) 20:01	14 18:55 (3) 20:57	15 20:24 (20)	21:40
12	08:23	14:00 (1) 07:36	16:32	24 16:45 (19) 06:16	18:46 (3) 05:11	20:08 (20)	04:35
16:09	69	15:23 (23) 17:09	18:04	23 17:08 (19) 20:03	5 18:51 (3) 20:59	17 20:25 (20)	21:41
13	08:22	14:00 (1) 07:34	16:30	23 16:46 (19) 06:14	18:59	20:07 (20)	04:34
16:11	69	15:24 (23) 17:11	18:06	21 17:07 (19) 20:05	21 21:00	20:28 (18)	21:41
14	08:21	14:00 (1) 07:32	16:27	21 16:47 (19) 06:11	18:57	20:06 (20)	04:34
16:13	68	15:25 (23) 17:13	18:08	18 17:05 (19) 20:07	21:02	24 20:30 (18)	21:42
15	08:20	14:01 (1) 07:30	16:25	21 16:49 (19) 06:09	18:56	20:06 (20)	04:34
16:14	66	15:25 (23) 17:15	18:10	14 17:03 (19) 20:09	21:04	26 20:32 (18)	21:43
16	08:19	14:01 (1) 07:28	16:23	23 16:52 (19) 06:06	18:54	20:05 (20)	04:34
16:16	66	15:26 (23) 17:17	18:12	12 17:45 (26) 20:10	21:05	28 20:33 (18)	21:43
17	08:18	14:02 (1) 07:26	16:20	12 17:39 (26) 06:04	18:52	20:05 (20)	04:34
16:18	67	15:27 (23) 17:19	18:14	8 17:47 (26) 20:12	21:07	30 20:35 (18)	21:44
18	08:17	14:02 (1) 07:24	16:18	17:37 (26) 06:02	18:51	20:05 (20)	04:33
16:19	66	15:27 (23) 17:21	18:16	12 17:49 (26) 20:14	21:09	31 20:36 (18)	21:44
19	08:16	14:02 (1) 07:22	16:15	17:37 (26) 05:59	18:50	20:05 (20)	04:34
16:21	67	15:28 (23) 17:23	18:18	14 17:51 (26) 20:16	21:10	33 20:38 (18)	21:44
20	08:15	14:02 (1) 07:19	16:13	17:36 (26) 05:57	18:58	20:05 (20)	04:34
16:23	66	15:27 (23) 17:25	18:20	17 17:53 (26) 20:18	21:12	34 20:39 (18)	21:45
21	08:14	14:03 (1) 07:17	16:10	17:37 (26) 05:55	18:56	20:05 (20)	04:34
16:25	66	15:28 (23) 17:27	18:22	16 17:53 (26) 20:20	21:14	34 20:39 (18)	21:45
22	08:12	14:04 (1) 07:15	16:08	17:36 (26) 05:52	18:55	20:05 (20)	04:34
16:27	66	15:29 (23) 17:29	18:23	16 17:52 (26) 20:22	21:15	35 20:40 (18)	21:45
23	08:11	14:04 (1) 07:13	16:05	17:37 (26) 05:50	18:53	20:06 (20)	04:34
16:29	64	15:28 (23) 17:31	18:25	14 17:51 (26) 20:24	21:17	34 20:40 (18)	21:45
24	08:10	14:05 (1) 07:10	16:03	17:38 (26) 05:48	18:52	20:05 (20)	04:34
16:31	62	15:28 (23) 17:33	18:27	11 17:49 (26) 20:25	21:18	34 20:39 (18)	21:46
25	08:08	14:06 (1) 07:08	16:00	17:41 (26) 05:46	18:50	20:06 (20)	04:35
16:32	60	15:28 (23) 17:35	18:29	10 17:56 (3) 20:27	21:20	33 20:39 (18)	21:46
26	08:07	14:06 (1) 07:06	15:58	17:46 (3) 05:44	18:49	20:07 (20)	04:35
16:34	59	15:27 (23) 17:37	18:31	14 18:00 (3) 20:29	21:21	32 20:39 (18)	21:46
27	08:05	14:07 (1) 07:03	15:55	17:44 (3) 05:41	18:48	20:07 (20)	04:36
16:36	55	15:26 (23) 17:39	18:33	18 18:02 (3) 20:31	21:23	32 20:39 (18)	21:45
28	08:04	14:09 (1) 07:01	16:56 (19) 05:53	17:42 (3) 05:39	18:47	20:08 (20)	04:36
16:38	51	15:26 (23) 17:41	7 17:03 (19) 18:35	21 18:03 (3) 20:33	21:24	31 20:39 (18)	21:45
29	08:02	14:09 (1) 07:00	16:50	18:41 (3) 05:37	18:45	20:08 (20)	04:37
16:40	48	15:25 (23) 17:43	19:37	23 19:04 (3) 20:35	21:26	30 20:38 (18)	21:45
30	08:00	14:10 (1) 07:00	16:48	18:40 (3) 05:35	18:44	20:09 (20)	04:37
16:42	42	15:23 (23) 17:45	19:39	25 19:05 (3) 20:37	21:27	29 20:38 (18)	21:45
31	07:59	14:11 (1) 07:00	16:45	18:38 (3) 05:33	18:43	20:10 (20)	
16:44	31	14:42 (1) 07:00	19:40	27 19:05 (3) 20:39	21:28	26 20:37 (18)	
Sonnenscheinstunden	248	272	367	421	496	512	
astr.max.mögl.Beschattung	1955	97	589	272	629	73	
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.67	0.67	0.68	0.68	0.63	0.63	
Gesamte Reduktion	0.11	0.15	0.19	0.25	0.29	0.26	
Met.wahrsch.Beschattung	208	14	115	69	184	19	

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)

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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Lizenzierter Anwender:
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Am Westersielzug 11
DE-25840 Friedrichstadt

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AF - IO32

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember					
1	04:38	05:19	20:19 (20) 06:14	18:41 (3) 07:08	17:25 (19) 07:07	08:03	13:41 (1)				
2	21:44	21:09	20:35 (20) 20:01	18:55 (3) 18:46	17:48 (19) 16:35	15:50	70 15:04 (23)				
3	04:39	05:20	20:19 (20) 06:16	18:36 (3) 07:10	17:24 (19) 07:09	08:05	13:42 (1)				
4	21:44	21:07	20:34 (20) 19:59	18:58 (3) 18:44	17:48 (19) 16:33	15:46	69 15:04 (23)				
5	04:40	05:22	20:22 (20) 06:17	18:36 (3) 07:12	17:23 (19) 07:11	08:06	13:43 (1)				
6	21:44	21:05	20:32 (20) 19:56	18:57 (3) 18:41	17:48 (19) 16:31	15:48	70 15:05 (23)				
7	04:40	05:24	20:24 (20) 06:19	18:35 (3) 07:14	17:22 (19) 07:13	08:08	13:43 (1)				
8	21:43	21:03	20:29 (20) 19:54	18:58 (3) 18:39	17:48 (19) 16:29	15:48	69 15:04 (23)				
9	04:41	05:26	20:21	18:33 (3) 07:15	17:22 (19) 07:15	08:09	13:44 (1)				
10	21:43	21:01	19:51	18:58 (3) 18:37	17:48 (19) 16:27	15:47	69 15:04 (23)				
11	04:42	05:27	20:23	18:32 (3) 07:17	17:21 (19) 07:17	08:10	13:44 (1)				
12	21:42	20:59	19:49	18:59 (3) 18:34	17:47 (19) 16:25	13:55 (1) 15:47	68 15:03 (23)				
13	04:43	20:24 (20) 05:29	19:49	18:32 (3) 07:19	17:21 (19) 07:19	13:50 (1) 15:47	68 15:04 (23)				
14	21:41	20:26 (20) 20:57	19:46	18:59 (3) 18:32	17:47 (19) 16:23	14:06 (1) 15:46	68 15:04 (23)				
15	04:44	20:22 (20) 05:31	19:46	18:31 (3) 07:21	17:21 (19) 07:21	13:47 (1) 15:46	68 15:04 (23)				
16	21:41	20:29 (20) 20:55	19:44	18:59 (3) 18:29	17:46 (19) 16:21	14:08 (1) 15:45	67 15:03 (23)				
17	04:45	20:21 (20) 05:33	19:44	18:36 (3) 07:23	17:22 (19) 07:23	13:45 (1) 15:44	67 15:04 (23)				
18	21:40	20:41 (18) 20:53	19:41	18:58 (3) 18:27	17:46 (19) 16:20	14:10 (1) 15:45	66 15:03 (23)				
19	04:46	20:20 (20) 05:34	19:41	18:30 (3) 07:25	17:23 (19) 07:25	13:44 (1) 15:45	66 15:03 (23)				
20	21:39	20:43 (18) 20:51	19:39	18:58 (3) 18:24	17:44 (19) 16:18	14:12 (1) 15:45	65 15:02 (23)				
21	04:48	20:19 (20) 05:36	19:39	18:30 (3) 07:27	17:23 (19) 07:27	13:43 (1) 15:45	65 15:02 (23)				
22	21:38	20:44 (18) 20:49	19:36	18:58 (3) 18:22	17:43 (19) 16:16	14:14 (1) 15:44	65 15:03 (27)				
23	04:49	20:19 (20) 05:38	19:34	18:31 (3) 07:28	17:25 (19) 07:29	13:42 (1) 15:44	65 15:03 (27)				
24	21:37	20:45 (18) 20:47	19:34	18:57 (3) 18:20	17:41 (19) 16:14	14:14 (1) 15:44	65 15:03 (27)				
25	04:50	20:18 (20) 05:40	19:35	18:30 (3) 07:30	17:27 (19) 07:31	13:41 (1) 15:44	64 15:04 (27)				
26	21:36	20:46 (18) 20:45	19:31	18:56 (3) 18:17	17:39 (19) 16:13	14:14 (1) 15:44	65 15:03 (27)				
27	04:51	20:17 (20) 05:41	19:31	18:31 (3) 07:32	17:33	13:40 (1) 15:44	65 15:03 (27)				
28	21:35	20:46 (18) 20:43	19:29	18:55 (3) 18:15	17:33	14:14 (1) 15:44	65 15:04 (27)				
29	04:53	20:17 (20) 05:43	19:29	18:32 (3) 07:34	17:35	13:40 (1) 15:44	65 15:04 (27)				
30	21:34	20:47 (18) 20:40	19:26	18:53 (3) 18:12	17:35	14:14 (1) 15:44	64 15:04 (27)				
31	04:54	20:17 (20) 05:45	19:26	18:33 (3) 07:36	17:37	13:39 (1) 15:44	64 15:04 (27)				
1	21:33	20:48 (18) 20:38	19:24	18:52 (3) 18:10	17:37	13:41 (1) 15:44	64 15:04 (27)				
2	04:55	20:16 (20) 05:47	19:24	18:34 (3) 07:38	17:38	13:39 (1) 15:44	64 15:04 (27)				
3	21:32	20:48 (18) 20:36	19:21	18:49 (3) 18:08	17:38	13:40 (1) 15:44	64 15:05 (27)				
4	04:57	20:16 (20) 05:49	19:21	18:29 (26) 07:40	17:40	13:39 (1) 15:44	64 15:05 (27)				
5	21:30	20:49 (18) 20:34	19:19	18:45 (3) 18:05	17:40	13:40 (1) 15:44	64 15:06 (27)				
6	04:58	20:16 (20) 05:50	19:19	18:26 (26) 07:42	17:42	13:38 (1) 15:44	64 15:06 (27)				
7	21:29	20:50 (18) 20:32	19:16	18:36 (26) 18:03	17:43	13:40 (1) 15:44	63 15:06 (27)				
8	04:59	20:15 (20) 05:52	19:16	18:24 (26) 07:44	17:44	13:38 (1) 15:44	63 15:06 (27)				
9	21:28	20:49 (18) 20:29	19:14	18:38 (26) 18:01	17:45	13:40 (1) 15:44	63 15:06 (27)				
10	05:01	20:15 (20) 05:54	19:14	18:22 (26) 07:46	17:46	13:39 (1) 15:44	63 15:06 (27)				
11	21:26	20:49 (18) 20:27	19:11	18:37 (26) 17:59	17:47	13:39 (1) 15:44	64 15:07 (27)				
12	05:02	20:16 (20) 05:56	19:11	18:21 (26) 07:48	17:48	13:39 (1) 15:44	64 15:07 (27)				
13	21:25	20:50 (18) 20:25	19:09	18:38 (26) 17:56	17:49	13:40 (1) 15:44	64 15:07 (27)				
14	05:04	20:15 (20) 05:58	19:09	18:21 (26) 07:50	17:50	13:40 (1) 15:44	64 15:07 (27)				
15	21:23	20:49 (18) 20:22	19:06	18:38 (26) 17:54	17:51	13:40 (1) 15:44	64 15:08 (27)				
16	05:06	20:15 (20) 05:59	19:06	18:21 (26) 07:51	17:52	13:39 (1) 15:44	64 15:08 (27)				
17	21:22	20:48 (18) 20:20	19:04	18:35 (26) 17:52	17:53	13:40 (1) 15:44	63 15:08 (27)				
18	05:07	20:15 (20) 06:01	19:04	18:21 (26) 07:53	17:54	13:39 (1) 15:44	63 15:08 (27)				
19	21:20	20:47 (18) 20:18	19:01	18:33 (26) 17:50	17:55	13:40 (1) 15:44	65 15:09 (27)				
20	05:09	20:15 (20) 06:03	19:01	18:21 (26) 07:55	17:56	13:39 (1) 15:44	65 15:09 (27)				
21	21:19	20:45 (18) 20:15	18:59	18:30 (26) 18:48	17:56	13:40 (1) 15:44	64 15:09 (27)				
22	05:10	20:16 (20) 06:05	18:58	18:22 (26) 08:57	17:56	13:40 (1) 15:44	64 15:09 (27)				
23	21:17	20:44 (18) 20:13	18:56	18:27 (26) 16:45	17:57	13:40 (1) 15:44	64 15:09 (27)				
24	05:12	20:16 (20) 06:07	18:56	17:31 (19) 06:59	17:58	13:40 (1) 15:44	64 15:10 (27)				
25	21:16	20:42 (18) 20:11	18:54	18:25 (26) 16:43	17:59	13:40 (1) 15:44	66 15:11 (27)				
26	05:14	20:17 (20) 06:08	18:54	17:29 (19) 07:01	18:00	13:41 (1) 15:44	66 15:11 (27)				
27	21:14	20:41 (18) 20:08	18:51	17:45 (19) 16:41	18:01	13:41 (1) 15:44	64 15:10 (27)				
28	05:15	20:17 (20) 06:10	18:49	17:27 (19) 07:03	18:02	13:42 (1) 15:44	66 15:11 (27)				
29	21:12	20:39 (18) 20:06	18:49	17:47 (19) 16:39	18:03	13:42 (1) 15:44	66 15:11 (27)				
30	05:17	20:18 (20) 06:12	18:45 (3) 16:37	18:04	13:42 (1) 15:44	66 15:11 (27)					
31	21:10	20:36 (20) 20:03	18:51 (3) 16:37	18:05	13:42 (1) 15:44	65 15:12 (27)					
Sonnenscheinstunden 514							461	383	328	257	231
astr.max.mögl.Beschattung 653							52	573	294	1303	2032
Red.Sonnenscheinwahrsch. 0.44							0.48	0.40	0.33	0.21	0.14
Reduktion Betriebsdauer 0.91							0.91	0.91	0.91	0.91	0.91
Reduktion Windrichtung 0.63							0.64	0.68	0.68	0.67	0.67
Gesamte Reduktion 0.25							0.28	0.25	0.21	0.13	0.08
Met.wahrsch.Beschattung 166							15	142	60	166	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	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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

André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AG - IO33

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:28	14:21 (1) 07:57	14:24 (1) 06:59	06:43	18:50 (3) 05:33	04:42	20:14 (20)		
2	15:54	46 15:16 (27) 15:46	59 15:40 (23) 17:43	19:42	22 19:12 (3) 20:39	21:29	28 20:42 (18)		
3	08:28	14:20 (1) 07:55	14:24 (1) 06:56	06:40	18:48 (3) 05:31	04:41	20:16 (20)		
4	15:57	49 15:17 (27) 16:48	57 15:39 (23) 17:45	19:44	24 19:12 (3) 20:40	21:31	26 20:42 (18)		
5	08:27	14:20 (1) 07:54	14:25 (1) 06:54	06:38	18:48 (3) 05:29	04:40	20:16 (20)		
6	15:57	50 15:18 (27) 16:50	52 15:38 (23) 17:47	19:46	25 19:13 (3) 20:42	21:32	25 20:41 (18)		
7	08:27	14:21 (1) 07:52	14:27 (1) 06:52	06:35	18:46 (3) 05:26	04:40	20:17 (20)		
8	15:58	51 15:20 (27) 16:52	46 15:37 (23) 17:49	19:48	26 19:12 (3) 20:44	21:33	24 20:41 (18)		
9	08:27	14:20 (1) 07:50	14:28 (1) 06:49	17:09 (19) 06:33	18:46 (3) 05:24	04:39	20:17 (20)		
10	15:59	54 15:21 (27) 16:54	35 15:03 (1) 17:51	5 17:14 (19) 19:50	27 19:13 (3) 20:46	21:34	21 20:40 (18)		
11	08:27	14:20 (1) 07:48	14:29 (1) 06:47	17:04 (19) 06:31	18:45 (3) 05:22	04:38	20:18 (20)		
12	16:00	55 15:22 (27) 16:56	32 15:01 (1) 17:53	13 17:17 (19) 19:52	27 19:12 (3) 20:48	21:35	17 20:39 (18)		
13	08:26	14:20 (1) 07:46	14:30 (1) 06:45	17:02 (19) 06:28	18:45 (3) 05:20	04:37	20:19 (20)		
14	16:02	56 15:23 (27) 16:58	30 15:00 (1) 17:55	17 17:19 (19) 19:54	27 19:12 (3) 20:50	21:36	10 20:29 (20)		
15	08:26	14:20 (1) 07:44	14:32 (1) 06:42	17:00 (19) 06:26	18:45 (3) 05:19	04:37	20:20 (20)		
16	16:03	55 15:23 (27) 17:00	26 14:58 (1) 17:57	20 17:20 (19) 19:55	27 19:12 (3) 20:51	21:37	9 20:29 (20)		
17	08:25	14:20 (1) 07:42	14:34 (1) 06:40	16:59 (19) 06:23	18:45 (3) 05:17	04:36	20:21 (20)		
18	16:05	55 15:23 (27) 17:03	22 14:56 (1) 17:59	22 17:21 (19) 19:57	26 19:11 (3) 20:53	21:38	7 20:28 (20)		
19	08:24	14:20 (1) 07:40	14:37 (1) 06:37	16:57 (19) 06:21	18:45 (3) 05:15	04:36	20:23 (20)		
20	16:06	56 15:24 (27) 17:05	17 14:54 (1) 18:00	24 17:21 (19) 19:59	26 19:11 (3) 20:55	21:39	4 20:27 (20)		
21	08:24	14:20 (1) 07:38	14:42 (1) 06:35	16:57 (19) 06:18	18:45 (3) 05:13	04:35	20:24 (20)		
22	16:08	57 15:24 (27) 17:07	8 14:50 (1) 18:02	25 17:22 (19) 20:01	24 19:09 (3) 20:57	21:40	20:20 (20)		
23	08:23	14:19 (1) 07:36	06:32	16:56 (19) 06:16	18:46 (3) 05:11	04:35	20:18 (20)		
24	16:09	57 15:24 (27) 17:09	18:04	25 17:21 (19) 20:03	22 19:08 (3) 20:59	9 20:27 (20)	21:41	20:43 (18)	
25	08:22	14:19 (1) 07:34	06:30	16:56 (19) 06:14	18:48 (3) 05:09	04:34	20:16 (20)		
26	16:11	61 15:29 (23) 17:11	18:06	26 17:22 (19) 20:05	19 19:07 (3) 21:00	12 20:28 (20)	21:41	20:43 (18)	
27	08:21	14:20 (1) 07:32	06:27	16:56 (19) 06:11	18:49 (3) 05:07	04:34	20:14 (20)		
28	16:13	62 15:31 (23) 17:13	18:08	25 17:21 (19) 20:07	15 19:04 (3) 21:02	15 20:29 (20)	21:42	20:43 (18)	
29	08:20	14:20 (1) 07:30	06:25	16:56 (19) 06:09	18:51 (3) 05:06	04:34	20:14 (20)		
30	16:14	64 15:33 (23) 17:15	18:10	25 17:21 (19) 20:09	11 19:02 (3) 21:04	17 20:31 (20)	21:43	20:43 (18)	
31	08:19	14:20 (1) 07:28	06:23	16:56 (19) 06:06	05:04	20 20:13 (20)	21:43	20:43 (18)	
32	16:16	66 15:36 (23) 17:17	18:12	24 17:20 (19) 20:10	21:05	20 20:33 (18)	21:43	20:43 (18)	
33	08:18	14:20 (1) 07:26	06:20	16:57 (19) 06:04	05:02	20 20:13 (20)	21:43	20:43 (18)	
34	16:18	67 15:36 (23) 17:19	18:14	22 17:19 (19) 20:12	21:07	22 20:35 (18)	21:44	20:43 (18)	
35	08:17	14:20 (1) 07:24	06:18	16:57 (19) 06:02	05:01	20 20:12 (20)	21:43	20:43 (18)	
36	16:19	67 15:37 (23) 17:21	18:16	22 17:49 (26) 20:14	21:09	24 20:36 (18)	21:44	20:43 (18)	
37	08:16	14:20 (1) 07:22	06:15	16:59 (19) 05:59	04:59	20 20:12 (20)	21:43	20:43 (18)	
38	16:21	67 15:38 (23) 17:23	18:18	23 17:51 (26) 20:16	21:10	26 20:38 (18)	21:44	20:43 (18)	
39	08:15	14:19 (1) 07:19	06:13	16:57 (19) 05:57	04:58	20 20:12 (20)	21:43	20:43 (18)	
40	16:23	67 15:38 (23) 17:25	18:20	22 17:53 (26) 20:18	21:12	27 20:39 (18)	21:45	20:43 (18)	
41	08:14	14:20 (1) 07:17	06:10	17:43 (26) 05:55	04:56	20 20:11 (20)	21:43	20:43 (18)	
42	16:25	65 15:39 (23) 17:27	18:22	12 17:55 (26) 20:20	21:14	29 20:40 (18)	21:45	20:43 (18)	
43	08:12	14:21 (1) 07:15	06:08	17:42 (26) 05:52	04:55	20 20:11 (20)	21:43	20:43 (18)	
44	16:27	66 15:41 (23) 17:29	18:23	14 17:56 (26) 20:22	21:15	31 20:42 (18)	21:45	20:43 (18)	
45	08:11	14:20 (1) 07:13	06:05	17:42 (26) 05:50	04:53	20 20:12 (20)	21:43	20:43 (18)	
46	16:29	68 15:41 (23) 17:31	18:25	16 17:58 (26) 20:24	21:17	31 20:43 (18)	21:45	20:43 (18)	
47	08:10	14:20 (1) 07:10	06:03	17:41 (26) 05:48	04:52	20 20:11 (20)	21:43	20:43 (18)	
48	16:31	68 15:41 (23) 17:33	18:27	16 17:57 (26) 20:25	21:18	32 20:43 (18)	21:46	20:43 (18)	
49	08:08	14:21 (1) 07:08	06:00	17:42 (26) 05:46	04:50	20 20:11 (20)	21:43	20:43 (18)	
50	16:32	68 15:42 (23) 17:35	18:29	15 17:57 (26) 20:27	21:20	32 20:43 (18)	21:46	20:43 (18)	
51	08:07	14:21 (1) 07:06	05:58	17:42 (26) 05:44	04:49	20 20:12 (20)	21:43	20:43 (18)	
52	16:34	67 15:42 (23) 17:37	18:31	13 17:55 (26) 20:29	21:21	31 20:43 (18)	21:46	20:43 (18)	
53	08:05	14:21 (1) 07:03	05:55	17:45 (26) 05:41	04:48	20 20:12 (20)	21:43	20:43 (18)	
54	16:36	67 15:42 (23) 17:39	18:33	8 17:53 (26) 20:31	21:23	31 20:43 (18)	21:45	20:43 (18)	
55	08:04	14:22 (1) 07:01	05:53	05:39	04:47	20 20:13 (20)	21:43	20:43 (18)	
56	16:38	66 15:42 (23) 17:41	18:35	20:33	21:24	30 20:43 (18)	21:45	20:43 (18)	
57	08:02	14:23 (1)	06:50	18:58 (3) 05:37	04:45	20 20:13 (20)	21:43	20:43 (18)	
58	16:40	65 15:42 (23)	19:37	7 19:05 (3) 20:35	21:26	30 20:43 (18)	21:45	20:43 (18)	
59	08:00	14:23 (1)	06:48	18:54 (3) 05:35	04:44	20 20:13 (20)	21:43	20:43 (18)	
60	16:42	64 15:42 (23)	19:39	15 19:09 (3) 20:37	21:27	30 20:43 (18)	21:45	20:43 (18)	
61	07:59	14:23 (1)	06:45	18:52 (3)	04:43	20 20:14 (20)	21:45	20:43 (18)	
62	16:44	62 15:41 (23)	19:40	18 19:10 (3)	21:28	28 20:42 (18)	21:45	20:43 (18)	
63	Sonnenscheinstunden	248	272	367	421	496	512	171	
64	astr.max.mögl.Beschattung	1888	384	474	348	507	171	0.45	
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45	0.91	
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	0.63	
67	Reduktion Windrichtung	0.68	0.68	0.68	0.67	0.63	0.63	0.29	
68	Gesamte Reduktion	0.11	0.15	0.19	0.25	0.29	0.26	0.44	
69	Met.wahrsch.Beschattung	203	57	92	88	148	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	Schattenende (WEA mit letztem Schatten)

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:53 / 70

Lizenzierter Anwender:
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Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AG - IO33

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember	
1	04:38	05:19	20:30 (20) 06:14	18:45 (3) 07:08	17:36 (19) 07:07	14:06 (1) 08:03	
2	21:44	21:09	6 20:36 (20) 20:01	24 19:09 (3) 18:46	25 18:01 (19) 16:35	18 14:24 (1) 15:50	
3	04:39	20:28 (20) 05:20	06:16	18:43 (3) 07:10	17:36 (19) 07:09	14:03 (1) 08:05	
4	21:44	20:31 (20) 21:07	19:59	26 19:09 (3) 18:44	25 18:01 (19) 16:33	23 14:26 (1) 15:49	
5	04:40	20:27 (20) 05:22	06:17	18:43 (3) 07:12	17:35 (19) 07:11	14:01 (1) 08:06	
6	21:44	20:33 (20) 21:05	19:56	26 19:09 (3) 18:41	24 17:59 (19) 16:31	27 14:28 (1) 15:48	
7	04:40	20:26 (20) 05:24	06:19	18:42 (3) 07:14	17:36 (19) 07:13	13:59 (1) 08:08	
8	21:43	20:34 (20) 21:03	19:54	27 19:09 (3) 18:39	23 17:59 (19) 16:29	30 14:29 (1) 15:48	
9	04:41	20:26 (20) 05:26	06:21	18:41 (3) 07:15	17:36 (19) 07:15	13:59 (1) 08:09	
10	21:43	20:35 (20) 21:01	19:51	27 19:08 (3) 18:37	21 17:57 (19) 16:27	33 14:32 (1) 15:47	
11	04:42	20:25 (20) 05:27	06:23	18:41 (3) 07:17	17:37 (19) 07:17	13:58 (1) 08:10	
12	21:42	20:45 (18) 20:59	19:49	27 19:08 (3) 18:34	19 17:56 (19) 16:25	36 15:03 (23) 15:46	
13	04:43	20:25 (20) 05:29	06:25	18:41 (3) 07:19	17:39 (19) 07:19	13:57 (1) 08:12	
14	21:41	20:46 (18) 20:57	19:46	27 19:08 (3) 18:32	15 17:54 (19) 16:23	46 15:07 (23) 15:46	
15	04:44	20:24 (20) 05:31	06:26	18:41 (3) 07:21	17:41 (19) 07:21	13:56 (1) 08:13	
16	21:41	20:48 (18) 20:55	19:44	27 19:08 (3) 18:29	10 17:51 (19) 16:21	53 15:09 (23) 15:45	
17	04:45	20:24 (20) 05:33	06:28	18:41 (3) 07:23	17:42 (19) 07:23	13:55 (1) 08:14	
18	21:40	20:49 (18) 20:53	19:41	25 19:06 (3) 18:27	16:20	56 15:10 (23) 15:45	
19	04:46	20:23 (20) 05:34	06:30	18:41 (3) 07:25	17:42 (19) 07:25	13:55 (1) 08:16	
20	21:39	20:49 (18) 20:51	19:39	24 19:05 (3) 18:24	16:18	59 15:11 (23) 15:45	
21	04:48	20:23 (20) 05:36	06:32	18:42 (3) 07:27	17:42 (19) 07:27	13:55 (1) 08:17	
22	21:38	20:50 (18) 20:49	19:36	22 19:04 (3) 18:22	16:16	62 15:13 (23) 15:44	
23	04:49	20:23 (20) 05:38	06:34	18:44 (3) 07:28	17:42 (19) 07:28	13:55 (1) 08:18	
24	21:37	20:51 (18) 20:47	19:34	18 19:02 (3) 18:20	16:14	64 15:14 (23) 15:44	
25	04:50	20:22 (20) 05:40	06:35	18:44 (3) 07:30	17:43 (19) 07:30	13:54 (1) 08:19	
26	21:36	20:51 (18) 20:45	19:31	15 18:59 (3) 18:17	16:13	66 15:14 (23) 15:44	
27	04:51	20:22 (20) 05:41	06:37	18:48 (3) 07:32	17:43 (19) 07:32	13:54 (1) 08:20	
28	21:35	20:51 (18) 20:43	19:29	8 18:56 (3) 18:15	16:11	66 15:14 (23) 15:44	
29	04:53	20:21 (20) 05:43	06:39	17:34	17:35	13:54 (1) 08:21	
30	21:34	20:51 (18) 20:40	19:26	18:12	16:09	66 15:14 (23) 15:44	
31	04:54	20:22 (20) 05:45	06:41	18:35 (26) 07:36	17:37	13:54 (1) 08:22	
32	21:33	20:53 (18) 20:38	19:24	7 18:42 (26) 18:10	16:08	67 15:15 (23) 15:44	
33	04:55	20:22 (20) 05:47	06:43	18:31 (26) 07:38	17:38	13:54 (1) 08:23	
34	21:32	20:53 (18) 20:36	19:21	12 18:43 (26) 18:08	16:06	68 15:15 (23) 15:44	
35	04:57	20:21 (20) 05:49	06:44	18:30 (26) 07:40	17:40	13:54 (1) 08:23	
36	21:30	20:53 (18) 20:34	19:19	14 18:44 (26) 18:05	16:05	68 15:15 (23) 15:45	
37	04:58	20:22 (20) 05:50	06:46	18:29 (26) 07:42	17:42	13:54 (1) 08:24	
38	21:29	20:53 (18) 20:32	19:16	16 18:45 (26) 18:03	16:03	68 15:15 (23) 15:45	
39	04:59	20:21 (20) 05:52	06:48	18:28 (26) 07:44	17:44	13:55 (1) 08:25	
40	21:28	20:53 (18) 20:29	19:14	17 18:45 (26) 18:01	16:02	66 15:15 (23) 15:45	
41	05:01	20:21 (20) 05:54	06:50	18:27 (26) 07:46	17:46	13:56 (1) 08:25	
42	21:26	20:52 (18) 20:27	19:11	15 18:42 (26) 17:59	16:01	65 15:15 (23) 15:46	
43	05:02	20:22 (20) 05:56	06:52	18:27 (26) 07:48	17:48	13:57 (1) 08:26	
44	21:25	20:52 (18) 20:25	19:09	13 18:40 (26) 17:56	15:59	66 15:15 (23) 15:46	
45	05:04	20:22 (20) 05:58	06:53	17:46 (19) 07:50	17:49	13:56 (1) 08:26	
46	21:23	20:50 (18) 20:22	19:06	21 18:38 (26) 17:54	15:58	67 15:14 (23) 15:47	
47	05:06	20:21 (20) 05:59	06:55	17:43 (19) 07:51	17:51	13:57 (1) 08:27	
48	21:22	20:48 (18) 20:20	19:04	23 18:35 (26) 17:52	15:57	67 15:14 (23) 15:47	
49	05:07	20:22 (20) 06:01	06:57	17:42 (19) 07:53	17:53	13:57 (1) 08:27	
50	21:20	20:47 (18) 20:18	19:01	21 18:33 (26) 16:50	15:56	66 15:13 (23) 15:48	
51	05:09	20:22 (20) 06:03	06:59	17:39 (19) 07:55	17:55	13:58 (1) 08:28	
52	21:19	20:45 (18) 20:15	18:59	21 18:00 (19) 16:48	15:55	66 15:13 (23) 15:48	
53	05:10	20:23 (20) 06:05	07:01	17:38 (19) 06:57	17:56	13:59 (1) 08:28	
54	21:17	20:44 (18) 20:13	18:56	23 18:01 (19) 16:45	15:53	64 15:12 (23) 15:49	
55	05:12	20:23 (20) 06:07	18:53 (3) 07:03	17:37 (19) 06:59	17:58	14:00 (1) 08:28	
56	21:16	19 20:42 (18) 20:11	11 19:04 (3) 18:54	24 18:01 (19) 16:43	15:52	62 15:11 (23) 15:50	
57	05:14	20:24 (20) 06:08	18:49 (3) 07:04	17:37 (19) 07:01	18:00	14:01 (1) 08:28	
58	21:14	20:41 (20) 20:08	16 19:05 (3) 18:51	25 18:02 (19) 16:41	15:51	60 15:10 (23) 15:51	
59	05:15	20:25 (20) 06:10	18:48 (3) 07:06	17:36 (19) 07:03	18:01	14:02 (1) 08:28	
60	21:12	20:39 (20) 20:06	19 19:07 (3) 18:49	26 18:02 (19) 16:39	15:51	56 15:06 (27) 15:52	
61	05:17	20:27 (20) 06:12	18:46 (3)	17:35	17:59	13:59 (1) 08:28	
62	21:10	20:38 (20) 20:03	22 19:08 (3)	16:37	11 14:21 (1)	15:53	
63	Sonnenscheinstunden	514	461	383	328	257	231
64	astr.max.mögl.Beschattung	679	74	601	173	1681	1516
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.63	0.67	0.68	0.68	0.68	0.67
68	Gesamte Reduktion	0.25	0.30	0.25	0.20	0.13	0.08
69	Met.wahrsch.Beschattung	172	22	149	35	217	128

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 71
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AH - IO34

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni				
1 08:28		11:41 (28) 07:57	13:58 (1) 06:59	06:43	18:11 (19) 05:33	19:09 (3) 04:42				
15:54	97	15:16 (27) 15:46	84	15:43 (23) 17:43	19:42	38	19:08 (26) 20:39	16	19:25 (3) 21:29	
2 08:28		11:41 (28) 07:55	13:58 (1) 06:56	06:40	18:12 (19) 05:31	19:12 (3) 04:41				
15:55	99	15:17 (27) 16:48	85	15:43 (23) 17:45	19:44	33	19:08 (26) 20:40	10	19:22 (3) 21:31	
3 08:28		11:42 (28) 07:54	13:58 (1) 06:54	06:38	18:15 (19) 05:29	19:11 (3) 04:40				
15:57	100	15:19 (27) 16:50	84	15:42 (23) 17:47	19:46	24	19:05 (26) 20:42		21:32	
4 08:27		11:43 (28) 07:52	14:00 (1) 06:52	06:35	18:19 (19) 05:26	19:10 (3) 04:40				
15:58	101	15:20 (27) 16:52	82	15:43 (23) 17:49	19:48	7	19:00 (26) 20:44		21:33	
5 08:27		11:44 (28) 07:50	14:00 (1) 06:49	06:33	18:22 (19) 05:24	19:09 (3) 04:39				
15:59	100	15:20 (27) 16:54	81	15:43 (23) 17:51	19:50		20:46		21:34	
6 08:27		11:45 (28) 07:48	14:00 (1) 06:47	06:31	18:25 (19) 05:17	19:08 (3) 04:38				
16:00	101	15:20 (27) 16:56	78	15:42 (23) 17:53	19:52		20:48		20:57 (18)	
7 08:26		11:46 (28) 07:46	14:00 (1) 06:45	06:28	18:28 (19) 05:15	19:07 (3) 04:37				
16:02	101	15:21 (27) 16:58	75	15:40 (23) 17:55	19:54		20:50		21:36	
8 08:26		11:47 (28) 07:44	14:00 (1) 06:42	06:26	18:31 (19) 05:13	19:06 (3) 04:37				
16:03	101	15:22 (27) 17:01	73	15:39 (23) 17:57	19:55		20:51		21:37	
9 08:25		11:48 (28) 07:42	14:01 (1) 06:40	06:23	18:34 (19) 05:11	19:05 (3) 04:36				
16:05	100	15:22 (27) 17:03	68	15:37 (23) 17:59	19:57		20:53		21:38	
10 08:24		11:49 (28) 07:40	14:02 (1) 06:37	06:21	18:37 (19) 05:09	19:04 (3) 04:36				
16:06	98	15:22 (27) 17:05	61	15:35 (23) 18:00	19:59		20:55		21:39	
11 08:24		11:51 (28) 07:38	14:03 (1) 06:35	06:18	19:15 (3) 05:13	19:03 (3) 04:35				
16:08	98	15:23 (27) 17:07	50	14:53 (1) 18:02	20:01	11	19:26 (3) 20:57		21:40	
12 08:23		11:53 (28) 07:36	14:04 (1) 06:32	06:16	19:12 (3) 05:11	19:02 (3) 04:35				
16:09	96	15:23 (27) 17:09	49	14:53 (1) 18:04	20:03	17	19:29 (3) 20:59		21:41	
13 08:22		11:55 (28) 07:34	14:05 (1) 06:30	06:14	19:10 (3) 05:09	19:01 (3) 04:34				
16:11	91	15:23 (27) 17:11	47	14:52 (1) 18:06	20:05	21	19:31 (3) 21:00		21:41	
14 08:21		11:57 (28) 07:32	14:05 (1) 06:27	06:11	19:08 (3) 05:07	19:00 (3) 04:34				
16:13	89	15:24 (27) 17:13	45	14:50 (1) 18:08	20:07	23	19:31 (3) 21:02		21:42	
15 08:20		12:02 (28) 07:30	14:07 (1) 06:25	06:09	19:07 (3) 05:06	19:00 (3) 04:34				
16:14	82	15:24 (27) 17:15	43	14:50 (1) 18:10	20:09	25	19:32 (3) 21:04		21:43	
16 08:19		14:00 (1) 07:28	14:08 (1) 06:23	5	17:23 (19) 05:06	19:06 (3) 05:04		21:43		
16:16	73	15:24 (27) 17:17	40	14:48 (1) 18:12	17:28 (19) 20:10	27	19:33 (3) 21:05		21:43	
17 08:18		14:00 (1) 07:26	14:10 (1) 06:20	17:19 (19) 05:04	19:05 (3) 05:02	19:03 (3) 05:02		21:43		
16:18	78	15:30 (23) 17:19	37	14:47 (1) 18:14	14	17:33 (19) 20:12	29	19:34 (3) 21:07		21:44
18 08:17		13:59 (1) 07:24	14:13 (1) 06:18	17:16 (19) 05:02	19:04 (3) 05:01	19:03 (3) 05:01		21:44		
16:19	81	15:32 (23) 17:21	33	14:46 (1) 18:16	19	17:35 (19) 20:14	29	19:33 (3) 21:09		21:44
19 08:16		13:59 (1) 07:22	14:14 (1) 06:15	17:14 (19) 05:59	19:03 (3) 04:59	19:03 (3) 04:59		21:44		
16:21	82	15:34 (23) 17:23	29	14:43 (1) 18:18	23	17:37 (19) 20:15	31	19:34 (3) 21:10		21:44
20 08:15		13:59 (1) 07:19	14:15 (1) 06:13	17:12 (19) 05:57	19:03 (3) 04:58	19:03 (3) 04:58		21:44		
16:23	81	15:35 (23) 17:25	22	14:40 (1) 18:20	25	17:37 (19) 20:18	31	19:34 (3) 21:12		21:45
21 08:14		13:59 (1) 07:17	14:23 (1) 06:10	17:12 (19) 05:55	19:03 (3) 04:56	19:03 (3) 04:56		21:45		
16:25	81	15:37 (23) 17:27	12	14:35 (1) 18:22	26	17:38 (19) 20:20	31	19:34 (3) 21:14		21:45
22 08:12		13:59 (1) 07:15	06:08	17:10 (19) 05:52	19:02 (3) 04:55	19:02 (3) 04:55		21:45		
16:27	80	15:38 (23) 17:29	18:23	28	17:38 (19) 20:22	31	19:33 (3) 21:15		21:45	
23 08:11		13:59 (1) 07:13	06:05	17:10 (19) 05:50	19:02 (3) 04:53	19:02 (3) 04:53		21:45		
16:29	78	15:39 (23) 17:31	18:25	29	17:38 (19) 20:24	31	19:33 (3) 21:17		21:45	
24 08:10		13:58 (1) 07:10	06:03	17:09 (19) 05:48	19:03 (3) 04:52	19:03 (3) 04:52		21:45		
16:31	78	15:39 (23) 17:33	18:27	31	18:00 (26) 20:25	29	19:32 (3) 21:18		21:46	
25 08:08		13:59 (1) 07:08	06:00	17:09 (19) 05:46	19:03 (3) 04:50	19:03 (3) 04:50		21:46		
16:32	79	15:41 (23) 17:35	18:29	36	18:02 (26) 20:27	29	19:32 (3) 21:20		21:46	
26 08:07		13:58 (1) 07:06	05:58	17:08 (19) 05:44	19:04 (3) 04:49	19:04 (3) 04:49		21:46		
16:34	81	15:41 (23) 17:37	18:31	40	18:04 (26) 20:29	27	19:31 (3) 21:21		21:46	
27 08:05		13:58 (1) 07:03	05:55	17:08 (19) 05:41	19:04 (3) 04:48	19:04 (3) 04:48		21:46		
16:36	82	15:41 (23) 17:39	18:33	43	18:06 (26) 20:31	26	19:30 (3) 21:23		21:46	
28 08:04		13:59 (1) 07:01	05:53	17:08 (19) 05:39	19:05 (3) 04:47	19:05 (3) 04:47		21:46		
16:38	83	15:43 (23) 17:41	18:35	44	18:07 (26) 20:33	24	19:29 (3) 21:24		21:45	
29 08:02		13:58 (1) 07:00	05:50	18:09 (19) 05:37	19:06 (3) 04:45	19:06 (3) 04:45		21:45		
16:40	85	15:43 (23) 17:43	18:37	46	19:10 (26) 20:35	22	19:28 (3) 21:26		21:45	
30 08:00		13:58 (1) 07:00	05:48	18:09 (19) 05:35	19:08 (3) 04:44	19:08 (3) 04:44		21:45		
16:42	85	15:43 (23) 17:45	18:39	45	19:10 (26) 20:37	19	19:27 (3) 21:27		21:45	
31 07:59		13:58 (1) 07:00	05:45	18:10 (19) 05:34	19:09 (3) 04:43	19:09 (3) 04:43		21:45		
16:44	85	15:43 (23) 17:47	18:40	42	19:09 (26) 20:39		21:28		21:45	
Sonnenscheinstunden	248	272	367	421	496	512				
astr.max.mögl.Beschattung	2746	1178	496	615	26	347				
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45				
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91				
Reduktion Windrichtung	0.66	0.67	0.68	0.65	0.65	0.61				
Gesamte Reduktion	0.10	0.15	0.19	0.24	0.30	0.25				
Met.wahrsch.Beschattung	286	171	96	149	8	86				

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 72

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AH - IO34

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember		
1	04:38	20:56 (20) 05:19	06:14	19:15 (3) 07:08	07:07	13:31 (1) 08:03	11:33 (28)	
2	21:44	12 21:08 (18) 21:09	20:01	10 19:25 (3) 18:46	16:35	63 15:05 (23) 15:50	98 15:05 (27)	
3	04:39	20:56 (20) 05:20	06:16	19:15 (3) 07:10	07:09	13:31 (1) 08:05	11:33 (28)	
4	21:44	11 21:07 (18) 21:07	19:59	18:44	16:33	68 15:07 (23) 15:49	97 15:05 (27)	
5	04:40	20:57 (20) 05:22	06:17	19:12	07:11	13:30 (1) 08:06	11:32 (28)	
6	21:44	10 21:07 (18) 21:05	19:56	18:41	16:31	73 15:09 (23) 15:48	100 15:06 (27)	
7	04:40	20:58 (20) 05:24	06:19	19:14	07:13	13:29 (1) 08:08	11:31 (28)	
8	21:43	9 21:07 (18) 21:03	19:54	18:39	16:29	77 15:10 (23) 15:48	101 15:06 (27)	
9	04:41	21:00 (20) 05:26	06:21	19:15	07:15	13:30 (1) 08:09	11:31 (28)	
10	21:43	7 21:07 (18) 21:01	19:51	18:37	16:27	79 15:12 (23) 15:47	102 15:07 (27)	
11	04:42	21:03 (18) 05:27	06:23	19:17	07:17	13:30 (1) 08:10	11:31 (28)	
12	21:42	3 21:06 (18) 20:59	19:49	18:34	16:25	80 15:12 (23) 15:46	101 15:06 (27)	
13	04:43	21:04 (18) 05:29	06:25	19:19	07:19	13:29 (1) 08:12	11:31 (28)	
14	21:41	2 21:06 (18) 20:57	19:46	18:32	16:23	82 15:13 (23) 15:46	100 15:07 (27)	
15	04:44	05:31	06:26	18:15 (19) 07:21	07:21	13:29 (1) 08:13	11:31 (28)	
16	21:41	20:55	19:44	2 18:17 (19) 18:29	16:21	83 15:13 (23) 15:45	100 15:07 (27)	
17	04:45	05:33	06:28	18:08 (19) 07:23	07:23	13:29 (1) 08:14	11:31 (28)	
18	21:40	20:53	19:41	23 18:00 (19) 18:27	16:20	84 15:14 (23) 15:45	101 15:08 (27)	
19	04:46	05:34	06:30	18:05 (19) 07:25	07:25	13:29 (1) 08:16	11:31 (28)	
20	21:39	20:51	19:39	32 18:59 (26) 18:24	16:18	85 15:14 (23) 15:45	99 15:07 (27)	
21	04:48	05:36	19:20 (3) 06:32	18:04 (19) 07:27	07:27	13:30 (1) 08:17	11:31 (28)	
22	21:38	20:49	11 19:31 (3) 19:36	36 19:00 (26) 18:22	16:16	85 15:15 (23) 15:44	97 15:06 (27)	
23	04:49	05:38	19:17 (3) 06:34	18:02 (19) 07:28	07:29	13:30 (1) 08:18	11:31 (28)	
24	21:37	20:47	17 19:34 (3) 19:34	41 19:01 (26) 18:20	16:14	85 15:15 (23) 15:44	96 15:06 (27)	
25	04:50	05:40	19:15 (3) 06:35	18:00 (19) 07:30	07:31	13:30 (1) 08:19	11:31 (28)	
26	21:36	20:45	20 19:35 (3) 19:31	44 19:00 (26) 18:17	16:13	85 15:15 (23) 15:44	95 15:06 (27)	
27	04:51	05:41	19:14 (3) 06:37	17:59 (19) 07:32	07:33	13:30 (1) 08:20	11:31 (28)	
28	21:35	20:43	22 19:36 (3) 19:29	46 19:00 (26) 18:15	16:11	84 15:15 (23) 15:44	93 15:05 (27)	
29	04:53	05:43	19:13 (3) 06:39	17:58 (19) 07:34	07:35	13:31 (1) 08:21	11:31 (28)	
30	21:34	20:40	24 19:37 (3) 19:26	45 18:58 (26) 18:12	16:09	81 15:14 (23) 15:44	92 15:05 (27)	
31	04:54	05:45	19:11 (3) 06:41	17:58 (19) 07:36	07:37	13:31 (1) 08:22	11:32 (28)	
32	21:33	20:38	26 19:37 (3) 19:24	43 18:56 (26) 18:10	16:08	81 15:14 (23) 15:44	90 15:05 (27)	
33	04:55	05:47	19:10 (3) 06:43	17:56 (19) 07:38	07:38	13:32 (1) 08:23	11:32 (28)	
34	21:32	20:36	28 19:38 (3) 19:21	41 18:53 (26) 18:08	16:06	79 15:14 (23) 15:44	91 15:06 (27)	
35	04:57	05:49	19:10 (3) 06:44	17:56 (19) 07:40	07:40	13:32 (1) 08:23	11:33 (28)	
36	21:30	20:34	29 19:39 (3) 19:19	37 18:50 (26) 18:05	16:05	78 15:13 (23) 15:45	87 15:06 (27)	
37	04:58	05:50	19:08 (3) 06:46	17:56 (19) 07:42	07:42	13:33 (1) 08:24	11:33 (28)	
38	21:29	20:32	30 19:38 (3) 19:16	33 18:48 (26) 18:03	16:03	78 15:13 (23) 15:45	88 15:07 (27)	
39	05:00	05:52	19:08 (3) 06:48	17:56 (19) 07:44	07:44	13:33 (1) 08:25	11:33 (28)	
40	21:28	20:29	30 19:38 (3) 19:14	30 18:26 (19) 18:01	16:02	80 15:12 (23) 15:45	85 15:06 (27)	
41	05:01	05:54	19:08 (3) 06:50	17:55 (19) 07:46	14:51 (1) 07:46	13:35 (1) 08:25	11:34 (28)	
42	21:26	20:27	31 19:39 (3) 19:11	29 18:24 (19) 17:59	17 15:08 (1) 16:01	81 15:13 (23) 15:46	85 15:07 (27)	
43	05:02	05:56	19:07 (3) 06:52	17:56 (19) 07:48	14:47 (1) 07:48	13:36 (1) 08:26	11:34 (28)	
44	21:25	20:25	31 19:38 (3) 19:09	27 18:23 (19) 17:56	24 15:11 (1) 15:59	81 15:12 (23) 15:46	85 15:07 (27)	
45	05:04	05:58	19:07 (3) 06:53	17:57 (19) 07:50	14:44 (1) 07:49	13:35 (1) 08:26	11:35 (28)	
46	21:23	20:22	31 19:38 (3) 19:06	25 18:22 (19) 17:54	30 15:14 (1) 15:58	81 15:10 (23) 15:47	85 15:08 (27)	
47	05:06	05:59	19:07 (3) 06:55	17:58 (19) 07:51	14:41 (1) 07:51	13:36 (1) 08:27	11:35 (28)	
48	21:22	20:20	30 19:37 (3) 19:04	23 18:21 (19) 17:52	35 15:16 (1) 15:57	81 15:09 (23) 15:47	87 15:08 (27)	
49	05:07	06:01	19:08 (3) 06:57	17:59 (19) 06:53	13:39 (1) 07:53	13:37 (1) 08:27	11:36 (28)	
50	21:20	20:18	29 19:37 (3) 19:01	20 18:19 (19) 16:50	38 14:17 (1) 15:56	78 15:07 (23) 15:48	87 15:09 (27)	
51	05:09	06:03	19:07 (3) 06:59	18:00 (19) 06:55	13:37 (1) 07:55	13:38 (1) 08:28	11:36 (28)	
52	21:19	20:15	29 19:36 (3) 18:59	16 18:16 (19) 16:48	41 14:18 (1) 15:55	73 15:02 (27) 15:48	89 15:09 (27)	
53	05:10	06:05	19:08 (3) 07:01	18:03 (19) 06:57	13:36 (1) 07:56	11:41 (28) 08:28	11:36 (28)	
54	21:17	20:13	27 19:35 (3) 18:56	9 18:12 (19) 16:45	43 14:19 (1) 15:53	81 15:03 (27) 15:49	91 15:10 (27)	
55	05:12	06:07	19:09 (3) 07:03	06:59	13:35 (1) 07:58	11:38 (28) 08:28	11:37 (28)	
56	21:16	20:11	25 19:34 (3) 18:54	16:43	45 14:20 (1) 15:52	88 15:04 (27) 15:50	92 15:11 (27)	
57	05:14	06:08	19:09 (3) 07:04	07:01	13:34 (1) 08:00	11:36 (28) 08:28	11:38 (28)	
58	21:14	20:08	23 19:32 (3) 18:51	16:41	48 14:22 (1) 15:51	92 15:05 (27) 15:51	92 15:12 (27)	
59	05:15	06:10	19:10 (3) 07:06	07:03	13:33 (1) 08:01	11:35 (28) 08:28	11:38 (28)	
60	21:12	20:06	20 19:30 (3) 18:49	16:39	49 14:22 (1) 15:51	95 15:05 (27) 15:52	95 15:13 (27)	
61	05:17	06:12	19:12 (3)	07:05	13:32 (1)	11:39 (28)	95 15:13 (27)	
62	21:10	20:03	16 19:28 (3)	16:37	51 14:23 (1)	15:53	96 15:14 (27)	
63	Sonnenscheinstunden	514	461	383	328	257	231	2897
64	astr.max.mögl.Beschattung	54	529	612	421	2421		2897
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21		0.14
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91		0.91
67	Reduktion Windrichtung	0.61	0.65	0.68	0.67	0.67		0.64
68	Gesamte Reduktion	0.24	0.28	0.25	0.20	0.13		0.08
69	Met.wahrsch.Beschattung	13	150	152	84	307		233

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 73

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AI - IO35

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	12:55 (28) 07:57	14:38 (1) 06:59	06:43	18:53 (3) 05:33	04:42		20:16 (20)
2	15:54	39 15:16 (27) 15:46	63 15:51 (23) 17:43	19:42	20 19:13 (3) 20:39	21:29	17	20:37 (18)
3	08:28	12:56 (28) 07:55	14:38 (1) 06:56	06:40	18:51 (3) 05:31	04:41		20:18 (20)
4	15:57	38 15:17 (27) 16:48	62 15:50 (23) 17:45	19:44	22 19:13 (3) 20:40	21:31	11	20:35 (18)
5	08:27	13:01 (28) 07:54	14:39 (1) 06:54	06:38	18:50 (3) 05:29	04:40		20:20 (20)
6	15:57	32 15:18 (27) 16:50	60 15:50 (23) 17:47	19:46	24 19:14 (3) 20:42	21:32	4	20:24 (20)
7	08:27	14:41 (29) 07:52	14:40 (1) 06:52	06:35	18:49 (3) 05:26	04:40		
8	15:58	31 15:20 (27) 16:52	57 15:50 (23) 17:49	19:48	25 19:14 (3) 20:44	21:33		
9	08:27	14:41 (29) 07:50	14:41 (1) 06:49	06:33	18:49 (3) 05:24	04:39		
10	15:59	33 15:21 (27) 16:54	54 15:49 (23) 17:51	19:50	25 19:14 (3) 20:46	21:34		
11	08:27	14:40 (29) 07:48	14:41 (1) 06:47	06:31	18:47 (3) 05:22	04:38		
12	16:00	35 15:22 (27) 16:56	49 15:46 (23) 17:53	19:52	26 19:13 (3) 20:48	21:35		
13	08:26	14:41 (29) 07:46	14:42 (1) 06:45	17:11 (19) 06:28	18:48 (3) 05:20	04:37		
14	16:02	37 15:25 (27) 16:58	42 15:44 (23) 17:55	9 17:20 (19) 19:54	26 19:14 (3) 20:50	21:36		
15	08:26	14:41 (1) 07:44	14:43 (1) 06:42	17:08 (19) 06:26	18:48 (3) 05:19	04:37		
16	16:03	39 15:26 (27) 17:00	33 15:16 (1) 17:57	14 17:22 (19) 19:55	26 19:14 (3) 20:51	21:37		
17	08:25	14:41 (1) 07:42	14:44 (1) 06:40	17:06 (19) 06:23	18:47 (3) 05:17	04:36		
18	16:05	40 15:27 (27) 17:03	31 15:15 (1) 17:59	18 17:24 (19) 19:57	25 19:12 (3) 20:53	21:38		
19	08:24	14:40 (1) 07:40	14:46 (1) 06:37	17:04 (19) 06:21	18:48 (3) 05:15	04:36		20:16 (20)
20	16:06	43 15:29 (27) 17:05	28 15:14 (1) 18:00	21 17:25 (19) 19:59	24 19:12 (3) 20:55	8 20:24 (20) 21:39		
21	08:24	14:39 (1) 07:38	14:48 (1) 06:35	17:04 (19) 06:18	18:48 (3) 05:13	20:14 (20) 21:40		
22	16:08	45 15:29 (27) 17:07	25 15:13 (1) 18:02	22 17:26 (19) 20:01	22 19:10 (3) 20:57	11 20:25 (20) 21:40		
23	08:23	14:39 (1) 07:36	14:50 (1) 06:32	17:02 (19) 06:16	18:49 (3) 05:11	20:13 (20) 21:40		
24	16:09	46 15:30 (27) 17:09	21 15:11 (1) 18:04	24 17:26 (19) 20:03	20 19:09 (3) 20:59	14 20:27 (20) 21:41		
25	08:22	14:39 (1) 07:34	14:53 (1) 06:30	17:02 (19) 06:14	18:51 (3) 05:09	20:12 (20) 21:41		
26	16:11	47 15:30 (27) 17:11	15 15:08 (1) 18:06	24 17:26 (19) 20:05	17 19:08 (3) 21:00	16 20:28 (20) 21:41		
27	08:21	14:38 (1) 07:32	06:27	17:01 (19) 06:11	18:52 (3) 05:07	20:11 (20) 21:42		
28	16:13	49 15:31 (27) 17:13	18:08	24 17:25 (19) 20:07	13 19:05 (3) 21:02	19 20:30 (18) 21:42		
29	08:20	14:38 (1) 07:30	06:25	17:02 (19) 06:09	18:56 (3) 05:06	20:11 (20) 21:43		
30	16:14	50 15:31 (27) 17:15	18:10	24 17:26 (19) 20:09	5 19:01 (3) 21:04	21 20:32 (18) 21:43		
31	08:19	14:38 (1) 07:28	06:23	17:01 (19) 06:06	05:04	20:10 (20) 21:43		
32	16:16	51 15:32 (27) 17:17	18:12	24 17:25 (19) 20:10	21:05	23 20:33 (18) 21:43		
33	08:18	14:38 (1) 07:26	06:20	17:02 (19) 06:04	05:02	20:10 (20) 21:43		
34	16:18	52 15:32 (27) 17:19	18:14	22 17:24 (19) 20:12	21:07	25 20:35 (18) 21:44		
35	08:17	14:37 (1) 07:24	06:18	17:02 (19) 06:02	05:01	20:09 (20) 21:43		
36	16:19	58 15:39 (23) 17:21	18:16	21 17:23 (19) 20:14	21:09	27 20:36 (18) 21:44		
37	08:16	14:37 (1) 07:22	06:15	17:03 (19) 05:59	04:59	20:10 (20) 21:44		
38	16:21	63 15:42 (23) 17:23	18:18	23 17:51 (26) 20:16	21:10	28 20:38 (18) 21:44		
39	08:15	14:37 (1) 07:19	06:13	17:04 (19) 05:57	04:58	29 20:10 (20) 21:44		
40	16:23	63 15:43 (23) 17:25	18:20	24 17:53 (26) 20:18	21:12	29 20:39 (18) 21:45		
41	08:14	14:37 (1) 07:17	06:10	17:07 (19) 05:55	04:56	20:09 (20) 21:44		
42	16:25	65 15:45 (23) 17:27	18:22	20 17:55 (26) 20:20	21:14	31 20:40 (18) 21:45		
43	08:12	14:37 (1) 07:15	06:08	17:43 (26) 05:52	04:55	20:10 (20) 21:44		
44	16:27	66 15:47 (23) 17:29	18:23	13 17:56 (26) 20:22	21:15	31 20:41 (18) 21:45		
45	08:11	14:37 (1) 07:13	06:05	17:44 (26) 05:50	04:53	20:10 (20) 21:44		
46	16:29	62 15:47 (23) 17:31	18:25	15 17:59 (26) 20:24	21:17	31 20:41 (18) 21:45		
47	08:10	14:36 (1) 07:10	06:03	17:43 (26) 05:48	04:52	20:10 (20) 21:44		
48	16:31	62 15:48 (23) 17:33	18:27	16 17:59 (26) 20:25	21:18	30 20:40 (18) 21:46		
49	08:08	14:37 (1) 07:08	06:00	17:44 (26) 05:46	04:50	20:11 (20) 21:45		
50	16:32	62 15:49 (23) 17:35	18:29	14 17:58 (26) 20:27	21:20	29 20:40 (18) 21:46		
51	08:07	14:37 (1) 07:06	05:58	17:44 (26) 05:44	04:49	20:11 (20) 21:45		
52	16:34	64 15:50 (23) 17:37	18:31	13 17:57 (26) 20:29	21:21	29 20:40 (18) 21:46		
53	08:05	14:37 (1) 07:03	05:55	17:46 (26) 05:41	04:48	20:12 (20) 21:45		
54	16:36	64 15:50 (23) 17:39	18:33	9 17:55 (26) 20:31	21:23	28 20:40 (18) 21:45		
55	08:04	14:38 (1) 07:01	05:53	05:39	04:47	20:13 (20) 21:46		
56	16:38	64 15:51 (23) 17:41	18:35	20:33	21:24	27 20:40 (18) 21:45		
57	08:02	14:37 (1) 07:00	05:50	05:37	04:45	20:13 (20) 21:45		
58	16:40	65 15:51 (23) 17:43	19:37	20:35	21:26	26 20:39 (18) 21:45		
59	08:00	14:38 (1) 07:00	05:48	18:58 (3) 05:35	04:44	20:14 (20) 21:45		
60	16:42	64 15:51 (23) 17:45	19:39	11 19:09 (3) 20:37	21:27	24 20:38 (18) 21:45		
61	07:59	14:38 (1) 07:00	05:45	18:54 (3) 05:30	04:43	20:15 (20) 21:45		
62	16:44	64 15:51 (23) 17:47	19:40	17 19:11 (3) 20:39	21:28	21 20:38 (18) 21:45		
63	Sonnenscheinstunden	248	272	367	421	496	512	
64	astr.max.mögl.Beschattung	1593	540	422	320	528	32	
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45	
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
67	Reduktion Windrichtung	0.68	0.68	0.68	0.67	0.63	0.63	
68	Gesamte Reduktion	0.11	0.15	0.19	0.25	0.29	0.26	
69	Met.wahrsch.Beschattung	171	80	82	80	154	8	

Tabellen-Layout: Die Daten für jeden Tag 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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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 74

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AI - IO35

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	05:19	20:24 (20) 06:14	18:48 (3) 07:08	17:42 (19) 07:07	14:15 (1) 08:03	
2	21:44	21:09	20:37 (20) 20:01	19:10 (3) 18:46	18:06 (19) 16:35	14:44 (1) 15:50	
3	04:39	05:20	20:25 (20) 06:16	18:46 (3) 07:09	17:42 (19) 07:09	14:14 (1) 08:05	
4	21:44	21:07	20:35 (20) 19:59	19:10 (3) 18:44	18:05 (19) 16:33	14:45 (1) 15:46	
5	04:40	05:22	20:28 (20) 06:17	18:45 (3) 07:12	17:42 (19) 07:11	14:12 (1) 08:06	
6	21:44	21:05	20:33 (20) 19:56	19:10 (3) 18:41	18:03 (19) 16:31	14:46 (1) 15:48	
7	04:40	05:24	20:28 (20) 06:19	18:45 (3) 07:14	17:43 (19) 07:13	14:11 (1) 08:08	
8	21:43	21:03	19:54	19:11 (3) 18:39	18:02 (19) 16:29	14:14 (1) 15:48	
9	04:41	05:26	20:21	18:44 (3) 07:15	17:44 (19) 07:15	14:11 (1) 08:09	
10	21:43	21:01	19:51	19:10 (3) 18:37	18:00 (19) 16:27	14:14 (1) 15:47	
11	04:42	05:27	20:23	18:44 (3) 07:17	17:46 (19) 07:17	14:11 (1) 08:10	
12	21:42	20:59	19:49	19:10 (3) 18:34	17:58 (19) 16:25	14:11 (1) 08:10	
13	04:43	05:29	20:25	18:44 (3) 07:19	17:50 (19) 07:19	14:10 (1) 08:12	
14	21:41	20:57	19:46	19:09 (3) 18:32	17:53 (19) 16:23	14:10 (1) 08:12	
15	04:44	05:31	20:26	18:44 (3) 07:21	17:51 (19) 16:23	14:10 (1) 08:13	
16	21:41	20:55	19:44	19:09 (3) 18:29	17:51 (19) 16:23	14:10 (1) 08:13	
17	04:45	05:33	20:28	18:43 (3) 07:23	17:51 (19) 16:23	14:10 (1) 08:14	
18	21:40	20:53	19:41	19:07 (3) 18:27	17:50 (19) 16:23	14:10 (1) 08:14	
19	04:46	20:26 (20) 05:34	20:30	18:44 (3) 07:25	17:52 (19) 16:23	14:10 (1) 08:16	
20	21:39	20:33 (20) 20:51	19:39	19:06 (3) 18:24	17:51 (19) 16:23	14:10 (1) 08:16	
21	04:48	20:25 (20) 05:36	20:32	18:45 (3) 07:27	17:52 (19) 16:23	14:10 (1) 08:17	
22	21:38	20:44 (18) 20:49	19:36	19:05 (3) 18:22	17:51 (19) 16:23	14:10 (1) 08:17	
23	04:49	20:24 (20) 05:38	20:34	18:46 (3) 07:28	17:52 (19) 16:23	14:10 (1) 08:18	
24	21:37	20:46 (18) 20:47	19:34	19:04 (3) 18:20	17:51 (19) 16:23	14:10 (1) 08:18	
25	04:50	20:23 (20) 05:40	20:35	18:47 (3) 07:30	17:53 (19) 16:23	14:10 (1) 08:19	
26	21:36	20:47 (18) 20:45	19:31	19:00 (3) 18:17	17:51 (19) 16:23	14:10 (1) 08:19	
27	04:51	20:22 (20) 05:41	20:37	18:52 (3) 07:32	17:53 (19) 16:23	14:10 (1) 08:20	
28	21:35	20:47 (18) 20:43	19:29	18:56 (3) 18:15	17:51 (19) 16:23	14:10 (1) 08:20	
29	04:53	20:21 (20) 05:43	20:39	19:03 (3) 18:15	17:51 (19) 16:23	14:10 (1) 08:21	
30	21:34	20:48 (18) 20:40	19:26	18:52 (3) 18:12	17:51 (19) 16:23	14:10 (1) 08:21	
31	04:54	20:22 (20) 05:45	20:41	19:06 (3) 18:10	17:51 (19) 16:23	14:10 (1) 08:22	
32	21:33	20:49 (18) 20:38	19:24	18:44 (26) 18:10	17:51 (19) 16:23	14:10 (1) 08:22	
33	04:55	20:21 (20) 05:47	20:43	18:33 (26) 07:38	17:51 (19) 16:23	14:10 (1) 08:23	
34	21:32	20:50 (18) 20:36	19:21	18:45 (26) 18:08	17:51 (19) 16:23	14:10 (1) 08:23	
35	04:57	20:20 (20) 05:49	20:44	18:31 (26) 07:40	17:51 (19) 16:23	14:10 (1) 08:23	
36	21:30	20:50 (18) 20:34	19:19	18:46 (26) 18:05	17:51 (19) 16:23	14:10 (1) 08:23	
37	04:58	20:21 (20) 05:50	20:48	18:31 (26) 07:42	17:51 (19) 16:23	14:10 (1) 08:24	
38	21:29	20:51 (18) 20:32	19:16	18:46 (26) 18:03	17:51 (19) 16:23	14:10 (1) 08:24	
39	04:59	20:20 (20) 05:52	20:48	18:30 (26) 07:44	17:51 (19) 16:23	14:10 (1) 08:24	
40	21:28	20:51 (18) 20:29	19:14	18:46 (26) 18:01	17:51 (19) 16:23	14:10 (1) 08:24	
41	05:01	20:20 (20) 05:54	20:50	18:29 (26) 07:46	17:51 (19) 16:23	14:10 (1) 08:25	
42	21:26	20:50 (18) 20:27	19:11	18:42 (26) 17:59	17:51 (19) 16:23	14:10 (1) 08:25	
43	05:02	20:20 (20) 05:56	20:52	17:52 (19) 07:48	17:51 (19) 16:23	14:10 (1) 08:26	
44	21:25	20:51 (18) 20:25	19:09	18:40 (26) 17:56	17:51 (19) 16:23	14:10 (1) 08:26	
45	05:04	20:20 (20) 05:58	20:53	17:49 (19) 07:50	17:51 (19) 16:23	14:10 (1) 08:26	
46	21:23	20:50 (18) 20:22	19:06	18:38 (26) 17:54	17:51 (19) 16:23	14:10 (1) 08:26	
47	05:06	20:19 (20) 05:59	20:55	17:47 (19) 07:51	17:51 (19) 16:23	14:10 (1) 08:27	
48	21:22	20:48 (18) 20:20	19:04	18:35 (26) 17:52	17:51 (19) 16:23	14:10 (1) 08:27	
49	05:07	20:20 (20) 06:01	20:57	17:46 (19) 07:53	17:51 (19) 16:23	14:10 (1) 08:27	
50	21:20	20:47 (18) 20:18	19:01	18:33 (26) 16:50	17:51 (19) 16:23	14:10 (1) 08:27	
51	05:09	20:20 (20) 06:03	20:59	17:44 (19) 07:55	17:51 (19) 16:23	14:10 (1) 08:28	
52	21:19	20:45 (18) 20:15	18:59	18:06 (19) 16:48	17:51 (19) 16:23	14:10 (1) 08:28	
53	05:10	20:20 (20) 06:05	20:57	17:43 (19) 07:57	17:51 (19) 16:23	14:10 (1) 08:28	
54	21:17	20:44 (18) 20:13	18:56	18:06 (19) 16:45	17:51 (19) 16:23	14:10 (1) 08:28	
55	05:12	20:20 (20) 06:07	20:57	17:42 (19) 06:59	14:26 (1) 07:58	14:18 (1) 08:28	
56	21:16	20:42 (18) 20:11	19:03 (3) 18:54	18:06 (19) 16:43	14:33 (1) 15:52	14:11 (1) 08:28	
57	05:14	20:21 (20) 06:08	18:52 (3) 07:04	17:42 (19) 07:01	14:22 (1) 08:00	14:20 (1) 08:28	
58	21:14	20:41 (18) 20:08	19:06 (3) 18:51	18:06 (19) 16:41	14:39 (1) 15:51	14:11 (1) 08:28	
59	05:15	20:21 (20) 06:10	18:50 (3) 07:06	17:42 (19) 07:03	14:19 (1) 08:01	14:21 (1) 08:28	
60	21:12	20:39 (20) 20:06	19:08 (3) 18:49	18:06 (19) 16:39	14:41 (1) 15:51	14:11 (1) 08:28	
61	05:17	20:22 (20) 06:12	18:49 (3)	17:43 (19) 07:05	14:17 (1)	14:17 (1) 08:28	
62	21:10	20:38 (20) 20:03	20:59	16:37	14:43 (1)	15:53	14:14 (1) 08:28
63	Sonnenscheinstunden	514	461	383	328	257	231
64	astr.max.mögl.Beschattung	534	86	582	190	1668	1220
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.63	0.66	0.68	0.68	0.68	0.65
68	Gesamte Reduktion	0.25	0.29	0.25	0.20	0.13	0.08
69	Met.wahrsch.Beschattung	135	25	144	39	216	101

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:53 / 75

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AJ - IO36

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	13:22 (28) 07:57	14:58 (1) 06:59	06:43	18:47 (3) 05:33	04:42	
2	15:54	32 15:08 (29) 16:46	58 15:59 (23) 17:43	19:42	23 19:10 (3) 20:39	21:29	
3	08:28	13:22 (28) 07:55	14:58 (1) 06:56	06:40	18:46 (3) 05:31	20:08 (20) 04:41	
4	15:57	30 15:08 (29) 16:48	57 15:59 (23) 17:45	19:44	23 19:08 (3) 20:40	2 20:10 (20) 21:31	
5	08:27	13:27 (28) 07:54	14:58 (1) 06:54	06:38	18:46 (3) 05:29	20:04 (20) 04:40	
6	15:57	30 15:10 (29) 16:50	57 15:59 (23) 17:47	19:46	24 19:10 (3) 20:42	8 20:12 (20) 21:32	
7	08:27	13:27 (28) 07:52	15:00 (1) 06:52	06:35	18:45 (3) 05:26	20:03 (20) 04:40	
8	15:58	27 15:11 (29) 16:52	54 15:59 (23) 17:49	19:48	23 19:08 (3) 20:44	11 20:14 (20) 21:33	
9	08:27	13:30 (28) 07:50	15:00 (1) 06:49	06:33	18:46 (3) 05:24	20:01 (20) 04:39	
10	15:59	23 15:21 (27) 16:54	52 15:59 (23) 17:51	19:50	22 19:08 (3) 20:46	14 20:15 (20) 21:34	
11	08:27	14:53 (29) 07:48	15:00 (1) 06:47	17:10 (19) 06:30	18:45 (3) 05:22	20:00 (20) 04:38	
12	16:00	22 15:22 (27) 16:56	49 15:57 (23) 17:53	11 17:21 (19) 19:52	22 19:07 (3) 20:48	17 20:17 (20) 21:35	
13	08:26	14:54 (29) 07:46	15:01 (1) 06:45	17:08 (19) 06:28	18:46 (3) 05:20	19:59 (20) 04:37	
14	16:02	24 15:25 (27) 16:58	43 15:55 (23) 17:55	15 17:23 (19) 19:54	20 19:06 (3) 20:50	19 20:18 (20) 21:36	
15	08:26	14:54 (29) 07:44	15:02 (1) 06:42	17:06 (19) 06:26	18:48 (3) 05:19	19:59 (20) 04:37	
16	16:03	27 15:26 (27) 17:00	38 15:53 (23) 17:57	18 17:24 (19) 19:55	17 19:05 (3) 20:51	21 20:20 (18) 21:37	
17	08:25	14:54 (29) 07:42	15:03 (1) 06:40	17:06 (19) 06:23	18:49 (3) 05:17	19:59 (20) 04:36	
18	16:05	28 15:27 (27) 17:03	29 15:32 (1) 17:59	19 17:25 (19) 19:57	13 19:02 (3) 20:53	23 20:22 (18) 21:38	
19	08:24	14:54 (29) 07:40	15:04 (1) 06:37	17:04 (19) 06:21	18:52 (3) 05:15	19:59 (20) 04:36	
20	16:06	31 15:29 (27) 17:05	27 15:31 (1) 18:00	21 17:25 (19) 19:59	7 18:59 (3) 20:55	25 20:24 (18) 21:39	
21	08:24	14:54 (29) 07:38	15:06 (1) 06:35	17:04 (19) 06:18	05:13	19:59 (20) 04:35	
22	16:08	33 15:31 (27) 17:07	24 15:30 (1) 18:02	22 17:26 (19) 20:01	20:57	26 20:25 (18) 21:40	
23	08:23	14:54 (29) 07:36	15:08 (1) 06:32	17:03 (19) 06:16	05:11	19:59 (20) 04:35	
24	16:09	35 15:32 (27) 17:09	20 15:28 (1) 18:04	22 17:28 (19) 20:03	20:59	28 20:27 (18) 21:41	
25	08:22	14:54 (29) 07:34	15:11 (1) 06:30	17:03 (19) 06:14	05:09	19:59 (20) 04:34	
26	16:11	37 15:34 (27) 17:11	15 15:26 (1) 18:06	22 17:25 (19) 20:05	21:00	29 20:28 (18) 21:41	
27	08:21	14:55 (29) 07:32	15:15 (1) 06:27	17:03 (19) 06:11	05:07	19:59 (20) 04:34	
28	16:13	40 15:36 (27) 17:13	6 15:21 (1) 18:08	21 17:24 (19) 20:07	21:02	31 20:30 (18) 21:42	
29	08:20	14:55 (29) 07:30	06:25	17:04 (19) 06:09	05:06	20:00 (20) 04:34	
30	16:14	43 15:38 (27) 17:15	18:10	20 17:24 (19) 20:09	21:04	30 20:30 (18) 21:43	
31	08:19	14:56 (29) 07:28	06:23	17:04 (19) 06:06	05:04	20:01 (20) 04:34	
32	16:16	42 15:38 (27) 17:17	18:12	18 17:22 (19) 20:02	21:05	28 20:29 (18) 21:43	
33	08:18	14:57 (29) 07:26	06:20	17:06 (19) 06:04	05:02	20:02 (20) 04:34	
34	16:18	42 15:39 (27) 17:19	18:14	15 17:21 (19) 20:12	21:07	28 20:30 (18) 21:44	
35	08:17	14:56 (29) 07:24	06:18	17:07 (19) 06:02	05:01	20:03 (20) 04:33	
36	16:19	42 15:38 (27) 17:21	18:16	15 17:49 (26) 20:14	21:09	24 20:29 (18) 21:44	
37	08:16	14:57 (29) 07:22	06:15	17:44 (26) 05:59	04:59	20:05 (20) 04:33	
38	16:21	42 15:39 (27) 17:23	18:18	7 17:51 (26) 20:16	21:10	19 20:28 (18) 21:44	
39	08:15	14:57 (29) 07:19	06:13	17:42 (26) 05:57	04:58	20:18 (18) 04:34	
40	16:23	41 15:38 (27) 17:25	18:20	11 17:53 (26) 20:18	21:12	10 20:28 (18) 21:45	
41	08:14	14:59 (1) 07:17	06:10	17:42 (26) 05:55	04:56	20:19 (18) 04:34	
42	16:25	39 15:38 (27) 17:27	18:22	13 17:55 (26) 20:20	21:14	7 20:26 (18) 21:45	
43	08:12	14:59 (1) 07:15	06:08	17:42 (26) 05:52	04:55	04:34	
44	16:27	47 15:51 (23) 17:29	18:23	14 17:56 (26) 20:22	21:15	21:45	
45	08:11	14:58 (1) 07:13	06:05	17:42 (26) 05:50	04:53	04:34	
46	16:29	51 15:53 (23) 17:31	18:25	15 17:57 (26) 20:24	21:17	21:45	
47	08:10	14:58 (1) 07:10	06:03	17:42 (26) 05:48	04:52	04:34	
48	16:31	51 15:54 (23) 17:33	18:27	13 17:55 (26) 20:25	21:18	21:46	
49	08:08	14:58 (1) 07:08	06:00	17:44 (26) 05:46	04:50	04:35	
50	16:32	51 15:56 (23) 17:35	18:29	10 17:54 (26) 20:27	21:20	21:46	
51	08:07	14:58 (1) 07:06	05:58	17:47 (26) 05:43	04:49	04:35	
52	16:34	53 15:57 (23) 17:37	18:31	5 18:01 (3) 20:29	21:21	21:46	
53	08:05	14:57 (1) 07:03	05:55	17:53 (3) 05:41	04:48	04:36	
54	16:36	55 15:57 (23) 17:39	18:33	13 18:06 (3) 20:31	21:23	21:45	
55	08:04	14:58 (1) 07:01	05:53	17:51 (3) 05:39	04:47	04:36	
56	16:38	56 15:59 (23) 17:41	18:35	16 18:07 (3) 20:33	21:24	21:45	
57	08:02	14:58 (1)	06:50	18:49 (3) 05:37	04:45	04:37	
58	16:40	58 15:59 (23)	19:37	19 19:08 (3) 20:35	21:26	21:45	
59	08:00	14:58 (1)	06:48	18:48 (3) 05:35	04:44	04:37	
60	16:42	58 15:59 (23)	19:38	19:10 (3) 20:37	21:27	21:45	
61	07:59	14:58 (1)	06:45	18:47 (3)	04:43		
62	16:44	58 15:59 (23)	19:40	22 19:09 (3)	21:28		
63	Sonnenscheinstunden	248	272	367	421	496	512
64	astr.max.mögl.Beschattung	1248	529	419	194	400	
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	
67	Reduktion Windrichtung	0.68	0.68	0.68	0.67	0.63	
68	Gesamte Reduktion	0.11	0.15	0.19	0.25	0.29	
69	Met.wahrsch.Beschattung	134	78	81	49	117	

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)

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:53 / 76

Lizenzierter Anwender:
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Am Westersielzug 11
DE-25840 Friedrichstadt

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AJ - IO36

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	05:19	20:10 (20) 06:14	07:08	17:43 (19) 07:07	14:34 (1) 08:03	
2	21:44	21:09	20:37 (18) 20:01	18:46	22 18:05 (19) 16:35	27 15:01 (1) 15:50	
3	04:39	05:20	20:09 (20) 06:16	18:50 (3) 07:10	22 17:43 (19) 07:09	27 14:32 (1) 08:05	
4	21:44	21:07	20:35 (18) 19:59	7 18:57 (3) 18:44	22 18:05 (19) 16:33	30 15:02 (1) 15:47	
5	04:40	05:22	20:09 (20) 06:17	18:47 (3) 07:12	17:42 (19) 07:11	14:31 (1) 08:06	
6	21:44	21:05	20:33 (18) 19:56	13 19:00 (3) 18:41	21 18:03 (19) 16:31	39 15:23 (23) 15:48	
7	04:40	05:24	20:09 (20) 06:19	18:45 (3) 07:14	17:42 (19) 07:13	14:30 (1) 08:08	
8	21:43	21:03	20:31 (18) 19:54	17 19:02 (3) 18:39	21 18:03 (19) 16:29	45 15:25 (23) 15:48	
9	04:41	05:25	20:09 (20) 06:21	18:42 (3) 07:15	17:43 (19) 07:15	14:31 (1) 08:09	
10	21:43	21:01	20:30 (18) 19:51	20 19:02 (3) 18:37	19 18:02 (19) 16:27	50 15:28 (23) 15:47	
11	04:42	05:27	20:10 (20) 06:23	18:41 (3) 07:17	17:44 (19) 07:17	14:30 (1) 08:10	
12	21:42	20:59	18 20:28 (20) 19:49	22 19:03 (3) 18:34	16 18:00 (19) 16:25	53 15:29 (23) 15:46	
13	04:43	05:29	20:10 (20) 06:25	18:41 (3) 07:19	17:45 (19) 07:19	14:29 (1) 08:12	
14	21:41	20:57	16 20:26 (20) 19:46	22 19:03 (3) 18:32	13 17:58 (19) 16:23	55 15:29 (23) 15:46	
15	04:44	05:31	20:11 (20) 06:26	18:40 (3) 07:21	17:48 (19) 07:21	14:29 (1) 08:13	
16	21:41	20:55	13 20:24 (20) 19:44	24 19:04 (3) 18:29	7 17:55 (19) 16:21	56 15:30 (23) 15:45	
17	04:45	05:33	20:12 (20) 06:28	18:39 (3) 07:23	17:23	14:29 (1) 08:14	
18	21:40	20:53	11 20:23 (20) 19:41	24 19:03 (3) 18:27	16:20	58 15:30 (23) 15:45	
19	04:46	05:34	20:14 (20) 06:30	18:39 (3) 07:25	17:25	14:29 (1) 08:16	
20	21:39	20:51	6 20:20 (20) 19:39	24 19:03 (3) 18:24	16:18	58 15:30 (23) 15:45	
21	04:48	05:36	06:32	18:39 (3) 07:27	16:18	58 15:30 (23) 15:45	
22	21:38	20:49	19:36	23 19:02 (3) 18:22	16:16	58 15:31 (23) 15:44	
23	04:49	05:38	06:34	18:39 (3) 07:28	16:16	58 15:31 (23) 15:44	
24	21:37	20:47	19:34	23 19:02 (3) 18:20	16:14	58 15:31 (23) 15:44	
25	04:50	05:40	06:35	18:39 (3) 07:30	16:14	58 15:31 (23) 15:44	
26	21:36	20:45	19:31	21 19:00 (3) 18:17	16:13	57 15:31 (23) 15:44	
27	04:51	05:41	06:37	18:39 (3) 07:32	16:13	57 15:31 (23) 15:44	
28	21:35	20:43	19:29	20 18:59 (3) 18:15	16:11	55 15:30 (23) 15:44	
29	04:53	05:43	06:39	18:41 (3) 07:34	16:11	55 15:30 (23) 15:44	
30	21:34	20:40	19:26	17 18:58 (3) 18:12	16:09	55 15:30 (23) 15:44	
31	04:54	05:45	06:41	18:42 (3) 07:36	16:08	55 15:30 (23) 15:44	
32	21:33	20:38	19:24	14 18:56 (3) 18:10	16:08	53 15:30 (23) 15:44	
33	04:55	05:47	06:43	18:45 (3) 07:38	16:07	53 15:30 (23) 15:44	
34	21:32	20:36	19:21	6 18:51 (3) 18:08	16:06	51 15:29 (23) 15:44	
35	04:57	05:49	06:44	18:32 (26) 07:40	16:04	51 15:29 (23) 15:44	
36	21:30	20:34	19:19	9 18:41 (26) 18:05	16:05	51 15:28 (23) 15:45	
37	04:58	05:50	06:46	18:30 (26) 07:42	16:02	51 15:28 (23) 15:45	
38	21:29	20:31	19:16	12 18:42 (26) 18:03	16:03	51 15:27 (23) 15:45	
39	04:59	05:52	06:48	18:29 (26) 07:44	16:03	51 15:27 (23) 15:45	
40	21:28	20:29	19:14	14 18:43 (26) 18:01	16:02	48 15:26 (23) 15:45	
41	05:01	05:54	06:50	18:27 (26) 07:46	16:01	47 15:26 (23) 15:45	
42	21:26	20:27	19:11	15 18:42 (26) 17:59	16:01	39 15:13 (27) 15:46	
43	05:02	05:56	06:52	18:27 (26) 07:48	16:01	39 15:13 (27) 15:46	
44	21:25	4 20:35 (18) 20:25	19:09	13 18:40 (26) 17:56	16:01	41 15:15 (27) 15:46	
45	05:04	20:28 (18) 05:58	06:53	18:27 (26) 07:50	16:01	41 15:15 (27) 15:46	
46	21:23	9 20:37 (18) 20:22	19:06	11 18:38 (26) 17:54	16:01	42 15:15 (27) 15:47	
47	05:06	20:16 (20) 05:59	06:55	18:27 (26) 07:51	16:01	42 15:15 (27) 15:47	
48	21:22	16 20:38 (18) 20:20	19:04	8 18:35 (26) 17:52	16:01	42 15:15 (27) 15:47	
49	05:07	20:14 (20) 06:01	06:57	17:52 (19) 06:53	16:01	42 15:15 (27) 15:47	
50	21:20	22 20:39 (18) 20:18	19:01	14 18:33 (26) 16:50	16:01	42 15:16 (27) 15:48	
51	05:09	20:12 (20) 06:03	06:59	17:48 (19) 06:55	16:01	42 15:16 (27) 15:48	
52	21:19	26 20:39 (18) 20:15	18:59	16 18:30 (26) 16:48	16:01	42 15:16 (27) 15:48	
53	05:10	20:12 (20) 06:05	07:01	17:46 (19) 06:57	16:01	42 15:16 (27) 15:48	
54	21:17	28 20:40 (18) 20:13	18:56	17 18:03 (19) 16:45	16:01	43 15:17 (27) 15:49	
55	05:12	20:11 (20) 06:07	07:03	17:45 (19) 06:59	16:01	43 15:17 (27) 15:49	
56	21:15	29 20:40 (18) 20:11	18:54	19 18:04 (19) 16:43	9 14:52 (1) 15:52	41 15:16 (27) 15:50	
57	05:14	20:10 (20) 06:08	07:04	17:44 (19) 07:01	16:01	44 15:17 (27) 15:50	
58	21:14	31 20:41 (18) 20:08	18:51	21 18:05 (19) 16:41	16 14:56 (1) 15:51	37 15:15 (27) 15:51	
59	05:15	20:09 (20) 06:10	07:06	17:43 (19) 07:03	16:01	44 15:17 (27) 15:51	
60	21:12	30 20:39 (18) 20:06	18:49	22 18:05 (19) 16:39	21 14:58 (1) 15:51	36 15:15 (27) 15:52	
61	05:17	20:09 (20) 06:12		17:05	16:01	44 15:17 (27) 15:52	
62	21:10	29 20:38 (18) 20:03		16:37	25 15:00 (1)	15:53	
63	Sonnenscheinstunden	514	461	383	328	257	231
64	astr.max.mögl.Beschattung	224	184	488	212	1413	972
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.63	0.63	0.68	0.68	0.68	0.65
68	Gesamte Reduktion	0.25	0.28	0.25	0.20	0.13	0.08
69	Met.wahrsch.Beschattung	57	51	121	43	183	80

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 77
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AK - IO37

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1 08:28		13:35 (28) 07:57	15:09 (1) 06:59	19:42	18:46 (3) 05:33	19:59 (20) 04:42	
15:54	30	15:11 (29) 16:46	56	16:05 (23) 17:43	19:09 (3) 20:39	10	20:09 (20) 21:29
2 08:28		13:35 (28) 07:55	15:09 (1) 06:56	19:40	18:45 (3) 05:31	19:58 (20) 04:41	
15:55	31	15:12 (29) 16:48	55	16:05 (23) 17:45	19:44	23	19:08 (3) 20:40
3 08:28		13:37 (28) 07:54	15:09 (1) 06:54	19:38	18:46 (3) 05:29	19:57 (20) 04:40	1
15:57	31	15:13 (29) 16:50	55	16:05 (23) 17:47	19:46	22	19:08 (3) 20:42
4 08:27		13:38 (28) 07:52	15:10 (1) 06:52	19:35	18:45 (3) 05:26	19:56 (20) 04:40	8
15:58	32	15:15 (29) 16:52	54	16:05 (23) 17:49	19:48	22	19:07 (3) 20:44
5 08:27		13:39 (28) 07:50	15:11 (1) 06:49	19:33	18:46 (3) 05:24	19:56 (20) 04:39	20
15:59	30	15:15 (29) 16:54	52	16:05 (23) 17:51	19:50	20	19:06 (3) 20:46
6 08:27		13:41 (28) 07:48	15:10 (1) 06:47	19:30	18:47 (3) 05:22	19:55 (20) 04:38	13
16:00	29	15:16 (29) 16:56	50	16:03 (23) 17:53	11	17:23 (19) 19:52	17
7 08:26		13:43 (28) 07:46	15:11 (1) 06:45	19:28	18:48 (3) 05:20	19:55 (20) 04:37	15
16:02	27	15:18 (29) 16:58	47	16:03 (23) 17:55	15	17:25 (19) 19:54	15
8 08:26		13:46 (28) 07:44	15:11 (1) 06:42	19:26	18:51 (3) 05:19	19:55 (20) 04:37	23
16:03	22	15:18 (29) 17:00	44	16:01 (23) 17:57	17	17:25 (19) 19:55	9
9 08:25		13:51 (28) 07:42	15:12 (1) 06:40	19:23	19:00 (3) 05:17	25	20:20 (18) 21:37
16:05	20	15:27 (27) 17:03	37	15:59 (23) 17:59	19	17:27 (19) 19:57	26
10 08:24		13:51 (28) 07:40	15:14 (1) 06:37	19:21	20:53	26	20:22 (18) 21:38
16:06	23	15:29 (27) 17:05	28	15:42 (1) 18:00	20	17:26 (19) 19:59	20:55
11 08:24		13:51 (28) 07:38	15:15 (1) 06:35	19:18	20:55	28	20:24 (18) 21:39
16:08	25	15:31 (27) 17:07	26	15:41 (1) 18:02	21	17:27 (19) 20:01	20:57
12 08:23		13:51 (28) 07:36	15:16 (1) 06:32	19:16	20:57	29	20:25 (18) 21:40
16:09	27	15:32 (27) 17:09	24	15:40 (1) 18:04	21	17:26 (19) 20:03	20:58
13 08:22		13:52 (28) 07:34	15:16 (1) 06:30	19:14	20:58	29	20:26 (18) 21:41
16:11	30	15:34 (27) 17:11	19	15:38 (1) 18:06	20	17:26 (19) 20:05	21:00
14 08:21		13:52 (28) 07:32	15:20 (1) 06:27	19:11	21:00	27	20:26 (18) 21:41
16:13	31	15:36 (27) 17:13	15	15:35 (1) 18:08	19	17:25 (19) 20:07	20:57
15 08:20		13:52 (28) 07:30	15:25 (1) 06:25	19:10	21:02	24	20:25 (18) 21:42
16:14	34	15:38 (27) 17:15	5	15:30 (1) 18:10	17	17:24 (19) 20:09	20:56
16 08:19		13:52 (28) 07:28	15:23 (1) 06:23	19:06	21:04	17	20:25 (18) 21:43
16:16	36	15:40 (27) 17:17	18	15:32 (1) 18:12	16	17:23 (19) 20:06	21:05
17 08:18		13:53 (28) 07:26	15:24 (1) 06:20	19:04	21:05	10	20:23 (18) 21:43
16:18	40	15:43 (27) 17:19	12	15:21 (1) 18:14	12	17:21 (19) 20:12	21:07
18 08:17		13:53 (28) 07:24	15:25 (1) 06:18	19:02	21:07	7	20:22 (18) 21:44
16:19	39	15:42 (27) 17:21	6	15:17 (1) 18:14	6	17:17 (19) 20:14	21:09
19 08:16		13:53 (28) 07:22	15:26 (1) 06:15	19:00	21:09	21:09	21:44
16:21	40	15:43 (27) 17:23	18	15:18 (1) 18:16	20	17:16 (19) 20:11	21:10
20 08:15		13:53 (28) 07:19	15:27 (1) 06:13	18:58	21:10	27	20:26 (18) 21:41
16:23	40	15:43 (27) 17:25	18	15:18 (1) 18:20	20	17:16 (19) 20:08	21:09
21 08:14		13:54 (28) 07:17	15:28 (1) 06:10	18:52	21:12	24	20:25 (18) 21:42
16:25	39	15:43 (27) 17:27	18	15:16 (1) 18:22	20	17:15 (19) 20:07	21:09
22 08:12		13:54 (28) 07:15	15:29 (1) 06:08	18:46	21:14	24	20:25 (18) 21:42
16:27	37	15:43 (27) 17:29	18	15:14 (1) 18:23	20	17:14 (19) 20:06	21:09
23 08:11		13:54 (28) 07:13	15:30 (1) 06:05	18:40	21:15	24	20:25 (18) 21:42
16:29	36	15:42 (27) 17:31	19	15:12 (1) 18:25	20	17:13 (19) 20:04	21:10
24 08:10		13:54 (28) 07:10	15:31 (1) 06:03	18:34	21:17	24	20:26 (18) 21:41
16:31	41	15:46 (23) 17:33	18	15:10 (1) 18:27	20	17:12 (19) 20:03	21:11
25 08:08		13:54 (28) 07:08	15:32 (1) 06:00	18:28	21:18	24	20:26 (18) 21:41
16:32	44	15:49 (23) 17:35	18	15:08 (1) 18:29	20	17:11 (19) 20:02	21:12
26 08:07		13:55 (28) 07:06	15:33 (1) 05:58	18:22	21:20	24	20:26 (18) 21:41
16:34	45	16:00 (23) 17:37	11	15:04 (1) 18:31	20	17:10 (19) 20:01	21:13
27 08:05		13:55 (28) 07:03	15:34 (1) 05:55	18:16	21:21	24	20:26 (18) 21:41
16:36	47	16:01 (23) 17:39	10	15:02 (1) 18:33	20	17:09 (19) 20:00	21:14
28 08:04		13:55 (28) 07:01	15:35 (1) 05:53	18:10	21:23	24	20:26 (18) 21:41
16:38	50	16:03 (23) 17:41	9	15:00 (1) 18:35	20	17:08 (19) 20:00	21:15
29 08:02		13:55 (28) 06:59	15:36 (1) 05:50	18:04	21:24	24	20:26 (18) 21:41
16:40	53	16:04 (23) 17:43	8	14:58 (1) 18:37	20	17:07 (19) 20:00	21:16
30 08:00		13:55 (28) 06:57	15:37 (1) 05:48	18:00	21:25	24	20:26 (18) 21:41
16:42	53	16:04 (23) 17:45	7	14:56 (1) 18:40	20	17:06 (19) 20:00	21:17
31 07:59		13:55 (28) 06:55	15:38 (1) 05:45	17:54	21:26	24	20:26 (18) 21:41
16:44	54	16:04 (23) 17:47	6	14:54 (1) 18:43	20	17:05 (19) 20:00	21:18
Sonnenscheinstunden	248	272	367	421	496	512	
astr.max.mögl.Beschattung	1116	567	323	157	340	599	
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.68	0.68	0.68	0.67	0.63	0.61	
Gesamte Reduktion	0.11	0.15	0.19	0.25	0.30	0.25	
Met.wahrsch.Beschattung	120	85	63	40	100	152	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AK - IO37

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:38													
2	21:44	20	20:44 (2) 05:19		20:08 (20) 06:14									
3	21:44	20	21:04 (2) 21:09	29	20:37 (18) 20:01									
4	21:44	19	20:44 (2) 05:20		20:06 (20) 06:16									
5	04:41		20:45 (2) 05:22		20:06 (20) 06:17									
6	04:42		20:46 (2) 05:24		20:05 (20) 06:19									
7	04:43		21:04 (2) 21:05	27	20:33 (18) 19:56									
8	04:44		20:47 (2) 05:27		20:05 (20) 06:19									
9	04:45		21:04 (2) 21:03	26	20:31 (18) 19:54	9	18:57 (3) 18:39	20	18:04 (19) 16:29	48	15:32 (23) 15:48	20	15:02 (29)	
10	04:46		20:47 (2) 05:27		20:05 (20) 06:19									
11	04:48		21:03 (2) 20:59	23	20:28 (18) 19:49	17	19:00 (3) 18:34	16	18:02 (19) 16:25	54	15:35 (23) 15:46	29	15:02 (29)	
12	04:49		20:48 (2) 05:29		20:05 (20) 06:25									
13	04:50		21:03 (2) 20:57	21	20:26 (18) 19:46	19	19:01 (3) 18:32	13	18:00 (19) 16:23	54	15:35 (23) 15:46	30	15:03 (29)	
14	04:51		20:50 (2) 05:31		20:05 (20) 06:26									
15	04:53		21:02 (2) 20:55	18	20:23 (20) 19:44	21	19:02 (3) 18:29	7	17:57 (19) 16:21	54	15:35 (23) 15:45	31	15:02 (29)	
16	04:54		20:51 (2) 05:33		20:06 (20) 06:28									
17	04:55		21:01 (2) 20:53	17	20:23 (20) 19:41	22	19:01 (3) 18:27							
18	04:57		20:53 (2) 05:34		20:06 (20) 06:30									
19	04:58		20:59 (2) 20:51	14	20:20 (20) 19:39	22	19:01 (3) 18:24							
20	04:59		05:36		20:07 (20) 06:32									
21	05:01		05:38	11	20:18 (20) 19:36	22	19:01 (3) 18:22							
22	05:02		05:38		20:08 (20) 06:34									
23	05:04		05:40	9	20:17 (20) 19:34	22	19:01 (3) 18:20							
24	05:06		05:41		20:09 (20) 06:35									
25	05:07		05:42	5	20:14 (20) 19:31	21	18:59 (3) 18:17							
26	05:09		05:43		06:37									
27	05:10		05:43		19:29	21	18:59 (3) 18:15							
28	05:12		05:44		06:39									
29	05:14		05:45		19:26	19	18:58 (3) 18:12							
30	05:15		05:45		06:41									
31	05:17		05:46		19:24	16	18:56 (3) 18:10							
32	05:19		05:47		06:43									
33	05:21		05:48		19:21	12	18:53 (3) 18:08							
34	05:23		05:49		06:44									
35	05:25		05:50		19:19	6	18:50 (3) 18:05							
36	05:27		05:51		06:46									
37	05:29		05:52		19:16									
38	05:31		05:53		06:48									
39	05:33		05:54		19:14									
40	05:35		05:55		06:50									
41	05:37		05:56		19:11									
42	05:39		05:57		06:52									
43	05:41		05:58		19:09									
44	05:43		05:59		06:53									
45	05:45		06:00		19:06									
46	05:47		06:01		06:55									
47	05:49		06:02		19:04									
48	05:51		06:03		06:57									
49	05:53		06:04		19:01									
50	05:55		06:05		06:59									
51	05:57		06:06		18:51 (19) 16:45	11	18:02 (19) 16:48							
52	05:59		06:07		07:01									
53	06:01		06:08		18:56 (19) 16:43	15	18:04 (19) 16:45	8	15:01 (1) 15:53	34	15:17 (27) 15:49	26	13:56 (28)	
54	06:03		06:09		07:03									
55	06:05		06:10		18:54 (19) 16:43	17	18:05 (19) 16:43	16	15:05 (1) 15:52	32	15:16 (27) 15:50	25	13:56 (28)	
56	06:07		06:11		07:04									
57	06:09		06:12		18:51 (19) 16:41	19	18:06 (19) 16:41	20	15:08 (1) 15:51	30	15:15 (27) 15:51	25	13:56 (28)	
58	06:11		06:13		07:06									
59	06:13		06:14		18:49 (19) 16:39	20	18:06 (19) 16:39	23	15:09 (1) 15:51	28	15:15 (27) 15:52	28	13:57 (28)	
60	06:15		06:15											
61	06:17		06:16											
62	06:19		06:17											
63	06:21		06:18											
64	06:23		06:19											
65	06:25		06:20											
66	06:27		06:21											
67	06:29		06:22											
68	06:31		06:23											
69	06:33		06:24											
70	06:35		06:25											
71	06:37		06:26											
72	06:39		06:27											
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74	06:43		06:29											
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76	06:47		06:31											
77	06:49		06:32											
78	06:51		06:33											
79	06:53		06:34											
80	06:55		06:35											
81	06:57		06:36											
82	06:59		06:37											
83	07:01		06:38											
84	07:03		06:39											
85	07:05		06:40											
86	07:07		06:41											
87	07:09		06:42											
88	07:11		06:43											
89	07:13		06:44											
90	07:15		06:45											
91	07:17		06:46											
92	07:19		06:47											
93	07:21		06:48											
94	07:23		06:49											
95	07:25		06:50											
96	07:27		06:51											
97	07:29		06:52											
98	07:31		06:53											
99	07:33		06:54											
100	07:35		06:55											
101	07:37		06:56											
102	07:39		06:57											
103	07:41		06:58											
104	07:43		06:59											
105	07:45		07:00											
106	07:47		07:01											
107	07:49		07:02											
108	07:51		07:03											
109	07:53		07:04											
110	07:55		07:05											
111	07:57		07:06											
112	07:59		07:07											
113	08:01		07:08											
114	08:03		07:09											
115	08:05		07:10											
116	08:07		07:11											
117	08:09		07:12											
118	08:11		07:13											
119	08:13		07:14											
120	08:15		07:15											
121	08:17		07:16											
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123	08:21		07:18											
124	08:23		07:19				</							

Projekt:
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12/10/2015 15:53 / 79

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AL - IO38

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	13:37 (28) 07:57	15:11 (1) 06:59	16:43	18:46 (3) 05:33	19:58 (20) 04:42	20:43 (2)
2	15:54	29 15:11 (29) 16:46	53 16:05 (23) 17:43	19:42	23 19:09 (3) 20:39	11 20:09 (20) 21:29	7 20:50 (2)
3	08:28	13:37 (28) 07:55	15:11 (1) 06:56	16:40	18:45 (3) 05:31	19:57 (20) 04:41	20:42 (2)
4	15:57	30 15:12 (29) 16:48	54 16:06 (23) 17:45	19:44	23 19:08 (3) 20:40	13 20:10 (20) 21:31	10 20:52 (2)
5	08:27	13:40 (28) 07:54	15:11 (1) 06:54	16:38	18:46 (3) 05:29	19:56 (20) 04:40	20:41 (2)
6	15:57	31 15:14 (29) 16:50	54 16:06 (23) 17:47	19:46	22 19:08 (3) 20:42	16 20:12 (20) 21:32	13 20:54 (2)
7	08:27	13:40 (28) 07:52	15:12 (1) 06:52	16:35	18:46 (3) 05:26	19:55 (20) 04:40	20:40 (2)
8	15:58	31 15:15 (29) 16:52	53 16:06 (23) 17:49	19:48	20 19:06 (3) 20:44	18 20:13 (20) 21:33	14 20:54 (2)
9	08:27	13:41 (28) 07:50	15:12 (1) 06:49	16:33	18:47 (3) 05:24	19:55 (20) 04:39	20:39 (2)
10	15:59	31 15:16 (29) 16:54	52 16:06 (23) 17:51	19:50	19 19:06 (3) 20:46	19 20:15 (18) 21:34	16 20:55 (2)
11	08:27	13:42 (28) 07:48	15:12 (1) 06:47	16:30	18:47 (3) 05:22	19:54 (20) 04:38	20:38 (2)
12	16:00	30 15:17 (29) 16:56	50 16:05 (23) 17:53	10 17:23 (19) 19:52	17 19:04 (3) 20:48	22 20:17 (18) 21:35	17 20:56 (2)
13	08:26	13:45 (28) 07:46	15:12 (1) 06:45	16:28	17:11 (19) 19:50	18 18:49 (3) 20:50	20 20:58 (2)
14	16:02	28 15:18 (29) 16:58	48 16:04 (23) 17:55	14 17:25 (19) 19:54	13 19:02 (3) 20:50	24 20:18 (18) 21:36	19 20:57 (2)
15	08:26	13:47 (28) 07:44	15:13 (1) 06:42	16:26	17:09 (19) 19:54	18 18:52 (3) 20:51	20 20:58 (2)
16	16:03	25 15:19 (29) 17:00	45 16:03 (23) 17:57	17 17:26 (19) 19:55	7 18:59 (3) 20:51	26 20:20 (18) 21:37	20 20:58 (2)
17	08:25	13:48 (28) 07:42	15:14 (1) 06:40	16:23	17:08 (19) 19:53	19 19:55 (20) 04:36	20 20:58 (2)
18	16:05	18 15:20 (29) 17:03	39 16:01 (23) 17:59	19 17:27 (19) 19:57	20 20:22 (18) 21:38	21 20:58 (2)	21 20:58 (2)
19	08:24	13:49 (28) 07:40	15:15 (1) 06:37	16:21	17:07 (19) 19:52	18 19:56 (20) 04:36	20 20:58 (2)
20	16:06	20 15:21 (29) 17:05	28 15:43 (1) 18:00	20 17:27 (19) 19:59	20 20:25 (18) 21:39	21 20:59 (2)	21 20:59 (2)
21	08:24	13:50 (28) 07:38	15:16 (1) 06:35	16:18	17:07 (19) 19:56	19 19:56 (20) 04:35	20 20:58 (2)
22	16:08	24 15:21 (29) 17:07	27 15:43 (1) 18:02	20 17:27 (19) 20:01	20 20:25 (18) 21:40	22 21:00 (2)	22 21:00 (2)
23	08:23	13:51 (28) 07:36	15:18 (1) 06:32	16:16	17:06 (19) 19:54	19 19:57 (20) 04:35	20 20:58 (2)
24	16:09	25 15:22 (29) 17:09	24 15:42 (1) 18:04	20 17:28 (19) 20:03	20 20:26 (18) 21:41	22 20:59 (2)	22 20:59 (2)
25	08:22	13:52 (28) 07:34	15:20 (1) 06:30	16:14	17:06 (19) 19:52	19 19:58 (20) 04:34	20 20:58 (2)
26	16:11	28 15:23 (29) 17:11	20 15:40 (1) 18:06	20 17:29 (19) 20:05	21 20:27 (18) 21:42	23 21:01 (2)	23 21:01 (2)
27	08:21	13:53 (28) 07:32	15:21 (1) 06:27	16:11	17:06 (19) 19:51	19 19:57 (20) 04:34	20 20:58 (2)
28	16:13	30 15:24 (29) 17:13	16 15:37 (1) 18:08	19 17:25 (19) 20:07	21 20:28 (18) 21:43	23 21:02 (2)	23 21:02 (2)
29	08:20	13:54 (28) 07:30	15:22 (1) 06:25	16:09	17:07 (19) 19:50	18 19:58 (20) 04:34	20 20:58 (2)
30	16:14	33 15:25 (29) 17:15	7 15:33 (1) 18:10	18 17:25 (19) 20:09	21 20:29 (18) 21:43	23 21:02 (2)	23 21:02 (2)
31	08:19	13:55 (28) 07:28	15:23 (1) 06:23	16:06	17:07 (19) 19:50	19 19:58 (20) 04:34	20 20:58 (2)
1	16:16	35 15:26 (29) 17:17	18 15:34 (1) 18:12	16 17:23 (19) 20:10	21 20:30 (18) 21:44	24 21:03 (2)	24 21:03 (2)
2	08:18	13:56 (28) 07:26	15:24 (1) 06:21	16:04	17:09 (19) 19:50	18 19:59 (20) 04:34	20 20:58 (2)
3	16:18	39 15:27 (29) 17:19	18 15:35 (1) 18:14	12 17:24 (19) 20:12	21 20:31 (18) 21:45	24 21:04 (2)	24 21:04 (2)
4	08:17	13:57 (28) 07:24	15:25 (1) 06:19	16:02	17:12 (19) 19:50	19 19:59 (20) 04:33	20 20:58 (2)
5	16:19	39 15:28 (29) 17:21	18 15:36 (1) 18:16	5 17:17 (19) 20:14	21 20:32 (18) 21:46	24 21:05 (2)	24 21:05 (2)
6	08:16	13:58 (28) 07:22	15:26 (1) 06:17	16:01	17:10 (19) 19:50	18 19:59 (20) 04:33	20 20:58 (2)
7	16:21	39 15:29 (29) 17:23	18 15:37 (1) 18:18	20 17:18 (19) 20:16	21 20:33 (18) 21:47	24 21:06 (2)	24 21:06 (2)
8	08:15	13:59 (28) 07:21	15:27 (1) 06:15	16:00	17:08 (19) 19:50	19 19:59 (20) 04:34	20 20:58 (2)
9	16:23	39 15:30 (29) 17:25	18 15:38 (1) 18:20	20 17:19 (19) 20:18	21 20:34 (18) 21:48	24 21:07 (2)	24 21:07 (2)
10	08:14	14:00 (28) 07:19	15:28 (1) 06:13	16:00	17:07 (19) 19:50	19 19:59 (20) 04:34	20 20:58 (2)
11	16:25	39 15:31 (29) 17:27	18 15:39 (1) 18:22	20 17:20 (19) 20:20	21 20:35 (18) 21:49	24 21:08 (2)	24 21:08 (2)
12	08:12	14:01 (28) 07:17	15:29 (1) 06:11	16:00	17:06 (19) 19:50	19 19:59 (20) 04:34	20 20:58 (2)
13	16:27	37 15:32 (29) 17:29	18 15:40 (1) 18:23	20 17:21 (19) 20:22	21 20:36 (18) 21:50	24 21:09 (2)	24 21:09 (2)
14	08:11	14:02 (28) 07:15	15:30 (1) 06:09	16:00	17:05 (19) 19:50	19 19:59 (20) 04:34	20 20:58 (2)
15	16:29	36 15:33 (29) 17:31	18 15:41 (1) 18:25	20 17:22 (19) 20:24	21 20:37 (18) 21:51	24 21:10 (2)	24 21:10 (2)
16	08:10	14:03 (28) 07:13	15:31 (1) 06:07	16:00	17:04 (19) 19:50	19 19:59 (20) 04:34	20 20:58 (2)
17	16:31	38 15:34 (29) 17:33	18 15:42 (1) 18:27	20 17:23 (19) 20:26	21 20:38 (18) 21:52	24 21:11 (2)	24 21:11 (2)
18	08:08	14:04 (28) 07:11	15:32 (1) 06:05	16:00	17:03 (19) 19:50	19 19:59 (20) 04:35	20 20:59 (2)
19	16:32	42 15:35 (29) 17:35	18 15:43 (1) 18:29	4 18:01 (3) 20:27	21 20:39 (18) 21:53	24 21:12 (2)	24 21:12 (2)
20	08:07	14:05 (28) 07:09	15:33 (1) 06:03	16:00	17:02 (19) 19:50	19 19:59 (20) 04:35	20 20:59 (2)
21	16:34	45 15:36 (29) 17:37	18 15:44 (1) 18:31	11 18:04 (3) 20:29	21 20:40 (18) 21:54	24 21:13 (2)	24 21:13 (2)
22	08:05	14:06 (28) 07:07	15:34 (1) 06:01	16:00	17:01 (19) 19:50	19 19:59 (20) 04:36	20 20:59 (2)
23	16:36	47 15:37 (29) 17:39	18 15:45 (1) 18:33	15 18:06 (3) 20:31	21 20:41 (18) 21:55	24 21:14 (2)	24 21:14 (2)
24	08:04	14:07 (28) 07:05	15:35 (1) 06:00	16:00	17:00 (19) 19:50	19 19:59 (20) 04:37	20 20:59 (2)
25	16:38	49 15:38 (29) 17:41	18 15:46 (1) 18:35	18 18:07 (3) 20:33	20 20:42 (18) 21:56	24 21:15 (2)	24 21:15 (2)
26	08:02	14:08 (28) 07:03	15:36 (1) 05:58	16:00	16:59 (19) 19:50	19 19:59 (20) 04:37	20 20:59 (2)
27	16:40	51 15:39 (29) 17:43	18 15:47 (1) 18:37	20 18:08 (3) 20:35	3 20:05 (20) 21:26	24 21:16 (2)	24 21:16 (2)
28	08:00	14:09 (28) 07:01	15:37 (1) 05:56	16:00	16:58 (19) 19:50	19 19:59 (20) 04:37	20 20:59 (2)
29	16:42	53 15:40 (29) 17:45	18 15:48 (1) 18:39	22 18:09 (3) 20:37	8 20:07 (20) 21:27	24 21:17 (2)	24 21:17 (2)
30	07:59	14:10 (28) 06:59	15:38 (1) 05:54	16:00	16:57 (19) 19:50	19 19:59 (20) 04:38	20 20:59 (2)
31	16:44	53 15:41 (29) 17:47	18 15:49 (1) 18:41	23 18:10 (3) 20:39	21 20:43 (18) 21:57	24 21:18 (2)	24 21:18 (2)
Sonnenscheinstunden	248	272	367	421	496	512	
astr.max.mögl.Beschattung	1094	570	323	155	329	630	
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.68	0.69	0.68	0.67	0.63	0.61	
Gesamte Reduktion	0.11	0.15	0.19	0.25	0.30	0.25	
Met.wahrsch.Beschattung	118	85	63	39	97	160	

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 80
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AL - IO38

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	20:42 (2) 05:19	20:07 (20) 06:14				
2	21:44	21:04 (2) 21:09	20:36 (18) 20:01	18:46	17:46 (19) 07:07	14:45 (1) 08:03	
3	04:39	20:42 (2) 05:20	20:06 (20) 06:16	18:46	17:46 (19) 07:09	14:44 (1) 08:05	
4	21:44	21:03 (2) 21:07	20:35 (18) 19:59	18:44	17:45 (19) 07:11	14:43 (1) 08:06	
5	04:40	20:43 (2) 05:22	20:06 (20) 06:17	18:41	17:45 (19) 07:11	14:43 (1) 08:06	
6	21:44	21:03 (2) 21:05	20:33 (18) 19:56	18:41	17:45 (19) 07:13	14:42 (1) 08:08	
7	04:40	20:43 (2) 05:24	20:05 (20) 06:19	18:49 (3) 07:14	17:45 (19) 07:13	14:42 (1) 08:08	
8	21:43	21:03 (2) 21:03	20:31 (18) 19:54	18:56 (3) 18:39	17:45 (19) 07:15	14:42 (1) 08:09	
9	04:41	20:44 (2) 05:25	20:05 (20) 06:21	18:45 (3) 07:15	17:45 (19) 07:15	14:42 (1) 08:09	
10	21:43	21:03 (2) 21:01	20:30 (18) 19:51	18:58 (3) 18:37	18:43 (3) 18:27	14:42 (1) 08:14	
11	04:42	20:45 (2) 05:27	20:05 (20) 06:23	18:43 (3) 07:17	17:46 (19) 07:17	14:42 (1) 08:10	
12	21:42	21:03 (2) 20:59	20:28 (18) 19:49	19:00 (3) 18:34	16:18 (02) 16:25	15:36 (23) 15:46	
13	04:43	20:46 (2) 05:29	20:04 (20) 06:25	18:42 (3) 07:19	17:48 (19) 07:19	14:42 (1) 08:12	
14	21:41	21:03 (2) 20:57	20:26 (18) 19:46	19:01 (3) 18:32	12:18 (00) 16:23	15:36 (23) 15:46	
15	04:44	20:47 (2) 05:31	20:04 (20) 06:26	18:41 (3) 07:21	17:50 (19) 07:21	14:42 (1) 08:13	
16	21:41	21:02 (2) 20:55	20:24 (18) 19:44	19:01 (3) 18:29	7:17 (57) 16:21	15:36 (23) 15:45	
17	04:45	20:48 (2) 05:33	20:05 (20) 06:28	18:39 (3) 07:23	17:48 (19) 07:23	14:42 (1) 08:14	
18	21:40	21:01 (2) 20:53	20:22 (20) 19:41	19:01 (3) 18:27	16:20	15:36 (23) 15:45	
19	04:46	20:49 (2) 05:34	20:05 (20) 06:30	18:39 (3) 07:25	17:48 (19) 07:25	14:42 (1) 08:16	
20	21:39	21:00 (2) 20:51	20:20 (20) 19:39	19:01 (3) 18:24	16:18	15:36 (23) 15:45	
21	04:48	20:51 (2) 05:36	20:06 (20) 06:32	18:39 (3) 07:27	17:48 (19) 07:27	14:43 (1) 08:17	
22	21:38	20:59 (2) 20:49	20:18 (20) 19:36	19:01 (3) 18:22	16:16	15:37 (23) 15:44	
23	04:49	20:54 (2) 05:38	20:07 (20) 06:34	18:38 (3) 07:28	17:49 (19) 07:29	14:43 (1) 08:18	
24	21:37	20:56 (2) 20:47	20:17 (20) 19:34	19:01 (3) 18:20	16:14	15:37 (23) 15:44	
25	04:50	20:57 (2) 05:40	20:07 (20) 06:35	18:38 (3) 07:30	17:31	14:43 (1) 08:19	
26	21:36	20:45	7:20:14 (20) 19:31	21:18:59 (3) 18:17	16:13	15:36 (23) 15:44	
27	04:51	20:45	20:11 (20) 06:37	18:38 (3) 07:32	17:33	14:44 (1) 08:20	
28	21:35	20:43	1:20:12 (20) 19:29	21:18:59 (3) 18:15	16:11	15:36 (23) 15:44	
29	04:53	20:43	06:39	18:39 (3) 07:34	17:35	14:44 (1) 08:21	
30	21:34	20:40	19:26	19:18:58 (3) 18:12	16:09	15:35 (23) 15:44	
31	04:54	20:40	06:41	18:40 (3) 07:36	17:36	14:43 (23) 08:22	
32	21:33	20:38	19:24	18:56 (3) 18:10	16:08	14:43 (23) 15:44	
33	04:55	20:38	06:43	18:40 (3) 07:38	17:38	14:42 (29) 08:23	
34	21:32	20:36	19:21	18:53 (3) 18:08	16:06	15:32 (23) 15:44	
35	04:57	20:36	06:44	18:43 (3) 07:40	17:40	14:41 (29) 08:23	
36	21:30	20:34	19:19	18:50 (3) 18:05	16:05	15:29 (23) 15:45	
37	04:58	20:34	06:46	18:46 (3) 07:42	17:42	14:41 (29) 08:24	
38	21:29	20:31	19:16	18:03	16:03	15:17 (27) 15:45	
39	04:59	20:32	06:48	17:54	17:44	14:41 (29) 08:25	
40	21:28	20:29	19:14	18:01	16:02	15:18 (27) 15:45	
41	05:01	20:27	06:50	17:46	17:46	14:41 (29) 08:25	
42	21:26	20:27	19:11	17:59	16:01	15:19 (27) 15:46	
43	05:02	20:25	06:52	17:48	17:48	14:42 (29) 08:26	
44	21:25	20:25	19:09	17:56	15:59	15:20 (27) 15:46	
45	05:04	20:24	06:53	17:50	17:49	14:41 (29) 08:26	
46	21:23	20:22	19:06	17:54	15:58	15:20 (27) 15:46	
47	05:06	20:22	06:55	17:51	17:51	14:41 (29) 08:27	
48	21:22	20:20	19:04	17:52	15:57	15:20 (27) 15:47	
49	05:07	20:18	06:57	17:53	17:53	14:41 (29) 08:27	
50	21:20	20:18	19:01	17:50	15:56	15:20 (27) 15:48	
51	05:09	20:16	06:59	17:52 (19) 06:55	17:55	14:42 (29) 08:28	
52	21:19	20:15	18:59	18:02 (19) 16:48	15:54	15:18 (27) 15:48	
53	05:10	20:15	07:01	17:50 (19) 06:57	17:54	14:42 (29) 08:28	
54	21:17	20:25 (18) 06:05	18:56	14:18:04 (19) 16:45	10:15:04 (1) 15:53	15:17 (27) 15:49	
55	05:12	20:23 (18) 06:07	07:03	17:48 (19) 06:59	14:50 (1) 07:58	14:43 (29) 08:28	
56	21:15	20:33 (18) 20:11	18:54	17:18:05 (19) 16:43	17:15:07 (1) 15:52	15:16 (27) 15:50	
57	05:14	20:34 (18) 20:08	07:04	17:47 (19) 07:01	14:49 (1) 08:00	14:44 (29) 08:28	
58	21:14	20:34 (18) 20:08	18:51	19:18:06 (19) 16:41	21:15:10 (1) 15:51	15:15 (27) 15:51	
59	05:15	20:34 (18) 20:06	07:06	17:46 (19) 07:03	14:47 (1) 08:01	14:45 (29) 08:28	
60	21:12	20:34 (18) 20:06	18:49	20:18:06 (19) 16:39	24:15:11 (1) 15:51	15:15 (27) 15:52	
61	05:17	20:34 (18) 20:06	07:05	17:46 (19) 07:05	14:46 (1) 08:01	14:46 (1) 08:28	
62	21:10	20:35 (18) 20:03	19:01	16:37	26:15:12 (1) 15:53	15:53	
63	Sonnenscheinstunden	514	461	383	328	257	231
64	astr.max.mögl.Beschattung	263	263	342	230	1274	826
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.62	0.64	0.68	0.68	0.68	0.65
68	Gesamte Reduktion	0.25	0.28	0.25	0.21	0.13	0.08
69	Met.wahrsch.Beschattung	66	74	85	47	166	68

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 81
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AM - IO39

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1.017 1.220 930 354 7.936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	13:50 (28) 07:57	15:21 (1) 06:59	06:43	18:46 (3) 05:33	19:52 (20) 04:42	20:27 (2)	
2	08:28	14:16 (28) 16:46	49 16:10 (23) 17:43	19:42	21 19:07 (3) 20:39	17 20:09 (20) 21:29	23 20:50 (2)	
3	08:28	13:51 (28) 07:54	49 15:21 (1) 06:54	06:38	18 18:46 (3) 05:29	19 19:51 (20) 04:40	20 20:28 (2)	
4	08:27	13:52 (28) 07:52	49 15:22 (1) 06:52	06:35	19 19:05 (3) 20:42	21 20:12 (18) 21:32	24 20:52 (2)	
5	08:27	13:53 (28) 07:50	49 15:22 (1) 06:49	06:33	18 18:48 (3) 05:24	23 20:14 (18) 21:33	25 20:52 (2)	
6	08:27	13:54 (28) 07:48	49 15:21 (1) 06:47	06:30	14 18:48 (3) 05:24	24 20:15 (18) 21:34	26 20:52 (2)	
7	08:26	13:56 (28) 07:46	49 15:21 (1) 06:45	17:14 (19) 06:30	10 18:59 (3) 20:48	26 20:17 (18) 21:35	26 20:53 (2)	
8	08:26	13:57 (28) 07:44	49 15:22 (1) 06:42	17:12 (19) 06:28	05:20	19 19:52 (20) 04:37	20 20:27 (2)	
9	08:25	13:58 (28) 07:42	46 16:09 (23) 17:57	17:10 (19) 06:26	20 20:18 (18) 21:36	26 20:53 (2)		
10	08:24	14:00 (28) 07:40	46 16:09 (23) 17:57	17:08 (19) 06:24	05:18	19 19:53 (20) 04:37	20 20:27 (2)	
11	08:24	14:02 (28) 07:38	36 16:06 (23) 18:00	17:07 (19) 06:22	20 20:18 (18) 21:39	27 20:54 (2)		
12	08:23	14:04 (28) 07:36	36 16:06 (23) 18:00	17:05 (19) 06:20	05:16	20 20:18 (18) 21:40	27 20:54 (2)	
13	08:22	14:06 (28) 07:34	25 15:21 (1) 06:35	20 17:08 (19) 06:18	11 20:19 (18) 21:40	27 20:54 (2)		
14	08:21	14:08 (28) 07:32	25 15:21 (1) 06:33	19 17:07 (19) 06:16	10 20:19 (18) 21:41	27 20:54 (2)		
15	08:20	14:10 (28) 07:30	23 15:20 (1) 06:31	18 17:06 (19) 06:14	7 20:17 (18) 21:41	27 20:54 (2)		
16	08:19	14:12 (28) 07:28	19 15:19 (1) 06:29	18 17:05 (19) 06:12	05:07	04 20:16 (18) 21:42	27 20:54 (2)	
17	08:18	14:14 (28) 07:26	14 15:18 (1) 06:27	16 17:04 (19) 06:10	21:02	21 20:15 (18) 21:43	28 20:54 (2)	
18	08:17	14:16 (28) 07:24	14 15:17 (1) 06:25	16 17:03 (19) 06:08	05:06	04 20:14 (18) 21:44	28 20:54 (2)	
19	08:16	14:18 (28) 07:22	14 15:16 (1) 06:23	16 17:02 (19) 06:06	05:05	04 20:13 (18) 21:45	28 20:54 (2)	
20	08:15	14:20 (28) 07:20	5 15:15 (1) 06:21	13 17:01 (19) 06:04	05:04	04 20:12 (18) 21:46	28 20:54 (2)	
21	08:14	14:22 (28) 07:18	06:20	13 17:00 (19) 06:02	05:03	04 20:11 (18) 21:47	28 20:54 (2)	
22	08:12	14:24 (28) 07:16	06:19	7 17:20 (19) 20:12	21:07	04 20:10 (18) 21:48	28 20:54 (2)	
23	08:11	14:26 (28) 07:14	06:18	06:18	05:01	04 20:09 (18) 21:49	28 20:54 (2)	
24	08:10	14:28 (28) 07:12	06:17	06:17	05:00	04 20:08 (18) 21:50	28 20:54 (2)	
25	08:08	14:30 (28) 07:10	06:16	06:16	04:59	04 20:07 (18) 21:51	28 20:54 (2)	
26	08:07	14:32 (28) 07:08	06:15	06:15	04:58	04 20:06 (18) 21:52	28 20:54 (2)	
27	08:05	14:34 (28) 07:06	06:14	06:14	04:57	04 20:05 (18) 21:53	28 20:54 (2)	
28	08:04	14:36 (28) 07:04	06:13	06:13	04:56	04 20:04 (18) 21:54	28 20:54 (2)	
29	08:02	14:38 (28) 07:02	06:12	06:12	04:55	04 20:03 (18) 21:55	28 20:54 (2)	
30	08:00	14:40 (28) 07:00	06:11	06:11	04:54	04 20:02 (18) 21:56	28 20:54 (2)	
31	07:59	14:42 (28) 06:58	06:10	06:10	04:53	04 20:01 (18) 21:57	28 20:54 (2)	
	16:44	48 16:09 (23)	19:40	21 19:07 (3)	21:28	22 20:50 (2)		
	Sonnenscheinstunden 248	272	367	421	496	512	802	
	astr.max.mögl.Beschattung	981	580	314	146	378	802	
	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45	
	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
	Reduktion Windrichtung	0.68	0.69	0.68	0.66	0.63	0.62	
	Gesamte Reduktion	0.11	0.15	0.19	0.25	0.29	0.26	
	Met.wahrsch.Beschattung	106	88	61	36	111	206	

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 82
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AM - IO39

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember		
1	04:38	20:32 (2) 05:19	20:19 (18) 06:14	07:08	17:48 (19) 07:07	14:53 (1) 08:03	13:44 (28)	
2	21:44	20:59 (2) 21:09	11 20:30 (18) 20:01	18:46	19 18:07 (19) 16:35	38 15:36 (23) 15:50	25 15:07 (29)	
3	04:39	20:32 (2) 05:20	20:18 (18) 06:16	07:10	17:47 (19) 07:09	14:52 (3) 08:05	13:43 (28)	
4	21:44	20:58 (2) 21:07	12 20:30 (18) 19:59	18:44	20 18:07 (19) 16:33	43 15:38 (23) 15:49	27 15:07 (29)	
5	04:40	20:32 (2) 05:22	20:06 (20) 06:17	07:12	17:46 (19) 07:11	14:52 (1) 08:06	13:42 (28)	
6	21:44	20:59 (2) 21:05	21 20:31 (18) 19:56	18:41	20 18:06 (19) 16:31	46 15:39 (23) 15:48	28 15:07 (29)	
7	04:40	20:33 (2) 05:24	20:03 (20) 06:19	07:14	17:46 (19) 07:13	14:51 (1) 08:08	13:41 (28)	
8	21:43	20:59 (2) 21:03	26 20:31 (18) 19:54	18:39	19 18:05 (19) 16:29	48 15:39 (23) 15:47	29 15:06 (29)	
9	04:41	20:33 (2) 05:25	20:03 (20) 06:21	07:15	17:47 (19) 07:15	14:52 (1) 08:09	13:41 (28)	
10	21:43	20:59 (2) 21:01	26 20:30 (18) 19:51	18:37	17 18:04 (19) 16:27	49 15:41 (23) 15:47	29 15:06 (29)	
11	04:42	20:33 (2) 05:27	20:02 (20) 06:23	18 18:45 (3) 07:17	17 18:04 (19) 16:27	50 15:41 (23) 15:47	29 15:06 (29)	
12	21:42	20:59 (2) 20:59	26 20:28 (18) 19:49	10 18:55 (3) 18:34	15 18:03 (19) 16:25	50 15:41 (23) 15:46	28 15:05 (29)	
13	04:43	20:34 (2) 05:29	20:01 (20) 06:25	18 18:43 (3) 07:19	17 18:03 (19) 16:25	14:51 (1) 08:12	13:40 (28)	
14	21:41	20:59 (2) 20:57	25 20:26 (18) 19:46	14 18:57 (3) 18:32	12 18:01 (19) 16:23	50 15:41 (23) 15:46	23 14:03 (28)	
15	04:44	20:34 (2) 05:31	20:01 (20) 06:26	18 18:42 (3) 07:21	17 18:01 (19) 16:23	14:51 (1) 08:13	13:40 (28)	
16	21:41	20:59 (2) 20:55	23 20:24 (18) 19:44	17 18:59 (3) 18:29	7 17:58 (19) 16:21	50 15:41 (23) 15:45	24 14:04 (28)	
17	04:45	20:35 (2) 05:33	20:01 (20) 06:28	18 18:40 (3) 07:23	17 18:00 (19) 16:21	14:51 (1) 08:14	13:40 (28)	
18	21:40	20:59 (2) 20:53	22 20:23 (18) 19:41	19 18:59 (3) 18:27	16 16:20	50 15:41 (23) 15:45	25 14:05 (28)	
19	04:46	20:35 (2) 05:34	20:00 (20) 06:30	18 18:39 (3) 07:25	17 17:59 (19) 16:21	14:52 (1) 08:16	13:40 (28)	
20	21:39	20:59 (2) 20:51	19 20:20 (18) 19:39	20 18:59 (3) 18:24	16 16:18	49 15:41 (23) 15:45	26 14:06 (28)	
21	04:48	20:36 (2) 05:36	20:00 (20) 06:32	18 18:38 (3) 07:27	17 17:58 (19) 16:21	14:53 (1) 08:17	13:40 (28)	
22	21:38	20:59 (2) 20:49	18 20:18 (20) 19:36	21 18:59 (3) 18:22	16 16:16	48 15:41 (23) 15:44	26 14:06 (28)	
23	04:49	20:36 (2) 05:38	20:00 (20) 06:34	18 18:38 (3) 07:28	17 17:57 (19) 16:21	14:53 (1) 08:18	13:40 (28)	
24	21:37	20:58 (2) 20:47	17 20:17 (20) 19:34	21 18:59 (3) 18:20	16 16:14	47 15:40 (23) 15:44	27 14:07 (28)	
25	04:50	20:37 (2) 05:40	20:00 (20) 06:35	18 18:37 (3) 07:30	17 17:56 (19) 16:20	14:52 (1) 08:19	13:40 (28)	
26	21:36	20:58 (2) 20:45	14 20:14 (20) 19:31	21 18:58 (3) 18:17	16 16:13	45 15:39 (23) 15:44	28 14:08 (28)	
27	04:51	20:37 (2) 05:41	20:01 (20) 06:37	18 18:37 (3) 07:32	17 17:55 (19) 16:20	14:50 (29) 08:20	13:40 (28)	
28	21:35	20:57 (2) 20:43	11 20:12 (20) 19:29	21 18:58 (3) 18:15	16 16:11	43 15:37 (23) 15:44	28 14:08 (28)	
29	04:53	20:38 (2) 05:43	20:02 (20) 06:39	18 18:37 (3) 07:34	17 17:54 (19) 16:20	14:49 (29) 08:21	13:40 (28)	
30	21:34	20:56 (2) 20:40	9 20:11 (20) 19:26	20 18:57 (3) 18:12	16 16:09	41 15:36 (23) 15:44	29 14:09 (28)	
31	04:54	20:39 (2) 05:45	20:03 (20) 06:41	18 18:36 (3) 07:36	17 17:53 (19) 16:20	14:48 (29) 08:22	13:41 (28)	
1	21:33	20:56 (2) 20:38	5 20:08 (20) 19:24	18 18:56 (3) 18:10	16 16:08	34 15:33 (23) 15:44	29 14:10 (28)	
2	04:55	20:40 (2) 05:47	06:43	18 18:38 (3) 07:38	17 17:52 (19) 16:20	14:47 (29) 08:23	13:41 (28)	
3	21:32	20:55 (2) 20:36	19:21	15 18:53 (3) 18:08	16 16:06	33 15:20 (21) 15:44	29 14:10 (28)	
4	04:57	20:41 (2) 05:49	06:44	18 18:40 (3) 07:40	17 17:50 (19) 16:20	14:47 (29) 08:23	13:42 (28)	
5	21:30	20:54 (2) 20:34	19:19	10 18:50 (3) 18:05	16 16:05	34 15:21 (21) 15:45	29 14:11 (28)	
6	04:58	20:43 (2) 05:50	06:46	18 18:43 (3) 07:42	17 17:49 (19) 16:20	14:46 (29) 08:24	13:41 (28)	
7	21:29	20:52 (2) 20:31	19:16	5 18:48 (3) 18:03	16 16:03	36 15:22 (21) 15:45	30 14:11 (28)	
8	04:59	20:42 (2) 05:52	06:48	07:44	17 17:48 (19) 16:20	14:46 (29) 08:25	13:42 (28)	
9	21:28	20:29	19:14	18:01	16 16:02	37 15:23 (21) 15:45	30 14:12 (28)	
10	05:01	05:54	06:50	07:46	17 17:46	36 14:46 (29) 08:25	13:43 (28)	
11	21:26	20:27	19:11	17:59	16 16:01	37 15:23 (21) 15:46	30 14:13 (28)	
12	05:02	05:56	06:52	07:48	17 17:48	36 14:46 (29) 08:26	13:43 (28)	
13	21:25	20:25	19:09	17:56	16 16:00	37 15:23 (21) 15:46	30 14:13 (28)	
14	05:04	05:58	06:53	07:50	17 17:49	36 14:47 (29) 08:26	13:44 (28)	
15	21:23	20:22	19:06	17:54	16 16:00	34 15:22 (21) 15:46	30 14:14 (28)	
16	05:06	05:59	06:55	07:51	17 17:49	36 14:47 (29) 08:27	13:44 (28)	
17	21:22	20:20	19:04	17:52	16 16:00	34 15:21 (21) 15:47	30 14:14 (28)	
18	05:07	06:01	06:57	06:53	17 17:53	34 14:48 (29) 08:27	13:44 (28)	
19	21:20	20:18	19:01	16:50	16 16:00	32 15:20 (21) 15:48	30 14:14 (28)	
20	05:09	06:03	06:59	06:55	17 17:56 (19) 07:55	32 15:20 (21) 15:48	30 14:14 (28)	
21	21:19	20:15	18:59	4 18:00 (19) 16:48	8 15:12 (1) 15:54	29 15:18 (27) 15:48	29 14:14 (28)	
22	05:10	06:05	07:01	12 17:52 (19) 06:57	15 15:00 (1) 07:56	26 14:49 (29) 08:28	13:45 (28)	
23	21:17	20:13	18:56	2 18:04 (19) 16:45	15 15:15 (1) 15:53	29 15:17 (27) 15:49	30 14:15 (28)	
24	05:12	06:07	07:02	17 17:51 (19) 06:59	14 14:57 (1) 07:58	26 14:50 (29) 08:28	13:46 (28)	
25	21:15	20:11	18:54	14 18:05 (19) 16:43	20 15:17 (1) 15:52	23 15:16 (27) 15:50	29 14:15 (28)	
26	05:14	06:08	07:04	17 17:49 (19) 07:01	14 14:57 (1) 08:00	20 14:51 (29) 08:28	13:47 (28)	
27	21:14	20:08	18:51	17 18:06 (19) 16:41	23 15:20 (1) 15:51	20 15:15 (27) 15:51	28 14:15 (28)	
28	05:15	06:10	07:06	19 17:48 (19) 07:03	26 14:55 (1) 08:01	18 14:52 (29) 08:28	13:47 (28)	
29	21:12	20:25 (18) 20:06	18:49	19 18:07 (19) 16:39	26 15:21 (1) 15:51	18 15:15 (27) 15:52	29 14:16 (28)	
30	05:17	20:20 (18) 06:12		07:05	14 14:54 (1)	08:28	13:48 (28)	
31	21:10	8 20:28 (18) 20:03		16:37	27 15:21 (1)	15:53	28 14:16 (28)	
	Sonnenscheinstunden	514	461	383	328	257	231	
	astr.max.mögl.Beschattung	426	285	298	248	1161	872	
	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14	
	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	
	Reduktion Windrichtung	0.62	0.64	0.68	0.68	0.69	0.66	
	Gesamte Reduktion	0.25	0.28	0.25	0.21	0.13	0.08	
	Met.wahrsch.Beschattung	107	80	74	51	152	73	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 83
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AN - IO40

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	14:00 (28) 07:57	15:33 (1) 06:59	06:43	18:49 (3) 05:33	19:53 (20) 04:42	20:27 (2)	
2	15:54	32 14:32 (28) 16:46	40 16:14 (23) 17:43	19:42	21 19:10 (3) 20:39	16 20:09 (20) 21:29	23 20:50 (2)	
3	08:28	14:00 (28) 07:55	15:33 (1) 06:56	06:40	18:49 (3) 05:31	19:53 (20) 04:41	20:28 (2)	
4	15:57	31 14:31 (28) 16:48	43 16:16 (23) 17:45	19:44	20 19:09 (3) 20:40	17 20:10 (20) 21:31	23 20:51 (2)	
5	08:27	14:01 (28) 07:54	15:32 (1) 06:54	06:38	18:49 (3) 05:29	19:53 (20) 04:40	20:27 (2)	
6	15:57	31 14:32 (28) 16:50	44 16:16 (23) 17:47	19:46	20 19:09 (3) 20:42	17 20:10 (20) 21:32	25 20:52 (2)	
7	08:27	14:02 (28) 07:52	15:32 (1) 06:52	06:35	18:49 (3) 05:26	19:53 (20) 04:40	20:27 (2)	
8	15:58	31 14:33 (28) 16:52	45 16:17 (23) 17:49	19:48	19 19:08 (3) 20:44	17 20:10 (20) 21:33	25 20:52 (2)	
9	08:27	14:02 (28) 07:50	15:33 (1) 06:49	06:33	18:50 (3) 05:24	19:53 (20) 04:39	20:27 (2)	
10	15:59	30 14:32 (28) 16:54	45 16:18 (23) 17:51	19:50	17 19:07 (3) 20:46	16 20:09 (20) 21:34	25 20:52 (2)	
11	08:27	14:03 (28) 07:48	15:31 (1) 06:47	06:30	18:51 (3) 05:22	19:53 (20) 04:38	20:27 (2)	
12	16:00	29 14:32 (28) 16:56	47 16:18 (23) 17:53	19:52	13 19:04 (3) 20:48	15 20:08 (20) 21:35	26 20:53 (2)	
13	08:26	14:04 (28) 07:46	15:31 (1) 06:45	06:28	18:53 (3) 05:20	19:53 (20) 04:37	20:27 (2)	
14	16:02	29 14:33 (28) 16:58	47 16:18 (23) 17:55	19:54	9 19:02 (3) 20:50	14 20:07 (20) 21:36	26 20:53 (2)	
15	08:26	14:05 (28) 07:44	15:32 (1) 06:42	06:26	17:18 (19) 06:26	19:54 (20) 04:37	20:27 (2)	
16	16:03	27 14:32 (28) 17:00	45 16:17 (23) 17:57	11 17:29 (19) 19:55	20:51	12 20:06 (20) 21:37	26 20:53 (2)	
17	08:25	14:06 (28) 07:42	15:32 (1) 06:40	06:24	17:17 (19) 06:23	19:56 (20) 04:36	20:27 (2)	
18	16:05	26 14:32 (28) 17:03	45 16:17 (23) 17:59	14 17:31 (19) 19:57	20:53	10 20:06 (20) 21:38	26 20:53 (2)	
19	08:24	14:06 (28) 07:40	15:32 (1) 06:37	06:21	17:15 (19) 06:21	19:58 (20) 04:36	20:27 (2)	
20	16:06	26 14:32 (28) 17:05	45 16:17 (23) 18:00	16 17:31 (19) 19:59	20:55	5 20:03 (20) 21:39	27 20:54 (2)	
21	08:24	14:07 (28) 07:38	15:33 (1) 06:35	06:18	17:14 (19) 06:18	19:53 (20) 04:35	20:28 (2)	
22	16:08	29 15:27 (29) 17:07	43 16:16 (23) 18:02	18 17:32 (19) 20:01	20:57	21:40	26 20:54 (2)	
23	08:23	14:09 (28) 07:36	15:34 (1) 06:32	06:16	17:13 (19) 06:16	19:54 (20) 04:35	20:27 (2)	
24	16:09	31 15:29 (29) 17:09	39 16:14 (23) 18:04	19 17:32 (19) 20:03	20:58	21:41	27 20:54 (2)	
25	08:22	14:10 (28) 07:34	15:34 (1) 06:30	06:14	17:13 (19) 06:14	19:56 (20) 04:34	20:28 (2)	
26	16:11	32 15:31 (29) 17:11	32 16:11 (23) 18:06	19 17:32 (19) 20:05	21:00	21:41	26 20:54 (2)	
27	08:21	14:12 (28) 07:32	15:34 (1) 06:27	06:11	17:13 (19) 06:11	19:57 (20) 04:34	20:28 (2)	
28	16:13	31 15:32 (29) 17:13	27 16:01 (1) 18:08	18 17:31 (19) 20:07	21:02	21:42	27 20:55 (2)	
29	08:20	14:14 (28) 07:30	15:36 (1) 06:25	06:09	17:13 (19) 06:09	19:56 (20) 04:34	20:28 (2)	
30	16:14	30 15:34 (29) 17:15	24 16:00 (1) 18:10	18 17:31 (19) 20:09	21:04	21:43	27 20:55 (2)	
31	08:19	14:17 (28) 07:28	15:37 (1) 06:23	06:04	17:13 (19) 06:06	19:56 (20) 04:34	20:29 (2)	
32	16:16	28 15:40 (27) 17:17	15:59 (1) 18:12	17 17:30 (19) 20:10	21:05	21:43	26 20:55 (2)	
33	08:18	15:19 (29) 07:26	15:39 (1) 06:20	06:04	17:15 (19) 06:04	19:58 (20) 04:34	20:29 (2)	
34	16:18	22 15:43 (27) 17:19	15:58 (1) 18:14	14 17:29 (19) 20:12	21:07	21:44	27 20:56 (2)	
35	08:17	15:18 (29) 07:24	15:41 (1) 06:18	06:02	17:16 (19) 06:02	19:57 (20) 04:33	20:29 (2)	
36	16:19	25 15:44 (27) 17:21	15:55 (1) 18:16	10 17:26 (19) 20:14	21:09	21:44	27 20:56 (2)	
37	08:16	15:18 (29) 07:22	15:47 (1) 06:15	06:01	17:20 (19) 05:59	19:58 (20) 04:33	20:29 (2)	
38	16:21	28 15:46 (27) 17:23	3 15:50 (1) 18:18	2 17:22 (19) 20:16	21:11	21:44	27 20:56 (2)	
39	08:15	15:18 (29) 07:19	18:20	05:57	17:18 (19) 05:57	19:58 (20) 04:34	20:29 (2)	
40	16:23	30 15:48 (27) 17:25	18:20	05:57	21:12	21:45	27 20:56 (2)	
41	08:14	15:18 (29) 07:17	06:10	05:55	04:56	04:34	20:29 (2)	
42	16:25	32 15:50 (27) 17:27	18:22	05:55	21:14	21:45	27 20:56 (2)	
43	08:12	15:18 (29) 07:15	06:08	05:52	04:55	04:34	20:29 (2)	
44	16:27	34 15:52 (27) 17:29	18:23	05:52	21:15	21:45	27 20:56 (2)	
45	08:11	15:19 (29) 07:13	06:05	05:50	04:53	04:34	20:30 (2)	
46	16:29	35 15:54 (27) 17:31	18:25	05:48	21:17	5 20:41 (2) 21:45	27 20:57 (2)	
47	08:10	15:19 (29) 07:10	06:03	05:48	04:52	20:32 (2) 04:34	20:30 (2)	
48	16:31	34 15:53 (27) 17:33	18:27	05:46	21:18	11 20:43 (2) 21:46	27 20:57 (2)	
49	08:08	15:20 (29) 07:08	06:00	05:46	04:50	20:31 (2) 04:35	20:30 (2)	
50	16:32	34 15:54 (27) 17:35	18:29	05:46	21:20	14 20:45 (2) 21:46	27 20:57 (2)	
51	08:07	15:20 (29) 07:06	05:58	05:43	04:49	20:30 (2) 04:35	20:31 (2)	
52	16:34	33 15:53 (27) 17:37	18:31	8 18:04 (3) 20:29	21:21	16 20:46 (2) 21:46	27 20:58 (2)	
53	08:05	15:20 (29) 07:03	05:55	17:54 (3) 05:41	19:58 (20) 04:48	20:29 (2) 04:36	20:31 (2)	
54	16:36	33 15:53 (1) 17:39	18:33	12 18:06 (3) 20:31	4 20:02 (20) 21:23	18 20:47 (2) 21:45	26 20:57 (2)	
55	08:04	15:22 (29) 07:01	05:53	17:52 (3) 05:39	19:56 (20) 04:47	20:29 (2) 04:36	20:31 (2)	
56	16:38	34 15:56 (1) 17:41	18:35	15 18:07 (3) 20:33	8 20:04 (20) 21:24	19 20:48 (2) 21:45	27 20:58 (2)	
57	08:02	15:23 (29)	05:50	18:51 (3) 05:37	19:55 (20) 04:45	20:28 (2) 04:37	20:31 (2)	
58	16:40	34 15:57 (1)	19:37	19 19:10 (3) 20:35	10 20:05 (20) 21:26	21 20:49 (2) 21:45	27 20:58 (2)	
59	08:00	15:24 (29)	06:48	18:49 (3) 05:35	19:54 (20) 04:44	20:28 (2) 04:37	20:32 (2)	
60	16:42	41 16:10 (23)	19:38	21 19:10 (3) 20:37	13 20:07 (20) 21:27	21 20:49 (2) 21:45	26 20:58 (2)	
61	07:59	15:26 (29)	06:45	18:49 (3)	04:43	20:27 (2)		
62	16:44	44 16:12 (23)	19:40	21 19:10 (3)	21:28	23 20:50 (2)		
63	Sonnenscheinstunden	248	272	367	421	496	512	787
64	astr.max.mögl.Beschattung	966	669	272	154	287	512	787
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.51	0.45
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.68	0.69	0.68	0.67	0.63	0.63	0.62
68	Gesamte Reduktion	0.11	0.15	0.19	0.25	0.29	0.29	0.26
69	Met.wahrsch.Beschattung	104	102	53	39	84	202	202

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 84
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AN - IO40

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	20:32 (2) 05:19	06:14	07:08	17:53 (19) 07:07	15:02 (1) 08:03	
2	21:44	27 20:59 (2) 21:08	20:01	18:46	19 18:12 (19) 16:35	15:46 (23) 15:50	
3	04:40	20:32 (2) 05:22	20:07 (20) 06:17	18:46	17:53 (19) 07:09	15:02 (1) 08:05	
4	21:44	26 20:58 (2) 21:05	7 20:14 (20) 19:56	18:41	18 18:11 (19) 16:33	45 15:47 (23) 15:49	
5	04:41	20:33 (2) 05:24	20:05 (20) 06:19	18:39	17:53 (19) 07:13	15:01 (1) 08:08	
6	21:43	26 20:59 (2) 21:03	11 20:16 (20) 19:54	18:39	15 18:08 (19) 16:29	46 15:47 (23) 15:47	
7	04:41	20:33 (2) 05:25	20:04 (20) 06:21	9 18:49 (3) 07:15	17:54 (19) 07:15	15:02 (1) 08:09	
8	21:43	26 20:59 (2) 21:01	13 20:17 (20) 19:51	9 18:58 (3) 18:37	13 18:07 (19) 16:27	46 15:48 (23) 15:47	
9	04:42	20:33 (2) 05:27	20:04 (20) 06:23	18:47 (3) 07:17	17:57 (19) 07:17	15:02 (1) 08:10	
10	21:42	26 20:59 (2) 20:59	14 20:18 (20) 19:49	13 19:00 (3) 18:34	7 18:04 (19) 16:25	46 15:48 (23) 15:46	
11	04:43	20:34 (2) 05:29	20:02 (20) 06:25	18:45 (3) 07:19	07:19	15:03 (1) 08:12	
12	21:41	25 20:59 (2) 20:57	16 20:18 (20) 19:46	17 19:02 (3) 18:32	16:23	45 15:48 (23) 15:46	
13	04:44	20:34 (2) 05:31	20:02 (20) 06:26	18:44 (3) 07:21	07:21	15:03 (1) 08:13	
14	21:41	25 20:59 (2) 20:55	17 20:19 (20) 19:44	19 19:03 (3) 18:29	16:21	44 15:47 (23) 15:45	
15	04:45	20:35 (2) 05:33	20:02 (20) 06:28	18:42 (3) 07:23	07:23	15:03 (1) 08:14	
16	21:40	24 20:59 (2) 20:53	17 20:19 (20) 19:41	20 19:02 (3) 18:27	16:20	43 15:46 (23) 15:45	
17	04:46	20:35 (2) 05:34	20:01 (20) 06:30	18:42 (3) 07:25	07:25	15:01 (29) 08:16	
18	21:39	24 20:59 (2) 20:51	17 20:18 (20) 19:39	21 19:03 (3) 18:24	16:18	40 15:44 (23) 15:45	
19	04:48	20:35 (2) 05:36	20:01 (20) 06:32	18:42 (3) 07:27	07:27	14:57 (29) 08:17	
20	21:38	24 20:59 (2) 20:49	17 20:18 (20) 19:36	21 19:03 (3) 18:22	16:16	43 15:43 (23) 15:44	
21	04:49	20:36 (2) 05:38	20:02 (20) 06:34	18:42 (3) 07:28	07:29	14:56 (29) 08:18	
22	21:37	23 20:59 (2) 20:47	15 20:17 (20) 19:34	20 19:02 (3) 18:20	16:14	39 15:41 (23) 15:44	
23	04:50	20:36 (2) 05:40	20:02 (20) 06:35	18:41 (3) 07:30	07:31	14:55 (29) 08:19	
24	21:36	22 20:58 (2) 20:45	12 20:14 (20) 19:31	20 19:01 (3) 18:17	16:13	34 15:29 (1) 15:44	
25	04:51	20:37 (2) 05:41	20:03 (20) 06:37	18:41 (3) 07:32	07:33	14:54 (29) 08:20	
26	21:35	21 20:58 (2) 20:43	9 20:12 (20) 19:29	19 19:00 (3) 18:15	16:11	34 15:28 (1) 15:44	
27	04:53	20:37 (2) 05:43	20:04 (20) 06:39	18:42 (3) 07:34	07:35	14:53 (29) 08:21	
28	21:34	20 20:57 (2) 20:40	7 20:11 (20) 19:26	16 18:58 (3) 18:12	16:09	33 15:26 (1) 15:44	
29	04:54	20:39 (2) 05:45	20:05 (20) 06:41	18:43 (3) 07:36	07:36	14:53 (29) 08:22	
30	21:33	18 20:57 (2) 20:38	3 20:08 (20) 19:24	13 18:56 (3) 18:10	16:08	33 15:26 (27) 15:44	
31	04:55	20:39 (2) 05:47	06:43	18:44 (3) 07:38	07:38	14:53 (29) 08:23	
1	21:32	17 20:56 (2) 20:36	19:21	9 18:53 (3) 18:08	16:06	34 15:27 (27) 15:44	
2	04:57	20:40 (2) 05:49	06:44	18:48 (3) 07:40	07:40	14:52 (29) 08:23	
3	21:30	15 20:55 (2) 20:34	19:19	2 18:50 (3) 18:05	16:05	35 15:27 (27) 15:45	
4	04:58	20:41 (2) 05:50	06:46	07:42	07:42	14:53 (29) 08:24	
5	21:29	12 20:53 (2) 20:31	19:16	18:03	16:03	35 15:28 (27) 15:45	
6	04:59	20:44 (2) 05:52	06:48	07:44	07:44	14:53 (29) 08:25	
7	21:28	8 20:52 (2) 20:29	19:14	18:01	16:02	34 15:27 (27) 15:45	
8	05:01	20:27	06:50	07:46	07:46	14:53 (29) 08:25	
9	21:26	20:27	19:11	17:59	16:01	32 15:25 (27) 15:46	
10	05:02	05:56	06:52	07:48	07:48	14:54 (29) 08:26	
11	21:25	20:25	19:09	17:56	15:59	30 15:24 (27) 15:46	
12	05:04	05:58	06:53	07:50	16:15 (1) 07:49	28 14:54 (29) 08:26	
13	21:23	20:22	19:06	17:54	7 16:22 (1) 15:58	28 15:22 (27) 15:46	
14	05:06	05:59	06:55	07:51	16:11 (1) 07:51	25 14:55 (29) 08:27	
15	21:22	20:20	19:04	17:52	15 16:26 (1) 15:57	25 15:21 (27) 15:47	
16	05:07	06:01	06:57	07:53	15:08 (1) 07:53	14:56 (29) 08:27	
17	21:20	20:18	19:01	9 18:09 (19) 16:50	20 15:28 (1) 15:56	22 15:20 (27) 15:48	
18	05:09	06:03	06:59	17:57 (19) 06:55	15:06 (1) 07:55	23 13:55 (28) 08:28	
19	21:19	20:15	18:59	13 18:10 (19) 16:48	23 15:29 (1) 15:54	28 15:18 (27) 15:48	
20	05:10	06:05	07:01	17:55 (19) 06:57	15:05 (1) 07:56	20 13:53 (28) 08:28	
21	21:17	20:13	18:56	16 18:11 (19) 16:45	25 15:30 (1) 15:53	30 15:13 (29) 15:49	
22	05:12	06:07	07:02	17:54 (19) 06:59	15:04 (1) 07:58	31 13:52 (28) 08:28	
23	21:15	20:11	18:54	18 18:12 (19) 16:43	27 15:31 (1) 15:52	31 15:12 (29) 15:50	
24	05:14	06:08	07:04	17:54 (19) 07:01	15:04 (1) 08:00	32 13:51 (28) 08:28	
25	21:14	20:08	18:51	18 18:12 (19) 16:41	34 15:42 (23) 15:51	32 15:12 (29) 15:51	
26	05:15	06:10	07:06	17:53 (19) 07:03	15:03 (1) 08:01	31 13:51 (28) 08:28	
27	21:12	20:06	18:49	19 18:12 (19) 16:39	41 15:44 (23) 15:51	31 15:11 (29) 15:52	
28	05:17	06:12	07:05	07:05	15:02 (1)	08:28	33 13:59 (28)
29	21:10	20:03	18:47	16:37	44 15:46 (23)	15:53	32 14:31 (28)
30	Sonnenscheinstunden	514	461	383	328	257	231
31	astr.max.mögl.Beschattung	435	175	312	326	1088	988
32	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14
33	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
34	Reduktion Windrichtung	0.62	0.64	0.68	0.69	0.69	0.66
35	Gesamte Reduktion	0.25	0.28	0.25	0.21	0.13	0.08
36	Met.wahrsch.Beschattung	109	49	78	68	143	83

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 85
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AO - IO41

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:28	14:09 (28) 07:57	15:30 (29) 06:59	06:43	18:51 (3) 05:33	19:53 (20) 04:42	20:25 (2)		
2	15:54	34 14:43 (28) 16:46	38 16:14 (23) 17:43	19:42	20 19:11 (3) 20:39	16 20:09 (20) 21:29	24 20:49 (2)		
3	08:28	14:09 (28) 07:55	15:32 (29) 06:56	06:40	18:50 (3) 05:31	19:53 (20) 04:41	20:25 (2)		
4	15:57	33 14:42 (28) 16:48	40 16:16 (23) 17:45	19:44	20 19:10 (3) 20:40	16 20:08 (20) 21:31	25 20:50 (2)		
5	08:27	14:10 (28) 07:54	15:41 (1) 06:54	06:38	18:51 (3) 05:29	19:53 (20) 04:40	20:25 (2)		
6	15:57	33 14:43 (28) 16:50	37 16:18 (23) 17:47	19:46	19 19:10 (3) 20:42	16 20:09 (20) 21:32	25 20:50 (2)		
7	08:27	14:11 (28) 07:52	15:41 (1) 06:52	06:35	18:51 (3) 05:26	19:53 (20) 04:40	20:25 (2)		
8	15:58	33 14:44 (28) 16:52	39 16:20 (23) 17:49	19:48	18 19:09 (3) 20:44	16 20:09 (20) 21:33	25 20:50 (2)		
9	08:27	14:11 (28) 07:50	15:41 (1) 06:49	06:33	18:52 (3) 05:24	19:53 (20) 04:39	20:25 (2)		
10	15:59	33 14:44 (28) 16:54	41 16:22 (23) 17:51	19:50	16 19:08 (3) 20:46	15 20:08 (20) 21:34	25 20:50 (2)		
11	08:27	14:11 (28) 07:48	15:40 (1) 06:47	06:30	18:52 (3) 05:22	19:53 (20) 04:38	20:25 (2)		
12	16:00	33 14:44 (28) 16:56	42 16:22 (23) 17:53	19:52	14 19:06 (3) 20:48	14 20:07 (20) 21:35	26 20:51 (2)		
13	08:26	14:13 (28) 07:46	15:39 (1) 06:44	06:28	18:55 (3) 05:20	19:54 (20) 04:37	20:25 (2)		
14	16:02	31 14:44 (28) 16:58	43 16:22 (23) 17:55	19:54	8 19:03 (3) 20:50	12 20:06 (20) 21:36	26 20:51 (2)		
15	08:26	14:13 (28) 07:44	15:39 (1) 06:42	06:26	05:18	19:55 (20) 04:37	20:26 (2)		
16	16:03	31 14:44 (28) 17:00	43 16:22 (23) 17:57	3 17:28 (19) 19:55	20:51	9 20:04 (20) 21:37	25 20:51 (2)		
17	08:25	14:14 (28) 07:42	15:39 (1) 06:40	17:21 (19) 19:23	05:17	19:59 (20) 04:38	20:25 (2)		
18	16:05	30 14:44 (28) 17:03	43 16:22 (23) 17:59	11 17:32 (19) 19:57	20:53	3 20:02 (20) 21:38	26 20:51 (2)		
19	08:24	14:15 (28) 07:40	15:40 (1) 06:37	17:19 (19) 06:21	05:15	04:36	20:26 (2)		
20	16:06	29 14:44 (28) 17:05	42 16:22 (23) 18:00	14 17:33 (19) 19:59	20:55	21:39	26 20:52 (2)		
21	08:24	14:15 (28) 07:38	15:40 (1) 06:35	17:18 (19) 06:18	05:13	04:35	20:26 (2)		
22	16:08	29 14:44 (28) 17:07	42 16:22 (23) 18:02	16 17:34 (19) 20:01	20:57	21:40	26 20:52 (2)		
23	08:23	14:16 (28) 07:36	15:40 (1) 06:32	17:17 (19) 06:16	05:11	04:35	20:26 (2)		
24	16:09	28 14:44 (28) 17:09	41 16:21 (23) 18:04	17 17:34 (19) 20:03	20:58	21:41	26 20:52 (2)		
25	08:22	14:17 (28) 07:34	15:41 (1) 06:30	17:16 (19) 06:14	05:09	04:34	20:26 (2)		
26	16:11	27 14:44 (28) 17:11	39 16:20 (23) 18:06	19 17:35 (19) 20:05	21:00	21:41	26 20:52 (2)		
27	08:21	14:19 (28) 07:32	15:41 (1) 06:27	17:16 (19) 06:11	05:07	04:34	20:27 (2)		
28	16:13	29 15:33 (29) 17:13	35 16:17 (23) 18:08	18 17:34 (19) 20:07	21:02	21:42	25 20:52 (2)		
29	08:20	14:20 (28) 07:30	15:42 (1) 06:25	17:16 (19) 06:09	05:06	04:34	20:27 (2)		
30	16:14	33 15:36 (29) 17:15	27 16:09 (1) 18:10	18 17:34 (19) 20:09	21:04	21:43	26 20:53 (2)		
31	08:19	14:22 (28) 07:28	15:43 (1) 06:23	17:16 (19) 06:06	05:04	04:34	20:27 (2)		
32	16:16	32 15:37 (29) 17:17	25 16:08 (1) 18:12	17 17:33 (19) 20:10	21:05	21:43	26 20:53 (2)		
33	08:18	14:24 (28) 07:26	15:44 (1) 06:20	17:17 (19) 06:04	05:02	04:34	20:28 (2)		
34	16:18	32 15:39 (29) 17:19	23 16:07 (1) 18:14	15 17:32 (19) 20:12	21:07	21:44	25 20:53 (2)		
35	08:17	14:25 (28) 07:24	15:45 (1) 06:18	17:17 (19) 06:02	05:01	04:33	20:28 (2)		
36	16:19	31 15:40 (29) 17:21	20 16:05 (1) 18:16	13 17:30 (19) 20:14	21:09	21:44	25 20:53 (2)		
37	08:16	14:28 (28) 07:22	15:47 (1) 06:15	17:20 (19) 05:59	04:59	04:33	20:28 (2)		
38	16:21	27 15:41 (29) 17:23	17 16:04 (1) 18:18	8 17:28 (19) 20:16	21:10	21:44	26 20:54 (2)		
39	08:15	15:23 (29) 07:19	15:50 (1) 06:13	05:57	04:58	04:34	20:28 (2)		
40	16:23	18 15:41 (29) 17:25	11 16:01 (1) 18:20	20:18	21:12	21:45	26 20:54 (2)		
41	08:14	15:24 (29) 07:17	06:10	05:55	04:56	04:34	20:28 (2)		
42	16:25	18 15:42 (29) 17:27	18:22	20:20	21:14	7 20:32 (2) 04:34	26 20:54 (2)		
43	08:12	15:23 (29) 07:15	06:08	05:52	04:55	20:30 (2) 04:34	20:28 (2)		
44	16:27	19 15:42 (29) 17:29	18:23	20:22	21:15	12 20:42 (2) 21:45	26 20:54 (2)		
45	08:11	15:24 (29) 07:13	06:05	05:50	04:53	20:29 (2) 04:34	20:29 (2)		
46	16:29	19 15:43 (29) 17:31	18:25	20:24	21:17	15 20:44 (2) 21:45	26 20:55 (2)		
47	08:10	15:24 (29) 07:10	06:03	05:48	04:52	20:27 (2) 04:34	20:29 (2)		
48	16:31	19 15:43 (29) 17:33	18:27	20:25	21:18	17 20:44 (2) 21:46	26 20:55 (2)		
49	08:08	15:24 (29) 07:08	06:00	05:46	04:50	20:27 (2) 04:35	20:29 (2)		
50	16:32	20 15:44 (29) 17:35	18:29	20:27	21:20	18 20:45 (2) 21:46	25 20:54 (2)		
51	08:07	15:24 (29) 07:06	05:58	05:43	04:49	20:26 (2) 04:35	20:29 (2)		
52	16:34	20 15:44 (29) 17:37	18:31	6 18:04 (3) 20:29	1 20:00 (20) 21:21	20 20:46 (2) 21:46	26 20:55 (2)		
53	08:05	15:25 (29) 07:03	05:55	05:41	04:48	19:56 (20) 04:36	20:29 (2)		
54	16:36	19 15:44 (29) 17:39	18:33	10 18:06 (3) 20:31	6 20:02 (20) 21:23	21 20:47 (2) 21:45	26 20:55 (2)		
55	08:04	15:26 (29) 07:01	05:53	05:39	04:47	19:55 (20) 04:37	20:26 (2) 04:36	20:30 (2)	
56	16:38	18 15:44 (29) 17:41	18:35	13 18:07 (3) 20:33	9 20:04 (20) 21:24	21 20:47 (2) 21:45	26 20:56 (2)		
57	08:02	15:26 (29)	06:50	05:37	04:45	19:54 (20) 04:45	20:25 (2) 04:37	20:29 (2)	
58	16:40	29 15:59 (1)	19:37	17 19:10 (3) 20:35	11 20:05 (20) 21:26	23 20:48 (2) 21:45	26 20:55 (2)		
59	08:00	15:27 (29)	06:48	05:35	04:44	19:53 (20) 04:44	20:25 (2) 04:37	20:30 (2)	
60	16:42	32 16:02 (1)	19:38	20 18:11 (3) 20:37	14 20:07 (20) 21:27	23 20:48 (2) 21:45	26 20:56 (2)		
61	07:59	15:28 (29)	06:45	05:31	04:43	04:43	20:25 (2)		
62	16:44	33 16:03 (1)	19:40	20 19:11 (3)	21:28	24 20:49 (2)			
63	Sonnenscheinstunden	248	272	367	421	496	512		
64	astr.max.mögl.Beschattung	852	688	255	156	318	769		
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45		
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91		
67	Reduktion Windrichtung	0.68	0.70	0.68	0.66	0.63	0.62		
68	Gesamte Reduktion	0.11	0.15	0.20	0.25	0.29	0.26		
69	Met.wahrsch.Beschattung	92	105	50	39	93	198		

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 86
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AO - IO41

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	20:30 (2) 05:19	06:14	07:08	17:56 (19) 07:07	15:09 (1) 08:03	
2	21:44	20:56 (2) 21:08	20:01	18:46	18:14 (19) 16:35	15:52 (23) 15:50	
3	04:39	20:56 (2) 21:07	06:16	18:46	17:57 (19) 07:09	15:09 (1) 08:05	
4	21:44	20:56 (2) 21:07	19:59	18:44	16:18 (19) 16:33	15:52 (23) 15:49	
5	04:40	20:30 (2) 05:22	06:17	18:46	17:56 (19) 07:11	15:09 (1) 08:06	
6	21:44	20:56 (2) 21:05	19:56	18:41	15:18 (19) 16:31	15:52 (23) 15:48	
7	04:40	20:31 (2) 05:24	20:07 (20) 06:19	17:14	17:57 (19) 07:13	15:09 (1) 08:08	
8	21:43	20:57 (2) 21:03	6 20:13 (20) 19:54	18:39	13 18:10 (19) 16:29	43 15:52 (23) 15:47	
9	04:41	20:31 (2) 05:25	20:05 (20) 06:21	8 18:51 (3) 07:15	18:00 (19) 07:15	15:10 (1) 08:09	
10	21:43	20:57 (2) 21:01	10 20:15 (20) 19:51	8 18:59 (3) 18:37	7 18:07 (19) 16:27	42 15:52 (23) 15:47	
11	04:42	20:32 (2) 05:27	20:04 (20) 06:23	18:48 (3) 07:17	16:11 (1) 08:10	15:11 (1) 08:10	
12	21:42	20:57 (2) 20:59	13 20:17 (20) 19:49	14 19:02 (3) 18:34	16:25 41 15:52 (23) 15:46	32 14:30 (28)	
13	04:43	20:32 (2) 05:29	20:02 (20) 06:25	18:47 (3) 07:19	16:19 15:11 (1) 08:12	13:58 (28)	
14	21:41	20:57 (2) 20:57	15 20:17 (20) 19:46	16 19:03 (3) 18:32	16:23 40 15:51 (23) 15:46	33 14:31 (28)	
15	04:44	20:32 (2) 05:31	20:02 (20) 06:26	18:46 (3) 07:21	16:21 15:12 (1) 08:13	13:58 (28)	
16	21:41	20:58 (2) 20:55	16 20:18 (20) 19:44	18 19:04 (3) 18:29	16:21 37 15:49 (23) 15:45	33 14:31 (28)	
17	04:45	20:32 (2) 05:33	20:02 (20) 06:28	18:44 (3) 07:23	16:23 15:03 (29) 08:14	13:59 (28)	
18	21:40	20:58 (2) 20:53	16 20:18 (20) 19:41	19 19:03 (3) 18:27	16:20 39 15:46 (23) 15:45	33 14:35 (28)	
19	04:46	20:33 (2) 05:34	20:01 (20) 06:30	18:44 (3) 07:25	16:25 15:00 (29) 08:16	13:59 (28)	
20	21:39	20:58 (2) 20:51	17 20:18 (20) 19:39	20 19:04 (3) 18:24	16:18 38 15:44 (23) 15:45	34 14:33 (28)	
21	04:48	20:33 (2) 05:36	20:01 (20) 06:32	18:43 (3) 07:27	16:27 15:00 (29) 08:17	13:59 (28)	
22	21:38	20:57 (2) 20:49	17 20:18 (20) 19:36	21 19:04 (3) 18:22	16:16 33 15:35 (1) 15:44	34 14:33 (28)	
23	04:49	20:33 (2) 05:38	20:01 (20) 06:34	18:43 (3) 07:28	16:29 14:59 (29) 08:18	13:59 (28)	
24	21:37	20:57 (2) 20:47	16 20:17 (20) 19:34	20 19:03 (3) 18:20	16:14 31 15:33 (1) 15:44	34 14:33 (28)	
25	04:50	20:33 (2) 05:40	20:01 (20) 06:35	18:43 (3) 07:30	16:31 14:58 (29) 08:19	13:58 (28)	
26	21:36	20:57 (2) 20:45	13 20:14 (20) 19:31	19 19:02 (3) 18:17	16:13 28 15:31 (1) 15:44	35 14:34 (28)	
27	04:51	20:34 (2) 05:41	20:02 (20) 06:37	18:43 (3) 07:32	16:33 14:58 (29) 08:20	14:00 (28)	
28	21:35	20:57 (2) 20:43	10 20:12 (20) 19:29	17 19:00 (3) 18:15	16:11 18 15:16 (29) 15:44	34 14:34 (28)	
29	04:53	20:34 (2) 05:43	20:03 (20) 06:39	18:44 (3) 07:34	16:35 14:57 (29) 08:21	14:00 (28)	
30	21:34	20:56 (2) 20:40	8 20:11 (20) 19:26	14 18:58 (3) 18:12	16:09 20 15:17 (29) 15:44	35 14:35 (28)	
31	04:54	20:35 (2) 05:45	20:03 (20) 06:41	18:45 (3) 07:36	16:36 14:57 (29) 08:22	14:01 (28)	
32	21:33	20:57 (2) 20:38	5 20:08 (20) 19:24	11 18:56 (3) 18:10	16:08 20 15:17 (29) 15:44	34 14:35 (28)	
33	04:55	20:36 (2) 05:47	06:43	18:46 (3) 07:38	16:38 14:57 (29) 08:23	14:01 (28)	
34	21:32	20:56 (2) 20:36	19:21 7 18:53 (3) 18:08	16:06 20 15:17 (29) 15:44	35 14:36 (28)		
35	04:57	20:36 (2) 05:49	06:44	18:47 (3) 07:40	16:39 14:57 (29) 08:23	14:02 (28)	
36	21:30	20:55 (2) 20:34	19:19	18:05	16:05 20 15:17 (29) 15:45	35 14:37 (28)	
37	04:58	20:37 (2) 05:50	06:46	18:42	16:42 14:58 (29) 08:24	14:02 (28)	
38	21:29	20:54 (2) 20:31	19:16	18:03	16:14 19 15:17 (29) 15:45	34 14:38 (28)	
39	04:59	20:38 (2) 05:52	06:48	18:44	16:44 14:58 (29) 08:25	14:03 (28)	
40	21:28	20:54 (2) 20:29	19:14	18:01	16:02 19 15:17 (29) 15:45	34 14:37 (28)	
41	05:01	20:39 (2) 05:54	06:50	18:46	16:46 14:59 (29) 08:25	14:03 (28)	
42	21:26	20:52 (2) 20:27	19:11	17:59	16:01 18 15:17 (29) 15:46	35 14:38 (28)	
43	05:02	20:42 (2) 05:56	06:52	18:48	16:48 14:59 (29) 08:26	14:03 (28)	
44	21:25	20:51 (2) 20:25	19:09	17:56	13 16:32 (1) 15:59	18 15:17 (29) 15:46	35 14:38 (28)
45	05:04	20:45 (2) 05:58	06:53	18:49	16:50 14:57 (29) 08:26	14:04 (28)	
46	21:23	20:47 (2) 20:22	19:06	17:54	18 16:35 (1) 15:58	27 15:17 (29) 15:46	35 14:39 (28)
47	05:06	20:59	06:55	18:05 (19) 07:51	16:15 (1) 07:51	14:02 (28) 08:27	14:05 (28)
48	21:22	20:20	19:04 5 18:10 (19) 17:52	21 16:36 (1) 15:57	31 15:17 (29) 15:47	34 14:39 (28)	
49	05:07	06:01	06:57 18:02 (19) 06:53	15:13 (1) 07:53	14:01 (28) 08:27	14:05 (28)	
50	21:20	20:18	19:01 11 18:13 (19) 16:50	24 15:37 (1) 15:56	32 15:16 (29) 15:48	35 14:40 (28)	
51	05:09	06:03	06:59 18:59 (19) 06:55	15:12 (1) 07:55	14:00 (28) 08:28	14:05 (28)	
52	21:19	20:15	18:59 15 18:14 (19) 16:48	26 15:38 (1) 15:54	33 15:16 (29) 15:48	35 14:40 (28)	
53	05:10	06:05	07:01 17:59 (19) 06:57	15:11 (1) 07:56	13:59 (28) 08:28	14:06 (28)	
54	21:17	20:13	18:56 16 18:14 (19) 16:45	28 15:39 (1) 15:53	33 15:15 (29) 15:49	34 14:40 (28)	
55	05:12	06:07	07:02 17:57 (19) 06:59	15:10 (1) 07:58	13:59 (28) 08:28	14:06 (28)	
56	21:15	20:11	18:54 18 18:15 (19) 16:43	37 15:47 (23) 15:52	29 15:13 (29) 15:50	35 14:41 (28)	
57	05:14	06:08	07:04 17:56 (19) 07:01	15:10 (1) 08:00	13:59 (28) 08:28	14:07 (28)	
58	21:14	20:08	18:51 19 18:15 (19) 16:41	40 15:50 (23) 15:51	26 14:25 (28) 15:51	34 14:41 (28)	
59	05:15	06:10	07:06 17:56 (19) 07:03	15:10 (1) 08:01	13:58 (28) 08:28	14:07 (28)	
60	21:12	20:06	18:49 19 18:15 (19) 16:39	41 15:51 (23) 15:51	28 14:26 (28) 15:52	34 14:41 (28)	
61	05:17	06:12	07:05 17:56 (19) 07:05	15:09 (1) 08:02	13:58 (28) 08:28	14:08 (28)	
62	21:10	20:03	18:47 19 18:15 (19) 16:37	43 15:52 (23) 15:53	28 14:27 (28) 15:53	34 14:42 (28)	
63	05:18	06:13	07:06 17:57 (19) 07:06	15:10 (1) 08:03	13:58 (28) 08:28	14:08 (28)	
64	21:08	20:00	18:45 19 18:15 (19) 16:35	44 15:53 (23) 15:54	29 14:28 (28) 15:54	34 14:43 (28)	
65	05:19	06:14	07:07 17:58 (19) 07:07	15:11 (1) 08:04	13:59 (28) 08:29	14:09 (28)	
66	21:07	20:00	18:44 19 18:15 (19) 16:34	45 15:54 (23) 15:55	30 14:29 (28) 15:55	34 14:44 (28)	
67	05:20	06:15	07:08 17:59 (19) 07:08	15:12 (1) 08:05	13:59 (28) 08:29	14:10 (28)	
68	21:06	20:00	18:43 19 18:15 (19) 16:33	46 15:55 (23) 15:56	31 14:30 (28) 15:56	34 14:45 (28)	
69	05:21	06:16	07:09 17:59 (19) 07:09	15:13 (1) 08:06	13:59 (28) 08:29	14:11 (28)	
70	21:05	20:00	18:42 19 18:15 (19) 16:32	47 15:56 (23) 15:57	32 14:31 (28) 15:57	34 14:46 (28)	
71	05:22	06:17	07:10 17:59 (19) 07:10	15:14 (1) 08:07	13:59 (28) 08:29	14:12 (28)	
72	21:04	20:00	18:41 19 18:15 (19) 16:31	48 15:57 (23) 15:58	33 14:32 (28) 15:58	34 14:47 (28)	
73	05:23	06:18	07:11 17:59 (19) 07:11	15:15 (1) 08:08	13:59 (28) 08:29	14:13 (28)	
74	21:03	20:00	18:40 19 18:15 (19) 16:30	49 15:58 (23) 15:59	34 14:33 (28) 15:59	34 14:48 (28)	
75	05:24	06:19	07:12 17:59 (19) 07:12	15:16 (1) 08:09	13:59 (28) 08:29	14:14 (28)	
76	21:02	20:00	18:39 19 18:15 (19) 16:29	50 15:59 (23) 15:59	35 14:34 (28) 15:59	34 14:49 (28)	
77	05:25	06:20	07:13 17:59 (19) 07:13	15:17 (1) 08:10	13:59 (28) 08:29	14:15 (28)	
78	21:01	20:00	18:38 19 18:15 (19) 16:28	51 15:59 (23) 15:59	36 14:35 (28) 15:59	34 14:50 (28)	
79	05:26	06:21	07:14 17:59 (19) 07:14	15:18 (1) 08:11	13:59 (28) 08:29	14:16 (28)	
80	21:00	20:00	18:37 19 18:15 (19) 16:27	52 15:59 (23) 15:59	37 14:36 (28) 15:59	34 14:51 (28)	
81	05:27	06:22	07:15 17:59 (19) 07:15	15:19 (1) 08:12	13:59 (28) 08:29	14:17 (28)	
82	20:59	20:00	18:36 19 18:15 (19) 16:26	53 15:59 (23) 15:59	38 14:37 (28) 15:59	34 14:52 (28)	
83	05:28	06:23	07:16 17:59 (19) 07:16	15:20 (1) 08:13	13:59 (28) 08:29	14:18 (28)	
84	20:58	20:00	18:35 19 18:15 (19) 16:25	54 15:59 (23) 15:59	39 14:38 (28) 15:59	34 14:53 (28)	
85	05:29	06:24	07:17 17:59 (19) 07:17	15:21 (1) 08:14	13:59 (28) 08:29	14:19 (28)	
86	20:57	20:00	18:34 19 18:15 (19) 16:24	55 15:59 (23) 15:59	40 14:39 (28) 15:59	34 14:54 (28)	
87	05:30	06:25	07:18 17:59 (19) 07:18	15:22 (1) 08:15	13:59 (28) 08:29	14:20 (28)	
88	20:56	20:00	18:33 19 18:15 (19) 16:23	56 15:59 (23) 15:59	41 14:40 (28) 15:59	34 14:55 (28)	
89	05:31	06:26	07:19 17:59 (19) 07:19	15:23 (1) 08:16	13:59 (28) 08:29	14:21 (28)	
90	20:55	20:00	18:32 19 18:15 (19) 16:22	57 15:59 (23) 15:59	42 14:41 (28) 15:59	34 14:56 (28)	
91	05:32	06:27	07:20 17:59 (19) 07:20	15:24 (1) 08:17	13:59 (28) 08:29	14:22 (28)	
92	20:54	20:00	18:31 19 18:15 (19) 16:21	58 15:59 (23) 15:59	43 14:42 (28) 15:59	34 14:57 (28)	
93	05:33	06:28	07:21 17:59 (19) 07:21	15:25 (1) 08:18	13:59 (28) 08:29	14:23 (28)	
94	20:53	20:00	18:30 19 18:15 (19) 16:20	59 15:59 (23) 15:59	44 14:43 (28) 15:59	34 14:58 (28)	
95	05:34	06:29	07:22 17:59 (19) 07:22	15:26 (1) 08:19	13:59 (28) 08:29	14:24 (28)	
96	20:52	20:00	18:29 19 18:15 (19) 16:19	60 15:59 (23) 15:59	45 14:44 (28) 15:59	34 14:59 (28)	
97	05:35	06:30	07:23 17:59 (19) 07:23	15:27 (1) 08:20	13:59 (28) 0		

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 87
Lizenzierter Anwender:
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DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AP - IO42

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1.017 1.220 930 354 7.936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	14:15 (28) 07:57	15:31 (29) 06:59	06:43	18:53 (3) 05:33	19:54 (20) 04:42	20:25 (2)	
2	08:28	14:49 (28) 16:46	29 16:06 (1) 17:43	19:42	20 19:13 (3) 20:39	15 20:09 (20) 21:29	24 20:49 (2)	
3	08:28	14:15 (28) 07:54	30 15:35 (29) 06:54	06:38	20 18:52 (3) 05:31	16 19:54 (20) 04:41	25 20:26 (2)	
4	08:27	14:16 (28) 07:52	31 16:18 (23) 17:47	19:46	19 19:12 (3) 20:42	16 20:10 (20) 21:32	25 20:51 (2)	
5	08:27	14:16 (28) 07:50	32 16:20 (23) 17:49	19:48	19 19:11 (3) 20:44	16 20:10 (20) 21:33	25 20:51 (2)	
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7	08:26	14:18 (28) 07:46	34 16:25 (23) 17:53	19:52	16 19:09 (3) 20:48	14 20:08 (20) 21:35	25 20:51 (2)	
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11	08:24	14:20 (28) 07:38	38 16:29 (23) 17:57	19:58	5 20:04 (20) 21:38	19:59 (20) 21:38	25 20:51 (2)	
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78	07:17	15:27 (28) 05:24	105 17:36 (23) 19:04	21:05	05:59	05:41	21:18 (2) 05:19	21:14 (2)
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82	07:13	15:31 (28) 05:16	109 17:40 (23) 19:08	21:09	05:59	05:45	21:22 (2) 05:23	21:18 (2)
83	07:12	15:32 (28) 05:14	110 17:41 (23) 19:09	21:10	05:59	05:46	21:23 (2) 05:24	21:19 (2)
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86	07:09	15:35 (28) 05:08	113 17:44 (23) 19:12	21:13	05:59	05:49	21:26 (2) 05:27	21:22 (2)
87	07:08	15:36 (28) 05:06	114 17:45 (23) 19:13	21:14	05:59	05:50	21:27 (2) 05:28	21:23 (2)
88	07:07	15:37 (28) 05						

Projekt:
151008_Miltzow_III-VII

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Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AP - IO42

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember						
1	04:38		20:31 (2)	05:19		06:14		07:08		18:00 (19)	07:07	15:14 (1)	08:03	14:02 (28)			
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	21:26	12	20:52 (2)	20:27		19:11		17:59	16	16:39 (1)	16:01	29	15:20 (29)	15:46	36	14:45 (28)	
22	05:02		20:43 (2)	05:56		06:52		07:48			16:21 (1)	07:48	14:07 (28)	08:26		14:09 (28)	
	21:25	9	20:52 (2)	20:25		19:09		17:56	20	16:41 (1)	15:59	31	15:19 (29)	15:46	36	14:45 (28)	
23	05:04		20:46 (2)	05:58		06:53		18:08 (19)	07:49		16:19 (1)	07:49	14:05 (28)	08:26		14:10 (28)	
	21:23	1	20:47 (2)	20:22		19:06	5	18:13 (19)	17:54	23	16:42 (1)	15:58	14:12 (28)	08:25		14:46 (28)	
24	05:06			05:59		06:55		18:05 (19)	07:51		16:18 (1)	07:51	14:04 (28)	08:27		14:10 (28)	
	21:22		20:20			19:04	11	18:16 (19)	17:52	25	16:43 (1)	15:57	15:18 (29)	15:47	36	14:46 (28)	
25	05:07		06:01			06:57		18:03 (19)	06:53		15:17 (1)	07:53	14:04 (28)	08:27		14:11 (28)	
	21:20		20:18			19:01	14	18:17 (19)	16:50	26	15:43 (1)	15:56	15:17 (29)	15:48	35	14:46 (28)	
26	05:09		06:03			06:59		18:01 (19)	06:55		15:16 (1)	07:55	14:03 (28)	08:28		14:11 (28)	
	21:19		20:15			18:59	16	18:17 (19)	16:48	28	15:44 (1)	15:54	15:16 (29)	15:48	35	14:46 (28)	
27	05:10		06:05			07:01		18:00 (19)	06:57		15:15 (1)	07:56	14:03 (28)	08:28		14:11 (28)	
	21:17		20:13			18:56	18	18:18 (19)	16:45	36	15:51 (23)	15:53	27	14:30 (28)	15:49	36	14:47 (28)
28	05:12		06:07			07:02		18:00 (19)	06:59		15:14 (1)	07:58	14:03 (28)	08:28		14:12 (28)	
	21:15		20:11			18:54	18	18:18 (19)	16:43	39	15:53 (23)	15:52	28	14:31 (28)	15:50	35	14:47 (28)
29	05:14		06:08			07:04		17:59 (19)	07:01		15:15 (1)	08:00	14:03 (28)	08:28		14:12 (28)	
	21:14		20:08			18:51	18	18:17 (19)	16:41	40	15:55 (23)	15:51	29	14:32 (28)	15:51	35	14:47 (28)
30	05:15		06:10			07:06		17:59 (19)	07:03		15:15 (1)	08:01	14:03 (28)	08:28		14:13 (28)	
	21:12		20:06			18:49	18	18:17 (19)	16:39	40	15:55 (23)	15:51	30	14:33 (28)	15:52	35	14:48 (28)
31	05:17		06:12					07:05			15:14 (1)			08:28		14:14 (28)	
	21:10		20:03					16:37	42	15:56 (23)			15:53	35	14:49 (28)		
Sonnenscheinstunden	514		461			383		328		257			231				
astr.max.mögl.Beschattung		480		155		318		394		874			1078				
Red.Sonnenscheinwahrsch.		0.44		0.48		0.40		0.33		0.21			0.14				
Reduktion Betriebsdauer		0.91		0.91		0.91		0.91		0.91			0.91				
Reduktion Windrichtung		0.62		0.64		0.68		0.70		0.69			0.67				
Gesamte Reduktion		0.25		0.28		0.25		0.21		0.13			0.09				
Met.wahrsch.Beschattung		121		44		79		83		115			92				

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 89

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AQ - IO43

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	14:17 (28) 07:57	15:32 (29) 06:59	06:43	18:54 (3) 05:33	19:54 (20) 04:42	20:25 (2)	
2	08:28	14:17 (28) 07:57	15:32 (29) 06:59	06:43	18:54 (3) 05:33	19:54 (20) 04:42	20:25 (2)	
3	08:28	14:17 (28) 07:57	15:32 (29) 06:59	06:43	18:54 (3) 05:33	19:54 (20) 04:42	20:25 (2)	
4	08:27	14:19 (28) 07:52	15:39 (29) 06:52	06:35	18:53 (3) 05:26	19:54 (20) 04:40	20:25 (2)	
5	08:27	14:19 (28) 07:52	15:39 (29) 06:52	06:35	18:53 (3) 05:26	19:54 (20) 04:40	20:25 (2)	
6	08:27	14:19 (28) 07:52	15:39 (29) 06:52	06:35	18:53 (3) 05:26	19:54 (20) 04:40	20:25 (2)	
7	08:26	14:20 (28) 07:46	15:48 (1) 06:44	06:28	18:55 (3) 05:20	19:55 (20) 04:37	20:26 (2)	
8	08:26	14:21 (28) 07:44	15:47 (1) 06:42	06:26	18:58 (3) 05:18	19:56 (20) 04:37	20:26 (2)	
9	08:25	14:21 (28) 07:42	15:47 (1) 06:40	06:23	19:05 (3) 05:17	20:00 (20) 04:38	20:26 (2)	
10	08:24	14:22 (28) 07:40	15:47 (1) 06:37	17:25 (19) 06:21	05:15	20:03 (20) 04:36	20:27 (2)	
11	08:24	14:22 (28) 07:38	15:47 (1) 06:35	17:23 (19) 06:18	05:13	20:03 (20) 04:35	20:27 (2)	
12	08:23	14:23 (28) 07:36	15:47 (1) 06:32	17:21 (19) 06:16	05:11	20:03 (20) 04:34	20:27 (2)	
13	08:22	14:24 (28) 07:34	15:47 (1) 06:30	17:19 (19) 06:14	05:09	20:03 (20) 04:34	20:27 (2)	
14	08:21	14:25 (28) 07:32	15:47 (1) 06:27	17:17 (19) 06:11	05:07	20:03 (20) 04:34	20:27 (2)	
15	08:20	14:26 (28) 07:30	15:47 (1) 06:25	17:15 (19) 06:09	05:05	20:03 (20) 04:34	20:27 (2)	
16	08:19	14:27 (28) 07:28	15:48 (1) 06:23	17:13 (19) 06:06	05:04	20:03 (20) 04:34	20:27 (2)	
17	08:18	14:28 (28) 07:26	15:49 (1) 06:20	17:11 (19) 06:04	05:02	20:03 (20) 04:34	20:27 (2)	
18	08:17	14:29 (28) 07:24	15:49 (1) 06:18	17:09 (19) 06:02	05:01	20:03 (20) 04:33	20:27 (2)	
19	08:16	14:31 (28) 07:22	15:50 (1) 06:15	17:07 (19) 05:59	04:59	20:03 (20) 04:33	20:27 (2)	
20	08:15	14:32 (28) 07:19	15:52 (1) 06:13	17:05 (19) 05:57	04:58	20:03 (20) 04:34	20:29 (2)	
21	08:14	14:34 (28) 07:17	15:54 (1) 06:10	17:03 (19) 05:55	04:56	20:03 (20) 04:34	20:29 (2)	
22	08:12	14:36 (28) 07:15	15:56 (1) 06:08	17:01 (19) 05:53	04:55	20:03 (20) 04:34	20:29 (2)	
23	08:11	14:37 (28) 07:13	15:57 (1) 06:06	16:59 (19) 05:51	04:53	20:03 (20) 04:34	20:29 (2)	
24	08:10	14:38 (28) 07:11	15:58 (1) 06:04	16:57 (19) 05:49	04:52	20:03 (20) 04:34	20:29 (2)	
25	08:08	14:39 (28) 07:09	15:59 (1) 06:02	16:55 (19) 05:47	04:50	20:03 (20) 04:35	20:30 (2)	
26	08:07	14:40 (28) 07:07	16:00 (1) 06:00	16:53 (19) 05:45	04:49	20:03 (20) 04:35	20:30 (2)	
27	08:05	14:41 (28) 07:05	16:01 (1) 05:58	16:51 (19) 05:43	04:48	20:03 (20) 04:36	20:30 (2)	
28	08:04	14:42 (28) 07:03	16:02 (1) 05:56	16:49 (19) 05:41	04:47	20:03 (20) 04:36	20:30 (2)	
29	08:02	14:43 (28) 07:01	16:03 (1) 05:54	16:47 (19) 05:39	04:46	20:03 (20) 04:37	20:31 (2)	
30	08:00	14:44 (28) 06:59	16:04 (1) 05:52	16:45 (19) 05:37	04:45	20:03 (20) 04:37	20:31 (2)	
31	07:59	14:45 (28) 06:57	16:05 (1) 05:50	16:43 (19) 05:35	04:44	20:03 (20) 04:37	20:31 (2)	
16:44	17:15	15:48 (29)	19:40	19:13 (3)	21:28	24	20:49 (2)	
Sonnenscheinstunden	248	272	367	421	496	512	747	
astr.max.mögl.Beschattung	885	699	226	164	318	512	747	
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.51	0.45	
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	0.91	
Reduktion Windrichtung	0.68	0.70	0.68	0.67	0.63	0.63	0.62	
Gesamte Reduktion	0.11	0.15	0.20	0.25	0.29	0.29	0.26	
Met.wahrsch.Beschattung	96	107	44	41	93	192		

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 90

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AQ - IO43

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember						
1	04:38	20:31 (2) 05:19	06:14	07:08	18:01 (19) 07:07	15:16 (1) 08:03	14:04 (28)					
2	21:44	20:56 (2) 21:08	20:01	18:46	16	18:17 (19) 16:35	41	15:57 (23) 15:50	32	14:36 (28)		
3	04:39	20:31 (2) 05:20	06:16	07:10	18:02 (19) 07:09	15:17 (1) 08:05	14:05 (28)					
4	21:44	20:56 (2) 21:07	19:59	18:44	13	18:15 (19) 16:33	40	15:57 (23) 15:49	32	14:37 (28)		
5	04:40	20:31 (2) 05:22	06:17	07:12	18:02 (19) 07:11	15:17 (1) 08:06	14:05 (28)					
6	21:44	20:56 (2) 21:05	19:56	18:41	10	18:12 (19) 16:31	39	15:56 (23) 15:48	33	14:38 (28)		
7	04:40	20:32 (2) 05:24	20:08 (20) 06:19	18:56 (3) 07:14	18:05 (19) 07:13	15:17 (1) 08:08	14:05 (28)					
8	21:43	20:57 (2) 21:03	20:14 (20) 19:54	6	18:09 (19) 16:29	39	15:56 (23) 15:47	33	14:38 (28)			
9	04:41	20:32 (2) 05:25	20:06 (20) 06:21	18:52 (3) 07:15	07:15	15:19 (1) 08:09	14:05 (28)					
10	21:43	20:57 (2) 21:01	10	20:16 (20) 19:51	12	18:04 (3) 16:37	16:27	36	15:55 (23) 15:47	34	14:38 (28)	
11	04:42	20:32 (2) 05:27	20:05 (20) 06:23	18:50 (3) 07:17	07:17	15:20 (1) 08:10	14:05 (28)					
12	21:42	20:57 (2) 20:59	13	20:18 (20) 19:49	15	19:05 (3) 18:34	16:25	33	15:53 (23) 15:46	34	14:39 (28)	
13	04:43	20:33 (2) 05:29	20:04 (20) 06:25	18:49 (3) 07:19	07:19	15:09 (29) 08:12	14:06 (28)					
14	21:41	20:58 (2) 20:57	14	20:18 (20) 19:46	17	19:06 (3) 18:32	16:23	34	15:51 (23) 15:46	34	14:40 (28)	
15	04:44	20:33 (2) 05:31	20:03 (20) 06:26	18:48 (3) 07:21	07:21	15:06 (29) 08:13	14:06 (28)					
16	21:41	20:58 (2) 20:55	16	20:19 (20) 19:44	19	19:07 (3) 18:29	16:21	33	15:49 (23) 15:45	34	14:40 (28)	
17	04:45	20:33 (2) 05:33	20:03 (20) 06:28	18:46 (3) 07:23	07:23	15:04 (29) 08:14	14:06 (28)					
18	21:40	20:58 (2) 20:53	16	20:19 (20) 19:41	20	19:06 (3) 18:27	16:20	28	15:36 (1) 15:45	35	14:41 (28)	
19	04:46	20:33 (2) 05:34	20:02 (20) 06:30	18:46 (3) 07:25	07:25	15:03 (29) 08:16	14:07 (28)					
20	21:39	20:58 (2) 20:51	17	20:19 (20) 19:39	20	19:06 (3) 18:24	16:18	26	15:37 (1) 15:45	35	14:42 (28)	
21	04:48	20:34 (2) 05:36	20:02 (20) 06:32	18:46 (3) 07:27	07:27	15:03 (29) 08:17	14:07 (28)					
22	21:38	20:58 (2) 20:49	16	20:18 (20) 19:36	20	19:06 (3) 18:22	16:16	17	15:20 (29) 15:44	35	14:42 (28)	
23	04:49	20:34 (2) 05:38	20:03 (20) 06:34	18:46 (3) 07:28	07:29	15:02 (29) 08:18	14:07 (28)					
24	21:37	20:58 (2) 20:47	14	20:17 (20) 19:34	19	19:05 (3) 18:20	16:14	19	15:21 (29) 15:44	35	14:42 (28)	
25	04:50	20:34 (2) 05:40	20:02 (20) 06:35	18:46 (3) 07:30	07:31	15:02 (29) 08:19	14:07 (28)					
26	21:36	20:57 (2) 20:45	12	20:14 (20) 19:31	17	19:03 (3) 18:17	16:13	19	15:21 (29) 15:44	35	14:43 (28)	
27	04:51	20:34 (2) 05:41	20:03 (20) 06:37	18:46 (3) 07:32	07:33	15:02 (29) 08:20	14:08 (28)					
28	21:35	20:57 (2) 20:43	9	20:12 (20) 19:29	14	19:00 (3) 18:15	16:11	19	15:21 (29) 15:44	35	14:43 (28)	
29	04:53	20:34 (2) 05:43	20:04 (20) 06:39	18:48 (3) 07:34	07:35	15:02 (29) 08:21	14:08 (28)					
30	21:34	20:57 (2) 20:40	7	20:11 (20) 19:26	10	18:58 (3) 18:12	16:09	20	15:22 (29) 15:44	36	14:44 (28)	
31	04:54	20:36 (2) 05:45	20:05 (20) 06:41	18:50 (3) 07:36	07:36	15:02 (29) 08:22	14:09 (28)					
32	21:33	20:57 (2) 20:38	3	20:08 (20) 19:24	6	18:56 (3) 18:10	16:08	20	15:22 (29) 15:44	36	14:44 (28)	
33	04:55	20:36 (2) 05:47	06:43	07:38	07:38	15:02 (29) 08:23	14:10 (28)					
34	21:32	20:56 (2) 20:36	19:21	18:08	16:06	20	15:22 (29) 15:44	35	14:45 (28)			
35	04:57	20:36 (2) 05:49	06:44	07:40	07:40	15:02 (29) 08:23	14:10 (28)					
36	21:30	20:56 (2) 20:34	19:19	18:05	16:05	19	15:21 (29) 15:45	36	14:46 (28)			
37	04:58	20:37 (2) 05:50	06:46	07:42	07:42	15:03 (29) 08:24	14:10 (28)					
38	21:29	20:54 (2) 20:31	19:16	18:03	16:03	18	15:21 (29) 15:45	35	14:45 (28)			
39	04:59	20:39 (2) 05:52	06:48	07:44	07:44	14:11 (28) 08:25	14:11 (28)					
40	21:28	15	20:54 (2) 20:29	19:14	18:01	12	16:39 (1) 16:02	29	15:21 (29) 15:45	35	14:46 (28)	
41	05:01	20:39 (2) 05:54	06:50	07:46	07:46	16:24 (1) 07:46	14:09 (28) 08:25	14:12 (28)				
42	21:26	13	20:52 (2) 20:27	19:11	17:59	18	16:42 (1) 16:01	33	15:21 (29) 15:46	35	14:47 (28)	
43	05:02	20:42 (2) 05:56	06:52	07:48	07:48	16:22 (1) 07:48	14:08 (28) 08:26	14:12 (28)				
44	21:25	10	20:52 (2) 20:25	19:09	17:56	21	16:43 (1) 15:59	34	15:20 (29) 15:46	35	14:47 (28)	
45	05:04	20:44 (2) 05:58	06:53	07:49	07:49	16:20 (1) 07:49	14:07 (28) 08:26	14:13 (28)				
46	21:23	5	20:49 (2) 20:22	19:06	7	18:15 (19) 17:54	24	16:44 (1) 15:58	35	15:20 (29) 15:46	35	14:48 (28)
47	05:06	20:40 (2) 05:59	06:55	07:51	07:51	16:19 (1) 07:51	14:06 (28) 08:27	14:13 (28)				
48	21:22	20:20	19:04	12	18:17 (19) 17:52	26	16:45 (1) 15:57	35	15:19 (29) 15:47	35	14:48 (28)	
49	05:07	06:01	06:57	18:04 (19) 06:53	15:18 (1) 07:53	14:06 (28) 08:27	14:13 (28)					
50	21:20	20:18	19:01	14	18:18 (19) 16:50	28	15:46 (1) 15:56	32	15:17 (29) 15:48	35	14:48 (28)	
51	05:09	06:03	06:59	18:01 (19) 06:55	15:17 (1) 07:55	14:05 (28) 08:28	14:13 (28)					
52	21:19	20:15	18:59	17	18:18 (19) 16:48	34	15:51 (23) 15:54	27	14:32 (28) 15:48	36	14:49 (28)	
53	05:10	06:05	07:01	18:01 (19) 06:57	15:17 (1) 07:56	14:05 (28) 08:28	14:14 (28)					
54	21:17	20:13	18:56	17	18:18 (19) 16:45	36	15:53 (23) 15:53	28	14:33 (28) 15:49	35	14:49 (28)	
55	05:12	06:07	07:02	18:00 (19) 06:59	15:16 (1) 07:58	14:05 (28) 08:28	14:14 (28)					
56	21:15	20:11	18:54	18	18:18 (19) 16:43	39	15:55 (23) 15:52	29	14:34 (28) 15:50	35	14:49 (28)	
57	05:14	06:08	07:04	18:00 (19) 07:01	15:17 (1) 08:00	14:05 (28) 08:28	14:15 (28)					
58	21:14	20:08	18:51	18	18:18 (19) 16:41	39	15:56 (23) 15:51	30	14:35 (28) 15:51	35	14:50 (28)	
59	05:15	06:10	07:06	18:00 (19) 07:03	15:16 (1) 08:01	14:05 (28) 08:28	14:15 (28)					
60	21:12	20:06	18:49	18	18:18 (19) 16:39	41	15:57 (23) 15:51	31	14:36 (28) 15:52	36	14:51 (28)	
61	05:17	06:12	07:05	18:00 (19) 07:05	15:16 (1) 08:02	14:06 (28) 08:28	14:16 (28)					
62	21:10	20:03	16:37	41	15:57 (23) 15:51	15:53	35	14:51 (28)				
63	Sonnenscheinstunden	514	461	383	316	328	257	863	231	1075		
64	astr.max.mögl.Beschattung	488	153	316	402	863	231	1075				
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14					
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91					
67	Reduktion Windrichtung	0.62	0.64	0.68	0.70	0.69	0.67					
68	Gesamte Reduktion	0.25	0.28	0.25	0.21	0.13	0.09					
69	Met.wahrsch.Beschattung	123	43	79	85	113	92					

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:53 / 91

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AR - IO44

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni			
1	08:28	14:26 (28) 07:57	15:35 (29) 06:59	06:43	18:55 (3) 05:33	19:54 (20) 04:42	20:23 (2)		
2	15:54	35 15:01 (28) 16:46	18 15:53 (29) 17:43	19:42	19 19:14 (3) 20:39	15 20:09 (20) 21:29	25 20:48 (2)		
3	08:28	14:26 (28) 07:55	15:36 (29) 06:56	06:40	18:54 (3) 05:31	19:54 (20) 04:41	20:24 (2)		
4	15:57	34 15:00 (28) 16:48	16 15:52 (29) 17:45	19:44	20 19:14 (3) 20:40	16 20:15 (20) 21:31	25 20:49 (2)		
5	08:27	14:27 (28) 07:54	15:37 (29) 06:54	06:38	18:54 (3) 05:28	19:54 (20) 04:40	20:24 (2)		
6	15:57	34 15:01 (28) 16:50	22 16:11 (1) 17:47	19:46	20 19:14 (3) 20:42	15 20:09 (20) 21:32	24 20:48 (2)		
7	08:27	14:28 (28) 07:52	15:39 (29) 06:52	06:35	18:54 (3) 05:26	19:54 (20) 04:40	20:24 (2)		
8	15:58	34 15:02 (28) 16:52	25 16:14 (1) 17:49	19:48	18 19:12 (3) 20:44	15 20:09 (20) 21:33	24 20:48 (2)		
9	08:27	14:28 (28) 07:50	15:42 (29) 06:49	06:33	18:55 (3) 05:24	19:54 (20) 04:39	20:24 (2)		
10	15:59	34 15:02 (28) 16:54	27 16:22 (23) 17:51	19:50	17 19:12 (3) 20:46	14 20:08 (20) 21:34	24 20:48 (2)		
11	08:27	14:28 (28) 07:48	15:37 (1) 06:47	06:30	18:55 (3) 05:22	19:55 (20) 04:38	20:25 (2)		
12	16:00	34 15:02 (28) 16:56	28 16:25 (23) 17:53	19:52	15 19:10 (3) 20:48	12 20:07 (20) 21:35	24 20:49 (2)		
13	08:26	14:29 (28) 07:46	15:56 (1) 06:44	06:28	18:57 (3) 05:20	19:56 (20) 04:37	20:24 (2)		
14	16:02	34 15:03 (28) 16:58	31 16:27 (23) 17:55	19:54	11 19:08 (3) 20:50	9 20:05 (20) 21:36	25 20:49 (2)		
15	08:26	14:29 (28) 07:44	15:55 (1) 06:42	06:26	19:00 (3) 05:18	19:58 (20) 04:37	20:25 (2)		
16	16:03	34 15:03 (28) 17:00	34 16:29 (23) 17:57	19:55	6 19:06 (3) 20:51	4 20:02 (20) 21:37	24 20:49 (2)		
17	08:25	14:30 (28) 07:42	15:54 (1) 06:40	06:23	05:17		04:36		
18	16:05	33 15:03 (28) 17:03	37 16:31 (23) 17:59	19:57			21:38	24	
19	08:24	14:30 (28) 07:40	15:54 (1) 06:37	06:21	05:15		04:36	20:25 (2)	
20	16:06	34 15:04 (28) 17:05	37 16:31 (23) 18:00	19:59	20:55		21:39	24	
21	08:24	14:30 (28) 07:38	15:54 (1) 06:35	06:18	17:27 (19) 06:18	05:13	04:35	20:26 (2)	
22	16:08	34 15:04 (28) 17:07	37 16:31 (23) 18:02	9 17:36 (19) 20:01	20:57		21:40	24	
23	08:23	14:31 (28) 07:36	15:54 (1) 06:32	06:16	17:24 (19) 06:16	05:11	04:35	20:26 (2)	
24	16:09	33 15:04 (28) 17:09	38 16:32 (23) 18:04	13 17:37 (19) 20:03	20:58		21:41	23	
25	08:22	14:32 (28) 07:34	15:54 (1) 06:30	06:14	17:24 (19) 06:14	05:09	04:34	20:26 (2)	
26	16:11	32 15:04 (28) 17:11	37 16:31 (23) 18:06	15 17:39 (19) 20:05	21:00		21:41	24	
27	08:21	14:33 (28) 07:32	15:53 (1) 06:27	06:11	17:22 (19) 06:11	05:07	04:34	20:27 (2)	
28	16:13	31 15:04 (28) 17:13	37 16:30 (23) 18:08	17 17:39 (19) 20:07	21:02		21:42	23	
29	08:20	14:33 (28) 07:30	15:53 (1) 06:25	06:09	17:22 (19) 06:09	05:06	04:34	20:27 (2)	
30	16:14	32 15:05 (28) 17:15	36 16:29 (23) 18:10	18 17:40 (19) 20:09	21:04		21:43	23	
31	08:19	14:34 (28) 07:28	15:54 (1) 06:23	06:06	17:21 (19) 06:06	05:04	04:34	20:27 (2)	
32	16:16	31 15:05 (28) 17:17	34 16:28 (23) 18:12	18 17:39 (19) 20:10	21:05		21:43	24	
33	08:18	14:36 (28) 07:26	15:54 (1) 06:20	06:04	17:22 (19) 06:04	05:02	04:34	20:28 (2)	
34	16:18	29 15:05 (28) 17:19	32 16:26 (23) 18:14	17 17:39 (19) 20:12	21:07		21:44	23	
35	08:17	14:36 (28) 07:24	15:54 (1) 06:18	06:02	17:22 (19) 06:02	05:01	04:33	20:28 (2)	
36	16:19	28 15:04 (28) 17:21	27 16:21 (1) 18:16	15 17:37 (19) 20:14	21:09		21:44	23	
37	08:16	14:37 (28) 07:22	15:55 (1) 06:15	06:01	17:23 (19) 05:59	04:59	04:33	20:28 (2)	
38	16:21	33 15:44 (29) 17:23	26 16:21 (1) 18:18	14 17:37 (19) 20:16	21:10	7 20:38 (2)	21:44	23	
39	08:15	14:38 (28) 07:19	15:56 (1) 06:13	06:04	17:24 (19) 05:57	04:58	04:34	20:28 (2)	
40	16:23	35 15:46 (29) 17:25	24 16:20 (1) 18:20	10 17:34 (19) 20:18	21:12	10 20:38 (2)	21:45	23	
41	08:14	14:39 (28) 07:17	15:58 (1) 06:10	06:00	17:27 (19) 05:55	04:56	04:34	20:28 (2)	
42	16:25	37 15:48 (29) 17:27	21 16:19 (1) 18:22	4 17:31 (19) 20:20	21:14	13 20:40 (2)	21:45	23	
43	08:12	14:40 (28) 07:15	15:59 (1) 06:08	06:02	05:52	04:55	04:34	20:28 (2)	
44	16:27	36 15:49 (29) 17:29	18 16:17 (1) 18:23	06:02	20:22	21:15	15 20:42 (2)	21:45	23
45	08:11	14:43 (28) 07:13	16:01 (1) 06:05	06:00	05:50	04:53	04:34	20:29 (2)	
46	16:29	34 15:50 (29) 17:31	13 16:14 (1) 18:25	06:04	20:24	21:17	18 20:44 (2)	21:45	23
47	08:10	14:45 (28) 07:10	06:03	05:48	04:52	04:52	04:34	20:29 (2)	
48	16:31	31 15:51 (29) 17:33	18:27	06:05	20:25	21:18	19 20:44 (2)	21:45	23
49	08:08	14:49 (28) 07:08	06:00	05:46	04:50	04:50	20:24 (2)	04:35	20:29 (2)
50	16:32	25 15:52 (29) 17:35	18:29	06:07	20:27	21:20	21 20:45 (2)	21:46	23
51	08:07	15:34 (29) 07:06	05:58	05:43	04:49	04:49	20:24 (2)	04:35	20:29 (2)
52	16:34	19 15:53 (29) 17:37	18:31	06:09	20:29	1 20:00 (20) 21:21	22 20:46 (2)	21:46	24
53	08:05	15:33 (29) 07:03	05:55	05:41	04:48	19:57 (20) 04:48	20:24 (2)	04:36	20:29 (2)
54	16:36	20 15:53 (29) 17:39	18:33	3 18:06 (3) 20:31	5 20:02 (20) 21:23	22 20:46 (2)	21:45	23	
55	08:04	15:34 (29) 07:01	05:53	17:59 (3) 05:39	19:56 (20) 04:47	20:24 (2)	04:36	20:30 (2)	
56	16:38	20 15:54 (29) 17:41	18:35	8 18:07 (3) 20:33	8 20:04 (20) 21:24	23 20:47 (2)	21:45	23	
57	08:02	15:34 (29) 07:00	05:50	18:58 (3) 05:37	19:55 (20) 04:45	20:24 (2)	04:37	20:29 (2)	
58	16:40	20 15:54 (29) 17:42	19:37	12 19:10 (3) 20:35	10 20:05 (20) 21:25	23 20:47 (2)	21:45	24	
59	08:00	15:34 (29) 07:00	06:48	18:56 (3) 05:35	19:54 (20) 04:44	20:24 (2)	04:37	20:30 (2)	
60	16:42	20 15:54 (29) 17:43	19:38	15 19:11 (3) 20:37	13 20:07 (20) 21:27	23 20:47 (2)	21:45	23	
61	07:59	15:35 (29) 07:00	06:45	18:55 (3) 05:34	04:43	04:43	20:23 (2)		
62	16:44	18 15:53 (29) 17:44	19:40	18 19:13 (3) 20:38	21:28	24 20:47 (2)			
63	Sonnenscheinstunden	248	272	367	421	496	512	708	
64	astr.max.mögl.Beschattung	938	655	206	163	340	708	045	
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.91	0.91	
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	0.91	
67	Reduktion Windrichtung	0.68	0.70	0.68	0.66	0.63	0.63	0.62	
68	Gesamte Reduktion	0.11	0.15	0.20	0.25	0.29	0.29	0.26	
69	Met.wahrsch.Beschattung	102	100	40	41	99	183		

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:53 / 92

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

André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AR - IO44

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember	
1	04:38		20:30 (2) 05:19		06:14		07:08		18:04 (19) 07:07		15:24 (1) 08:03	14:13 (28)
2	21:44	24	20:54 (2) 21:08		20:01		18:46	14	18:18 (19) 16:35	37	16:01 (23) 15:50	33 14:46 (28)
3	04:39		20:30 (2) 05:20		06:16		07:10		18:05 (19) 07:09		15:24 (1) 08:05	14:13 (28)
4	21:44	24	20:54 (2) 21:07		19:59		18:44	10	18:15 (19) 16:33	36	16:00 (23) 15:49	34 14:47 (28)
5	04:40		20:30 (2) 05:22		06:17		07:12		18:06 (19) 07:11		15:25 (1) 08:06	14:14 (28)
6	21:44	24	20:54 (2) 21:05		19:56		18:41	6	18:12 (19) 16:31	34	15:59 (23) 15:48	34 14:48 (28)
7	04:40		20:30 (2) 05:24		06:19		07:13		18:07 (19) 07:10		15:25 (1) 08:08	14:13 (28)
8	21:43	25	20:55 (2) 21:03		19:54	5	18:57 (3) 07:14		16:29	31	15:56 (23) 15:47	34 14:47 (28)
9	04:41		20:31 (2) 05:25		20:08 (20) 06:21		18:53 (3) 07:15		16:29	31	15:56 (23) 15:47	34 14:47 (28)
10	21:43	24	20:55 (2) 21:01	6	20:14 (20) 19:51	11	19:04 (3) 18:37		16:27	28	15:55 (23) 15:47	34 14:48 (28)
11	04:42		20:31 (2) 05:27		20:06 (20) 06:23		18:48 (3) 07:17		16:27	28	15:55 (23) 15:47	34 14:48 (28)
12	21:42	24	20:55 (2) 20:59	10	20:16 (20) 19:49	15	19:06 (3) 18:34		16:25	29	15:53 (23) 15:46	34 14:48 (28)
13	04:43		20:31 (2) 05:29		20:04 (20) 06:25		18:50 (3) 07:19		16:25	29	15:53 (23) 15:46	34 14:48 (28)
14	21:41	25	20:56 (2) 20:57	12	20:16 (20) 19:46	17	19:07 (3) 18:32		16:23	26	15:45 (1) 15:46	34 14:49 (28)
15	04:44		20:31 (2) 05:31		20:03 (20) 06:26		18:49 (3) 07:21		16:23	26	15:45 (1) 15:46	34 14:49 (28)
16	21:41	25	20:56 (2) 20:55	14	20:17 (20) 19:44	19	19:08 (3) 18:29		16:21	21	15:41 (1) 15:45	34 14:49 (28)
17	04:45		20:31 (2) 05:33		20:03 (20) 06:28		18:48 (3) 07:23		16:21	21	15:41 (1) 15:45	34 14:49 (28)
18	21:40	25	20:56 (2) 20:53	15	20:18 (20) 19:41	19	19:07 (3) 18:27		16:20	16	15:23 (29) 15:45	34 14:49 (28)
19	04:46		20:32 (2) 05:34		20:02 (20) 06:30		18:47 (3) 07:25		16:20	16	15:23 (29) 15:45	34 14:49 (28)
20	21:39	24	20:56 (2) 20:51	16	20:18 (20) 19:39	20	19:07 (3) 18:24		16:18	18	15:24 (29) 15:45	35 14:51 (28)
21	04:48		20:32 (2) 05:36		20:02 (20) 06:32		18:47 (3) 07:27		16:18	18	15:24 (29) 15:45	35 14:51 (28)
22	21:38	24	20:56 (2) 20:49	16	20:18 (20) 19:36	20	19:07 (3) 18:22		16:16	18	15:25 (29) 15:44	35 14:51 (28)
23	04:49		20:32 (2) 05:38		20:02 (20) 06:34		18:48 (3) 07:28		16:16	18	15:25 (29) 15:44	35 14:51 (28)
24	21:37	24	20:56 (2) 20:47	15	20:17 (20) 19:34	18	19:06 (3) 18:20		16:14	19	15:26 (29) 15:44	35 14:51 (28)
25	04:50		20:32 (2) 05:40		20:02 (20) 06:35		18:47 (3) 07:30		16:14	19	15:26 (29) 15:44	35 14:51 (28)
26	21:36	24	20:56 (2) 20:45	12	20:14 (20) 19:31	16	19:03 (3) 18:17		16:13	20	15:26 (29) 15:44	34 14:51 (28)
27	04:51		20:32 (2) 05:41		20:02 (20) 06:37		18:48 (3) 07:32		16:13	20	15:26 (29) 15:44	34 14:51 (28)
28	21:35	24	20:56 (2) 20:43	10	20:12 (20) 19:29	12	19:00 (3) 18:15		16:11	20	15:26 (29) 15:44	35 14:52 (28)
29	04:53		20:32 (2) 05:43		20:03 (20) 06:39		18:49 (3) 07:34		16:11	20	15:26 (29) 15:44	35 14:52 (28)
30	21:34	23	20:55 (2) 20:40	8	20:11 (20) 19:26	9	18:58 (3) 18:12		16:09	20	15:26 (29) 15:44	34 14:52 (28)
31	04:54		20:33 (2) 05:45		20:04 (20) 06:41		18:51 (3) 07:36		16:08	18	15:27 (29) 15:44	34 14:52 (28)
1	21:33	23	20:56 (2) 20:38	4	20:08 (20) 19:24	5	18:56 (3) 18:10		16:08	18	15:27 (29) 15:44	35 14:53 (28)
2	04:55		20:34 (2) 05:47		06:43		07:38		16:08	18	15:27 (29) 15:44	35 14:53 (28)
3	21:32	21	20:55 (2) 20:36		19:21		18:08		16:06	25	15:25 (29) 15:44	34 14:53 (28)
4	04:57		20:34 (2) 05:49		06:44		07:40		16:06	25	15:25 (29) 15:44	34 14:53 (28)
5	21:30	21	20:55 (2) 20:34		19:19		18:05	7	16:36 (1) 07:40		14:19 (28) 08:23	14:20 (28)
6	04:58		20:34 (2) 05:50		06:46		07:42		16:43 (1) 07:40		15:25 (29) 15:45	34 14:54 (28)
7	21:29	20	20:54 (2) 20:31		19:16		18:03	15	16:32 (1) 07:42	31	15:25 (29) 15:45	34 14:54 (28)
8	04:59		20:35 (2) 05:52		06:48		07:44		16:32 (1) 07:42		14:17 (28) 08:24	14:19 (28)
9	21:28	19	20:54 (2) 20:29		19:14		18:01	19	16:47 (1) 07:43	36	15:24 (29) 15:45	35 14:54 (28)
10	05:01		20:36 (2) 05:54		06:50		07:46		16:29 (1) 07:44		14:15 (28) 08:25	14:20 (28)
11	21:26	16	20:52 (2) 20:27		19:11		17:59	19	16:48 (1) 16:02	36	15:24 (29) 15:45	35 14:55 (28)
12	05:02		20:37 (2) 05:56		06:52		07:48		16:28 (1) 07:46		14:14 (28) 08:25	14:21 (28)
13	21:25	15	20:52 (2) 20:25		19:09		17:56	22	16:50 (1) 16:01	37	15:23 (29) 15:46	34 14:55 (28)
14	05:04		20:38 (2) 05:58		06:53		07:49		16:26 (1) 07:48		14:14 (28) 08:26	14:21 (28)
15	21:23	12	20:50 (2) 20:22		19:06	9	18:09 (19) 07:49	25	16:51 (1) 15:59	35	15:22 (29) 15:46	34 14:55 (28)
16	05:06		20:39 (2) 05:59		06:55		07:51		16:25 (1) 07:49		14:13 (28) 08:26	14:22 (28)
17	21:22	9	20:48 (2) 20:20		19:04	13	18:20 (19) 17:52	26	16:25 (1) 07:49	33	15:20 (29) 15:46	34 14:57 (28)
18	05:07		20:43 (2) 06:01		06:57		07:53		16:24 (1) 07:51		14:13 (28) 08:27	14:22 (28)
19	21:20	4	20:47 (2) 20:18		19:01	15	18:21 (19) 16:50	28	16:52 (1) 15:57	28	14:41 (28) 15:47	35 14:57 (28)
20	05:09		06:03		06:59		06:55		15:23 (1) 07:53		14:13 (28) 08:27	14:23 (28)
21	21:19		20:15		18:59	16	18:20 (19) 16:47	33	15:56 (23) 15:54	30	14:43 (28) 15:48	34 14:57 (28)
22	05:10		06:05		07:01		06:57		15:23 (1) 07:56		14:13 (28) 08:28	14:23 (28)
23	21:17		20:13		18:56	18	18:21 (19) 16:45	36	16:24 (1) 07:51	31	14:44 (28) 15:49	35 14:58 (28)
24	05:12		06:07		07:02		06:59		16:59 (23) 15:53	31	14:44 (28) 15:49	35 14:58 (28)
25	21:15		20:11		18:54	17	18:20 (19) 16:43	38	15:22 (1) 07:58		14:13 (28) 08:28	14:24 (28)
26	05:14		06:08		07:04		07:01		16:00 (23) 15:52	31	14:44 (28) 15:50	34 14:58 (28)
27	21:14		20:08		18:51	17	18:20 (19) 16:41	38	15:23 (1) 08:00		14:13 (28) 08:28	14:24 (28)
28	05:15		06:10		07:06		07:03		16:01 (23) 15:51	32	14:45 (28) 15:51	35 14:59 (28)
29	21:12		20:06		18:49	16	18:19 (19) 16:39	38	15:23 (1) 08:01		14:13 (28) 08:28	14:25 (28)
30	05:17		06:12		07:05		07:05		16:01 (23) 15:51	33	14:46 (28) 15:52	34 14:59 (28)
31	21:10		20:03		18:47		16:37	38	15:23 (1)		14:25 (28) 15:52	34 14:59 (28)
Summe	514		461		383		328		16:01 (23)	257	15:53	35 15:00 (28)
astr.max.mögl.Beschattung	523		138		307		428				231	
Red.Sonnenscheinwahrsch.	0.44		0.48		0.40		0.33				0.21	
Reduktion Betriebsdauer	0.91		0.91		0.91		0.91				0.91	
Reduktion Windrichtung	0.62		0.64		0.68		0.70				0.69	
Gesamte Reduktion	0.25		0.28		0.25		0.21				0.13	
Met.wahrsch.Beschattung	132		39		77		90				110	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 93

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AS - IO45

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28	14:30 (28) 07:57	15:37 (29) 06:59	06:43	18:57 (3) 05:33	19:55 (20) 04:42	20:24 (2)	
2	08:28	14:30 (28) 07:57	15:37 (29) 06:59	06:43	19:16 (3) 05:31	20:09 (20) 04:29	20:48 (2)	
3	08:28	14:31 (28) 07:54	15:38 (29) 06:54	06:38	18:56 (3) 05:28	19:55 (20) 04:40	20:25 (2)	
4	08:27	14:31 (28) 07:52	15:40 (29) 06:52	06:35	19:15 (3) 05:26	20:10 (20) 04:32	20:49 (2)	
5	08:27	14:31 (28) 07:50	15:41 (29) 06:49	06:33	19:14 (3) 05:24	20:09 (20) 04:39	20:25 (2)	
6	08:27	14:31 (28) 07:48	15:45 (29) 06:47	06:30	19:14 (3) 05:22	20:09 (20) 04:34	20:29 (2)	
7	08:26	14:33 (28) 07:46	16:00 (1) 06:44	06:28	19:12 (3) 05:20	20:08 (20) 04:35	20:25 (2)	
8	08:26	14:33 (28) 07:44	16:00 (1) 06:42	06:26	19:11 (3) 05:18	20:06 (20) 04:37	20:26 (2)	
9	08:25	14:33 (28) 07:42	16:29 (23) 07:57	19:55	19:09 (3) 05:17	20:04 (20) 04:37	20:50 (2)	
10	08:24	14:33 (28) 07:40	16:32 (23) 07:59	19:57	18:59 (3) 05:15	20:04 (20) 04:37	20:26 (2)	
11	08:24	14:34 (28) 07:38	16:34 (23) 08:02	19:59	18:59 (3) 05:13	20:04 (20) 04:37	20:26 (2)	
12	08:23	14:34 (28) 07:36	16:34 (23) 08:04	20:01	18:59 (3) 05:11	20:04 (20) 04:37	20:26 (2)	
13	08:22	14:35 (28) 07:34	16:34 (23) 08:06	20:03	18:59 (3) 05:09	20:04 (20) 04:37	20:26 (2)	
14	08:21	14:36 (28) 07:32	16:34 (23) 08:08	20:05	18:59 (3) 05:07	20:04 (20) 04:37	20:26 (2)	
15	08:20	14:36 (28) 07:30	16:34 (23) 08:10	20:07	18:59 (3) 05:05	20:04 (20) 04:37	20:26 (2)	
16	08:19	14:37 (28) 07:28	16:34 (23) 08:12	20:09	18:59 (3) 05:03	20:04 (20) 04:37	20:26 (2)	
17	08:18	14:38 (28) 07:26	16:34 (23) 08:14	20:11	18:59 (3) 05:01	20:04 (20) 04:37	20:26 (2)	
18	08:17	14:38 (28) 07:24	16:34 (23) 08:16	20:13	18:59 (3) 05:00	20:04 (20) 04:37	20:26 (2)	
19	08:16	14:40 (28) 07:22	16:34 (23) 08:18	20:15	18:59 (3) 04:59	20:04 (20) 04:37	20:26 (2)	
20	08:15	14:40 (28) 07:20	16:34 (23) 08:20	20:17	18:59 (3) 04:57	20:04 (20) 04:37	20:26 (2)	
21	08:14	14:42 (28) 07:18	16:34 (23) 08:22	20:19	18:59 (3) 04:55	20:04 (20) 04:37	20:26 (2)	
22	08:12	14:42 (28) 07:16	16:34 (23) 08:24	20:21	18:59 (3) 04:53	20:04 (20) 04:37	20:26 (2)	
23	08:11	14:44 (28) 07:14	16:34 (23) 08:26	20:23	18:59 (3) 04:51	20:04 (20) 04:37	20:26 (2)	
24	08:10	14:45 (28) 07:12	16:34 (23) 08:28	20:25	18:59 (3) 04:49	20:04 (20) 04:37	20:26 (2)	
25	08:08	14:48 (28) 07:10	16:34 (23) 08:30	20:27	18:59 (3) 04:47	20:04 (20) 04:37	20:26 (2)	
26	08:07	14:50 (28) 07:08	16:34 (23) 08:32	20:29	18:59 (3) 04:45	20:04 (20) 04:37	20:26 (2)	
27	08:05	14:52 (28) 07:06	16:34 (23) 08:34	20:31	18:59 (3) 04:43	20:04 (20) 04:37	20:26 (2)	
28	08:04	14:55 (28) 07:04	16:34 (23) 08:36	20:33	18:59 (3) 04:41	20:04 (20) 04:37	20:26 (2)	
29	08:02	14:58 (28) 07:02	16:34 (23) 08:38	20:35	18:59 (3) 04:39	20:04 (20) 04:37	20:26 (2)	
30	08:00	15:00 (28) 07:00	16:34 (23) 08:40	20:37	18:59 (3) 04:37	20:04 (20) 04:37	20:26 (2)	
31	07:59	15:03 (28) 06:58	16:34 (23) 08:42	20:39	18:59 (3) 04:35	20:04 (20) 04:37	20:26 (2)	
16:44	19:15 (29) 06:56	16:34 (23) 08:44	20:41	18:59 (3) 04:33	20:04 (20) 04:37	20:26 (2)		
Sonnenscheinstunden	248	272	367	421	496	512		
astr.max.mögl.Beschattung	974	660	195	166	329	704		
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45		
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91		
Reduktion Windrichtung	0.68	0.70	0.68	0.66	0.63	0.62		
Gesamte Reduktion	0.11	0.15	0.20	0.25	0.29	0.26		
Met.wahrsch.Beschattung	106	101	38	42	96	182		

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 94

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AS - IO45

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli		August		September		Oktober		November		Dezember			
1	04:38		20:31 (2) 05:19		06:14		07:08		18:07 (19) 07:07		15:28 (1) 08:03	14:16 (28)		
2	21:44	24	20:55 (2) 21:08		20:01		18:46		11 18:18 (19) 16:35	35	16:03 (23) 15:50	34 14:50 (28)		
3	04:39		20:31 (2) 05:20		06:16		07:10		18:09 (19) 07:09		15:28 (1) 08:05	14:17 (28)		
4	21:44	23	20:54 (2) 21:07		19:59		18:44		7 18:16 (19) 16:33	33	16:01 (23) 15:49	34 14:51 (28)		
5	04:40		20:31 (2) 05:22		06:17		07:12				15:29 (1) 08:06	14:17 (28)		
6	21:44	24	20:55 (2) 21:05		19:56		18:41			16:31	30	15:59 (23) 15:48	35 14:52 (28)	
7	04:40		20:31 (2) 05:24		06:19		18:57 (3) 07:14			07:13		15:30 (1) 08:08	14:17 (28)	
8	21:43	24	20:55 (2) 21:03		19:54	9	19:06 (3) 18:39			16:29	26	15:56 (23) 15:47	34 14:51 (28)	
9	04:41		20:32 (2) 05:25		20:08 (20) 06:21		18:53 (3) 07:15			07:15		15:15 (29) 08:09	14:18 (28)	
10	21:43	24	20:56 (2) 21:01	7	20:15 (20) 19:51	14	19:07 (3) 18:37			16:27	25	15:56 (23) 15:47	34 14:52 (28)	
11	04:42		20:32 (2) 05:27		20:06 (20) 06:23		18:52 (3) 07:17			07:17		15:12 (29) 08:10	14:18 (28)	
12	21:42	24	20:56 (2) 20:59	11	20:17 (20) 19:49	16	19:08 (3) 18:34			16:25	23	15:47 (1) 15:46	34 14:52 (28)	
13	04:43		20:32 (2) 05:29		20:05 (20) 06:25		18:51 (3) 07:19			07:19		15:10 (29) 08:12	14:19 (28)	
14	21:41	24	20:56 (2) 20:57	13	20:18 (20) 19:46	18	19:09 (3) 18:32			16:23	14	15:24 (29) 15:46	34 14:53 (28)	
15	04:44		20:32 (2) 05:31		20:04 (20) 06:26		18:50 (3) 07:21			07:21		15:09 (29) 08:13	14:19 (28)	
16	21:41	24	20:56 (2) 20:55	14	20:18 (20) 19:44	19	19:09 (3) 18:29			16:21	16	15:25 (29) 15:45	34 14:53 (28)	
17	04:45		20:32 (2) 05:33		20:04 (20) 06:28		18:49 (3) 07:23			07:23		15:08 (29) 08:14	14:19 (28)	
18	21:40	25	20:57 (2) 20:53	15	20:19 (20) 19:41	19	19:08 (3) 18:27			16:20	18	15:26 (29) 15:45	34 14:53 (28)	
19	04:46		20:33 (2) 05:34		20:03 (20) 06:30		18:49 (3) 07:25			07:25		15:08 (29) 08:16	14:20 (28)	
20	21:39	24	20:57 (2) 20:51	16	20:19 (20) 19:39	19	19:08 (3) 18:24			16:18	18	15:26 (29) 15:45	34 14:54 (28)	
21	04:48		20:33 (2) 05:36		20:03 (20) 06:32		18:49 (3) 07:27			07:27		15:08 (29) 08:17	14:20 (28)	
22	21:38	24	20:57 (2) 20:49	15	20:18 (20) 19:36	19	19:08 (3) 18:22			16:16	19	15:27 (29) 15:44	34 14:54 (28)	
23	04:49		20:33 (2) 05:38		20:03 (20) 06:34		18:49 (3) 07:28			07:29		15:08 (29) 08:18	14:20 (28)	
24	21:37	24	20:57 (2) 20:47	14	20:17 (20) 19:34	17	19:06 (3) 18:20			16:14	20	15:28 (29) 15:44	35 14:55 (28)	
25	04:50		20:33 (2) 05:40		20:03 (20) 06:35		18:49 (3) 07:30			07:31		15:08 (29) 08:19	14:24 (28)	
26	21:36	23	20:56 (2) 20:45	11	20:14 (20) 19:31	14	19:03 (3) 18:17			16:13	20	15:28 (29) 15:44	34 14:55 (28)	
27	04:51		20:33 (2) 05:41		20:04 (20) 06:37		18:50 (3) 07:32			07:33		15:08 (29) 08:20	14:21 (28)	
28	21:35	23	20:56 (2) 20:43	8	20:12 (20) 19:29	10	19:00 (3) 18:15			16:11	20	15:28 (29) 15:44	34 14:55 (28)	
29	04:53		20:33 (2) 05:43		20:05 (20) 06:39		18:52 (3) 07:34			07:35		15:09 (29) 08:21	14:22 (28)	
30	21:34	23	20:56 (2) 20:40	6	20:11 (20) 19:26	6	18:58 (3) 18:12			16:09	18	15:27 (29) 15:44	34 14:56 (28)	
31	04:54		20:34 (2) 05:45		20:05 (20) 06:41		07:36			07:36		14:23 (28) 08:22	14:22 (28)	
32	21:33	22	20:56 (2) 20:38	3	20:08 (20) 19:24		18:10			16:08	30	15:27 (29) 15:44	34 14:56 (28)	
33	04:55		20:35 (2) 05:47		06:43		07:38			16:38 (1) 07:38		14:21 (28) 08:23	14:23 (28)	
34	21:32	21	20:56 (2) 20:36		19:21		18:08		9	16:47 (1) 16:06	33	15:27 (29) 15:44	34 14:57 (28)	
35	04:57		20:35 (2) 05:49		06:44		07:40			16:35 (1) 07:40		14:19 (28) 08:23	14:24 (28)	
36	21:30	20	20:55 (2) 20:34		19:19		18:05		15	16:50 (1) 16:05	36	15:26 (29) 15:45	33 14:57 (28)	
37	04:58		20:35 (2) 05:50		06:46		07:42			16:33 (1) 07:42		14:18 (28) 08:24	14:24 (28)	
38	21:29	19	20:54 (2) 20:31		19:16		18:03		19	16:52 (1) 16:03	37	15:26 (29) 15:45	33 14:57 (28)	
39	04:59		20:35 (2) 05:52		06:48		07:44			16:31 (1) 07:44		14:17 (28) 08:25	14:24 (28)	
40	21:28	18	20:54 (2) 20:29		19:14		18:01		22	16:53 (1) 16:02	37	15:25 (29) 15:45	34 14:58 (28)	
41	05:01		20:37 (2) 05:54		06:50		07:46			16:29 (1) 07:46		14:17 (28) 08:25	14:25 (28)	
42	21:26	15	20:52 (2) 20:27		19:11		17:59		25	16:54 (1) 16:01	36	15:24 (29) 15:46	34 14:59 (28)	
43	05:02		20:39 (2) 05:56		06:52		18:12 (19) 07:48			16:28 (1) 07:48		14:16 (28) 08:26	14:25 (28)	
44	21:25	13	20:52 (2) 20:25		19:09	8	18:20 (19) 17:56		27	16:55 (1) 15:59	32	15:21 (29) 15:46	34 14:59 (28)	
45	05:04		20:40 (2) 05:58		06:53		18:09 (19) 07:49			16:27 (1) 07:49		14:16 (28) 08:26	14:26 (28)	
46	21:23	10	20:50 (2) 20:22		19:06	13	18:22 (19) 17:54		28	16:55 (1) 15:58	29	14:45 (28) 15:46	34 15:00 (28)	
47	05:06		20:41 (2) 05:59		06:55		18:08 (19) 07:51			16:27 (1) 07:51		14:16 (28) 08:27	14:26 (28)	
48	21:22	7	20:48 (2) 20:20		19:04	15	18:23 (19) 17:52		31	16:58 (23) 15:57	30	14:46 (28) 15:47	34 15:00 (28)	
49	05:07		20:41 (2) 06:01		06:57		18:07 (19) 06:53			15:26 (1) 07:53		14:15 (28) 08:27	14:27 (28)	
50	21:20		20:18		19:01	16	18:23 (19) 16:50		34	16:00 (23) 15:56	31	14:46 (28) 15:48	33 15:00 (28)	
51	05:09		20:03		06:59		18:05 (19) 06:55			15:26 (1) 07:55		14:15 (28) 08:28	14:27 (28)	
52	21:19		20:15		18:59	18	18:23 (19) 16:47		35	16:01 (23) 15:54	32	14:47 (28) 15:48	34 15:01 (28)	
53	05:10		20:05		07:01		18:05 (19) 06:57			15:25 (1) 07:56		14:16 (28) 08:28	14:27 (28)	
54	21:17		20:13		18:56	17	18:22 (19) 16:45		36	16:02 (23) 15:53	32	14:48 (28) 15:49	34 15:01 (28)	
55	05:12		20:07		07:02		18:05 (19) 06:59			15:25 (1) 07:58		14:16 (28) 08:28	14:28 (28)	
56	21:15		20:11		18:54	17	18:22 (19) 16:43		37	16:02 (23) 15:52	33	14:49 (28) 15:50	34 15:02 (28)	
57	05:14		20:08		07:04		18:05 (19) 07:01			15:27 (1) 08:00		14:16 (28) 08:28	14:28 (28)	
58	21:14		20:08		18:51	17	18:22 (19) 16:41		37	16:04 (23) 15:51	34	14:50 (28) 15:51	34 15:02 (28)	
59	05:15		20:06		07:06		18:06 (19) 07:03			15:27 (1) 08:01		14:16 (28) 08:28	14:29 (28)	
60	21:12		20:06		18:49	14	18:20 (19) 16:39		36	16:03 (23) 15:51	34	14:50 (28) 15:52	34 15:03 (28)	
61	05:17		06:12				07:05			15:27 (1)			08:28	14:29 (28)
62	21:10		20:03				16:37		36	16:03 (23)		15:53	34	15:03 (28)
63	Sonnenscheinstunden	514	461		383		328		257			231		
64	astr.max.mögl.Beschattung	502	133		315		445		832			1053		
65	Red.Sonnenscheinwahrsch.	0.44	0.48		0.40		0.33		0.21			0.14		
66	Reduktion Betriebsdauer	0.91	0.91		0.91		0.91		0.91			0.91		
67	Reduktion Windrichtung	0.62	0.64		0.68		0.70		0.69			0.68		
68	Gesamte Reduktion	0.25	0.28		0.25		0.21		0.13			0.09		
69	Met.wahrsch.Beschattung	127	38		79		94		109			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	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
--------------	-----------------------	-------------------------	----------------------	----------------------------------	------------------------------	--	---------------------------------------

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 95
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersiezug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AT - IO46

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28	09:24 (24) 07:57	08:38 (27) 06:59	06:43	07:10 (28) 05:33	04:42
2	15:54	15 09:39 (24) 16:46	18 08:56 (27) 17:43	19:42	18 07:28 (23) 20:39	21:30
3	08:28	09:25 (24) 07:55	08:36 (27) 06:57	06:40	07:09 (23) 05:31	04:41
4	15:57	15 09:40 (24) 16:48	22 08:59 (27) 17:45	19:44	19 07:28 (23) 20:40	21:31
5	08:27	09:25 (24) 07:54	08:36 (27) 06:54	06:38	07:08 (23) 05:29	04:41
6	15:57	14 09:39 (24) 16:50	25 09:01 (27) 17:47	19:46	21 07:29 (23) 20:42	21:32
7	08:27	09:26 (24) 07:52	08:35 (27) 06:52	06:36	07:07 (23) 05:27	04:40
8	15:58	14 09:40 (24) 16:52	27 09:02 (27) 17:49	19:48	22 07:29 (23) 20:44	21:33
9	08:27	09:27 (24) 07:50	08:34 (27) 06:49	06:33	07:06 (23) 05:25	04:39
10	15:59	12 09:39 (24) 16:54	29 09:03 (27) 17:51	19:50	23 07:29 (23) 20:46	21:34
11	08:27	09:27 (24) 07:48	08:33 (27) 06:47	06:31	07:05 (23) 05:23	04:38
12	16:01	12 09:39 (24) 16:57	31 09:04 (27) 17:53	7 07:25 (29) 19:52	23 07:28 (23) 20:48	21:35
13	08:26	09:29 (24) 07:46	08:33 (27) 06:45	07:22 (29) 06:28	06:52 (1) 05:21	04:37
14	16:02	10 09:39 (24) 16:59	32 09:05 (27) 17:55	14 07:36 (29) 19:54	30 07:28 (23) 20:50	21:36
15	08:26	09:31 (24) 07:44	08:31 (27) 06:42	07:19 (29) 06:26	06:50 (1) 05:19	04:37
16	16:03	7 09:38 (24) 17:01	34 09:05 (27) 17:57	18 07:37 (29) 19:56	35 07:28 (23) 20:51	21:37
17	08:25	09:33 (24) 07:42	08:31 (27) 06:40	07:17 (29) 06:23	06:47 (1) 05:17	04:36
18	16:05	3 09:36 (24) 17:03	35 09:06 (27) 17:59	22 07:39 (29) 19:57	36 07:26 (23) 20:53	21:38
19	08:24	07:40	08:31 (27) 06:37	07:17 (29) 06:21	06:45 (1) 05:15	04:36
20	16:06	17:05	35 09:06 (27) 18:01	23 07:40 (29) 19:59	39 07:26 (23) 20:55	21:39
21	08:24	07:38	08:31 (27) 06:35	07:15 (29) 06:18	06:45 (1) 05:13	04:35
22	16:08	17:07	36 09:07 (27) 18:03	25 07:40 (29) 20:01	37 07:25 (23) 20:57	21:40
23	08:23	07:36	08:31 (27) 06:32	07:15 (29) 06:16	06:43 (1) 05:11	04:35
24	16:09	17:09	36 09:07 (27) 18:04	26 07:41 (29) 20:03	35 07:22 (23) 20:59	21:41
25	08:22	07:34	08:31 (27) 06:30	07:14 (29) 06:14	06:43 (1) 05:09	04:34
26	16:11	17:11	36 09:07 (27) 18:06	27 07:41 (29) 20:05	31 07:20 (23) 21:00	21:41
27	08:21	07:32	08:31 (27) 06:28	07:14 (29) 06:11	06:43 (1) 05:08	04:34
28	16:13	17:13	36 09:07 (27) 18:08	27 07:41 (29) 20:07	22 07:05 (1) 21:02	21:42
29	08:20	07:30	08:30 (27) 06:25	07:13 (29) 06:09	06:43 (1) 05:06	04:34
30	16:14	17:15	36 09:06 (27) 18:10	27 07:40 (29) 20:09	20 07:03 (1) 21:04	21:43
31	08:19	07:28	08:31 (27) 06:23	07:13 (29) 06:07	06:43 (1) 05:04	04:34
1	16:16	17:17	35 09:06 (27) 18:12	27 07:40 (29) 20:11	20 06:43 (1) 21:05	21:43
2	08:18	07:26	08:31 (27) 06:20	07:13 (29) 06:04	06:44 (1) 05:02	04:34
3	16:18	17:19	35 09:06 (27) 18:14	26 07:39 (29) 20:12	18 07:02 (1) 21:07	21:44
4	08:17	07:24	08:32 (27) 06:18	07:14 (29) 06:02	06:44 (1) 05:01	04:34
5	16:20	17:21	34 09:06 (27) 18:16	25 07:39 (29) 20:14	16 07:00 (1) 21:09	21:44
6	08:16	07:22	08:32 (27) 06:15	07:14 (29) 06:00	06:45 (1) 04:59	04:34
7	16:21	17:23	32 09:04 (27) 18:18	23 07:37 (29) 20:16	14 06:59 (1) 21:10	21:45
8	08:15	07:19	08:31 (27) 06:12	07:12 (29) 05:57	06:43 (1) 04:58	04:34
9	16:23	17:25	31 09:04 (27) 18:20	21 07:36 (29) 20:18	10 06:57 (1) 21:12	21:45
10	08:14	07:17	08:34 (27) 06:10	07:16 (29) 05:55	04:56	04:34
11	16:25	17:27	29 09:03 (27) 18:22	17 07:33 (29) 20:20	21:14	21:45
12	08:12	07:15	08:35 (27) 06:08	07:18 (29) 05:53	04:55	04:34
13	16:27	17:29	26 09:01 (27) 18:24	13 07:31 (29) 20:22	21:15	9 05:30 (19) 04:34
14	08:11	07:13	08:37 (27) 06:05	07:23 (29) 05:50	04:53	9 05:39 (19) 21:45
15	16:29	17:31	22 08:59 (27) 18:25	2 07:25 (29) 05:48	12 05:29 (19) 21:46	24 05:28 (19) 04:34
16	08:10	07:10	08:39 (27) 06:03	05:48	04:52	05:28 (19) 21:45
17	16:31	17:33	18 08:57 (27) 18:27	20:26	21:18	14 05:42 (19) 21:46
18	08:08	07:08	08:42 (27) 06:00	06:24 (28) 05:46	04:51	05:26 (19) 21:46
19	16:33	17:35	11 08:53 (27) 18:29	2 06:26 (28) 20:27	21:20	17 05:43 (19) 21:46
20	08:07	07:06	05:58	06:22 (28) 05:44	04:49	05:25 (19) 21:46
21	16:35	17:37	18:31	5 06:27 (28) 20:29	21:21	19 05:44 (19) 21:46
22	08:05	07:04	05:55	06:19 (28) 05:41	04:48	05:25 (19) 21:46
23	16:36	17:39	18:33	8 06:27 (28) 20:31	21:23	19 05:44 (19) 21:45
24	08:04	07:01	05:53	06:17 (28) 05:39	04:47	05:25 (19) 21:45
25	16:38	17:41	18:35	10 06:27 (28) 20:33	21:24	20 05:45 (19) 21:45
26	08:02		06:50	07:14 (28) 05:37	04:46	05:24 (19) 21:45
27	16:40		19:37	13 07:27 (28) 20:35	21:26	22 05:46 (19) 21:45
28	08:01	08:45 (27)	06:48	07:12 (28) 05:35	04:44	05:24 (19) 21:45
29	16:42	4 08:49 (27)	19:39	14 07:26 (28) 20:37	21:27	22 05:46 (19) 21:45
30	07:59	08:41 (27)	06:45	07:09 (28)	04:43	05:24 (19)
31	16:44	13 08:54 (27)	19:40	17 07:26 (23)	21:28	22 05:46 (19)
Sonnenscheinstunden	248	272	367	421	496	512
astr.max.mögl.Beschattung	119	741	439	489	176	735
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
Reduktion Windrichtung	0.59	0.60	0.64	0.68	0.70	0.70
Gesamte Reduktion	0.09	0.13	0.18	0.25	0.32	0.28
Met.wahrsch.Beschattung	11	95	78	121	56	206

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 96

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AT - IO46

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember	
1	04:38	05:29 (19) 05:19	06:14	06:44 (1) 07:08	07:53 (29) 07:07	08:00 (27) 08:03	
2	21:45	25 05:54 (19) 21:09	20:01	37 07:24 (23) 18:47	27 08:20 (29) 16:35	36 08:36 (27) 15:50	
3	04:39	05:30 (19) 05:20	06:16	06:43 (1) 07:10	07:54 (29) 07:09	08:01 (27) 08:05	
4	21:44	24 05:54 (19) 21:07	19:59	39 07:24 (23) 18:44	25 08:19 (29) 16:33	34 08:35 (27) 15:49	
5	04:40	05:29 (19) 05:22	06:18	06:45 (1) 07:12	07:53 (29) 07:11	08:01 (27) 08:06	
6	21:44	25 05:54 (19) 21:05	19:56	36 07:24 (23) 18:42	25 08:18 (29) 16:31	33 08:34 (27) 15:48	
7	04:41	05:30 (19) 05:24	06:19	06:47 (1) 07:14	07:54 (29) 07:13	08:02 (27) 08:08	
8	21:43	24 05:54 (19) 21:03	19:54	35 07:25 (23) 18:39	22 08:16 (29) 16:29	33 08:35 (27) 15:48	
9	04:41	05:30 (19) 05:26	06:21	06:49 (1) 07:15	07:55 (29) 07:15	08:03 (27) 08:09	
10	21:43	25 05:55 (19) 21:01	19:51	31 07:25 (23) 18:37	20 08:15 (29) 16:27	31 08:34 (27) 15:47	
11	04:42	05:30 (19) 05:27	06:23	07:01 (23) 07:17	07:57 (29) 07:17	08:04 (27) 08:10	
12	21:42	25 05:55 (19) 20:59	19:49	23 07:24 (23) 18:34	16 08:13 (29) 16:25	29 08:33 (27) 15:46	
13	04:43	05:31 (19) 05:29	06:25	07:01 (23) 07:19	07:59 (29) 07:19	08:05 (27) 08:12	
14	21:41	24 05:55 (19) 20:57	19:46	23 07:24 (23) 18:32	11 08:10 (29) 16:23	27 08:32 (27) 15:46	
15	04:44	05:31 (19) 05:31	06:27	07:02 (23) 07:21	07:21	08:06 (27) 08:13	
16	21:41	24 05:55 (19) 20:55	19:44	22 07:24 (23) 18:29	16:21	24 08:30 (27) 15:46	
17	04:45	05:31 (19) 05:33	06:28	07:01 (23) 07:23	07:23	08:07 (27) 08:14	
18	21:40	24 05:55 (19) 20:53	19:41	21 07:22 (23) 18:27	16:20	22 08:29 (27) 15:45	
19	04:47	05:31 (19) 05:34	06:30	07:02 (23) 07:25	07:25	08:09 (27) 08:16	
20	21:39	24 05:55 (19) 20:51	19:39	19 07:21 (23) 18:24	16:18	18 08:27 (27) 15:45	
21	04:48	05:32 (19) 05:36	06:32	07:03 (23) 07:27	07:27	08:13 (27) 08:17	
22	21:38	23 05:55 (19) 20:49	19:36	17 07:20 (23) 18:22	16:16	12 08:25 (27) 15:45	
23	04:49	05:32 (19) 05:38	06:34	07:02 (28) 07:29	07:29	08:18 (27) 08:18	
24	21:37	23 05:55 (19) 20:47	19:34	16 07:18 (23) 18:20	16:14	2 08:20 (27) 15:44	
25	04:50	05:32 (19) 05:40	06:36	07:02 (28) 07:30	07:31	08:19	
26	21:36	23 05:55 (19) 20:45	19:32	15 07:17 (28) 18:17	16:13	15:44 16 09:30 (24)	
27	04:51	05:33 (19) 05:42	06:37	07:04 (28) 07:32	07:33	08:20	
28	21:35	21 05:54 (19) 20:43	19:29	13 07:17 (28) 18:15	16:11	15:44 17 09:31 (24)	
29	04:53	05:34 (19) 05:43	06:39	07:06 (28) 07:34	07:35	08:21	
30	21:34	21 05:55 (19) 20:40	19:27	11 07:17 (28) 18:13	16:09	15:44 17 09:32 (24)	
31	04:54	05:34 (19) 05:45	06:41	07:08 (28) 07:36	07:37	08:22	
32	21:33	20 05:54 (19) 20:38	19:24	9 07:17 (28) 18:10	16:08	15:44 17 09:32 (24)	
33	04:55	05:35 (19) 05:47	06:43	07:09 (28) 07:38	07:38	08:23	
34	21:32	18 05:53 (19) 20:36	19:21	6 07:15 (28) 18:08	15 09:27 (27) 16:06	15:44 17 09:33 (24)	
35	04:57	05:35 (19) 05:49	06:45	07:11 (28) 07:40	09:09 (27) 07:40	08:23	
36	21:30	18 05:53 (19) 20:34	19:19	3 07:14 (28) 18:06	20 09:29 (27) 16:05	15:45 18 09:34 (24)	
37	04:58	05:37 (19) 05:51	06:48	07:42	09:07 (27) 07:42	08:24	
38	21:29	15 05:52 (19) 20:32	19:16	19 07:18 (28) 18:03	24 09:31 (27) 16:03	15:45 17 09:34 (24)	
39	05:00	05:38 (19) 05:52	06:48	07:44	09:06 (27) 07:44	08:25	
40	21:28	13 05:51 (19) 20:29	19:14	18:01	26 09:32 (27) 16:02	15:45 17 09:34 (24)	
41	05:01	05:39 (19) 05:54	06:50	08:05 (29) 07:46	09:04 (27) 07:46	08:26	
42	21:26	10 05:49 (19) 20:27	19:11	11 08:16 (29) 17:59	29 09:33 (27) 16:01	15:46 17 09:35 (24)	
43	05:03	05:42 (19) 05:56	06:52	08:01 (29) 07:48	09:03 (27) 07:48	08:26	
44	21:25	6 05:48 (19) 20:25	19:09	16 08:17 (29) 17:56	31 09:34 (27) 15:59	15:46 17 09:35 (24)	
45	05:04	05:58	06:51 (1) 06:54	07:59 (29) 07:50	09:02 (27) 07:50	08:27	
46	21:23	20:22	10 07:01 (1) 19:06	20 08:19 (29) 17:54	33 09:35 (27) 15:58	15:47 17 09:36 (24)	
47	05:06	06:00	06:49 (1) 06:55	07:58 (29) 07:52	09:01 (27) 07:51	08:27	
48	21:22	20:20	14 07:03 (1) 19:04	22 08:20 (29) 17:52	34 09:35 (27) 15:57	15:47 17 09:36 (24)	
49	05:07	06:01	06:47 (1) 06:57	07:57 (29) 06:53	08:01 (27) 07:53	08:27	
50	21:20	20:18	17 07:04 (1) 19:01	24 08:21 (29) 16:50	35 08:36 (27) 15:56	15:48 18 09:37 (24)	
51	05:09	06:03	06:45 (1) 06:59	07:56 (29) 06:55	08:00 (27) 07:55	08:28	
52	21:19	20:15	19 07:04 (1) 18:59	25 08:21 (29) 16:48	36 08:36 (27) 15:55	15:49 18 09:37 (24)	
53	05:10	06:05	06:45 (1) 07:01	07:54 (29) 06:57	08:00 (27) 07:57	08:28	
54	21:17	20:13	20 07:05 (1) 18:56	27 08:21 (29) 16:45	36 08:36 (27) 15:54	15:49 17 09:38 (24)	
55	05:12	06:07	06:44 (1) 07:03	07:54 (29) 06:59	08:00 (27) 07:58	08:28	
56	21:16	20:11	21 07:05 (1) 18:54	27 08:21 (29) 16:43	37 08:37 (27) 15:53	15:50 17 09:38 (24)	
57	05:14	06:09	06:44 (1) 07:04	07:53 (29) 07:01	08:00 (27) 08:00	08:28	
58	21:14	20:08	21 07:05 (1) 18:51	28 08:21 (29) 16:41	37 08:37 (27) 15:52	15:51 17 09:39 (24)	
59	05:15	06:10	06:43 (1) 07:06	07:53 (29) 07:03	08:00 (27) 08:01	08:28	
60	21:12	20:06	30 07:20 (23) 18:49	28 08:21 (29) 16:39	36 08:36 (27) 15:51	15:52 16 09:38 (24)	
61	05:17	06:12	06:43 (1)	07:05	08:00 (27)	08:28	
62	21:10	20:04	35 07:22 (23)	16:37	36 08:36 (27)	15:53 16 09:39 (24)	
63	Sonnenscheinstunden	514	461	383	328	257	231
64	astr.max.mögl.Beschattung	455	187	604	611	301	439
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.70	0.68	0.66	0.61	0.60	0.59
68	Gesamte Reduktion	0.28	0.29	0.24	0.18	0.11	0.07
69	Met.wahrsch.Beschattung	125	55	143	109	34	32

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 97
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AU - IO47

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28	07:57	09:01 (27) 06:59	06:43	07:07 (28) 05:33	04:42
1	15:54	16:46	43 09:44 (27) 17:43	19:42	17 07:24 (28) 20:39	21:29
2	08:28	07:55	09:01 (27) 06:57	06:43	07:04 (28) 05:31	04:41
1	15:56	16:48	43 09:44 (27) 17:45	19:44	19 07:23 (28) 20:40	21:31
3	08:28	07:54	09:01 (27) 06:54	06:38	07:05 (28) 05:29	04:41
1	15:57	16:50	45 09:46 (27) 17:47	19:46	18 07:23 (28) 20:42	21:32
4	08:27	07:52	09:01 (27) 06:52	06:36	07:05 (28) 05:27	04:40
1	15:58	16:52	45 09:46 (27) 17:49	19:48	16 07:21 (28) 20:44	21:33
5	08:27	07:50	09:01 (27) 06:49	06:33	07:06 (28) 05:25	04:39
1	15:59	16:54	45 09:46 (27) 17:51	19:50	14 07:20 (28) 20:46	21:34
6	08:27	07:48	09:01 (27) 06:47	06:31	07:03 (28) 05:23	04:38
1	16:01	16:57	46 09:47 (27) 17:53	12 07:32 (29) 06:31	18 07:21 (28) 20:48	21:35
7	08:26	07:46	09:01 (27) 06:45	07:29 (29) 06:28	07:02 (28) 05:21	04:37
1	16:02	16:59	46 09:47 (27) 17:55	18 07:47 (29) 19:54	21 07:23 (28) 20:50	21:36
8	08:26	07:44	09:00 (27) 06:42	07:26 (29) 06:26	07:01 (28) 05:19	04:37
1	16:03	17:01	46 09:46 (27) 17:57	22 07:48 (29) 19:56	23 07:24 (28) 20:51	21:37
9	08:25	07:42	09:00 (27) 06:40	07:25 (29) 06:23	06:59 (28) 05:17	04:36
1	16:05	17:03	46 09:46 (27) 17:59	25 07:50 (29) 19:57	25 07:24 (28) 20:53	21:38
10	08:24	07:40	09:01 (27) 06:37	07:24 (29) 06:21	06:58 (28) 05:15	04:36
1	16:06	17:05	45 09:46 (27) 18:01	28 07:52 (29) 19:59	27 07:25 (28) 20:55	21:39
11	08:24	07:38	09:01 (27) 06:35	07:22 (29) 06:18	06:58 (28) 05:13	04:35
1	16:08	17:07	45 09:46 (27) 18:03	30 07:52 (29) 20:01	27 07:25 (28) 20:57	21:40
12	08:23	07:36	09:02 (27) 06:32	07:22 (29) 06:16	06:42 (1) 05:11	04:35
1	16:09	17:09	44 09:46 (27) 18:04	31 07:53 (29) 20:03	38 07:25 (28) 20:59	21:41
13	08:22	07:34	09:02 (27) 06:30	07:20 (29) 06:14	06:39 (1) 05:09	04:34
1	16:11	17:11	43 09:45 (27) 18:06	33 07:53 (29) 20:05	44 07:25 (28) 21:00	21:41
14	08:21	07:32	09:03 (27) 06:28	07:20 (29) 06:11	06:37 (1) 05:08	04:34
1	16:13	17:13	42 09:45 (27) 18:08	33 07:53 (29) 20:07	46 07:24 (28) 21:02	21:42
15	08:20	07:30	09:03 (27) 06:25	07:19 (29) 06:09	06:36 (1) 05:06	04:34
1	16:14	17:15	41 09:44 (27) 18:10	34 07:53 (29) 20:09	47 07:23 (28) 21:04	21:43
16	08:19	07:28	09:04 (27) 06:23	07:19 (29) 06:07	06:35 (1) 05:04	04:34
1	16:16	17:17	39 09:43 (27) 18:12	34 07:53 (29) 20:11	48 07:23 (28) 21:05	21:43
17	08:18	07:26	09:05 (27) 06:20	07:19 (29) 06:04	06:34 (1) 05:02	04:34
1	16:18	17:19	37 09:42 (27) 18:14	33 07:52 (29) 20:12	49 07:23 (28) 21:07	21:44
18	08:17	07:24	09:06 (27) 06:18	07:19 (29) 06:02	06:33 (1) 05:01	04:34
1	16:20	17:21	35 09:41 (27) 18:16	33 07:52 (29) 20:14	48 07:21 (28) 21:09	21:44
19	08:16	07:22	09:06 (27) 06:15	07:19 (29) 05:59	06:33 (1) 04:59	04:34
1	16:21	17:23	33 09:39 (27) 18:18	32 07:51 (29) 20:16	47 07:20 (28) 21:10	21:45
20	08:15	07:19	09:07 (27) 06:13	07:19 (29) 05:57	06:33 (1) 04:58	04:34
1	16:23	17:25	30 09:38 (27) 18:20	31 07:50 (29) 20:18	45 07:19 (28) 21:12	21:45
21	08:14	07:17	09:10 (27) 06:10	07:19 (29) 05:55	06:33 (1) 04:56	04:34
1	16:25	17:27	26 09:36 (27) 18:22	29 07:48 (29) 20:20	41 07:17 (28) 21:14	21:45
22	08:12	07:15	09:12 (27) 06:08	07:21 (29) 05:53	06:32 (1) 04:55	04:34
1	16:27	17:29	20 09:32 (27) 18:24	27 07:48 (29) 20:22	35 07:13 (28) 21:15	21:45
23	08:11	07:13	09:16 (27) 06:05	07:21 (29) 05:50	06:32 (1) 04:53	04:34
1	16:29	17:31	13 09:29 (27) 18:25	24 07:45 (29) 20:24	24 06:56 (1) 21:17	21:45
24	08:10	07:10	09:03 (27) 06:03	07:23 (29) 05:48	06:33 (1) 04:52	04:35
1	16:31	17:33	21 18:27	21 07:44 (29) 20:26	22 06:55 (1) 21:18	21:46
25	08:08	07:08	09:05 (27) 06:00	07:24 (29) 05:46	06:34 (1) 04:51	04:35
1	16:33	17:35	17 18:29	17 07:41 (29) 20:27	20 06:54 (1) 21:20	21:46
26	08:07	07:06	09:04 (27) 06:00	07:28 (29) 05:44	06:35 (1) 04:49	04:35
1	16:35	17:37	34 18:31	9 07:37 (29) 20:29	18 06:53 (1) 21:21	21:46
27	08:05	07:04	09:03 (27) 06:00	06:19 (28) 05:41	06:36 (1) 04:48	04:36
1	16:36	17:39	36 18:33	4 06:23 (28) 20:31	15 06:51 (1) 21:23	21:45
28	08:04	07:01	09:03 (27) 06:01	06:17 (28) 05:39	06:38 (1) 04:47	04:36
1	16:38	17:41	38 18:35	7 06:24 (28) 20:33	11 06:49 (1) 21:24	21:45
29	08:02	07:01	09:03 (27) 06:00	07:14 (28) 05:37	06:46 (1) 04:46	04:37
1	16:40	17:42	39 19:37	10 07:24 (28) 20:35	12 06:47 (1) 21:26	21:45
30	08:01	07:01	09:02 (27) 06:00	07:12 (28) 05:35	06:44 (1) 04:44	04:38
1	16:42	17:44	40 19:39	13 07:25 (28) 20:37	15 06:48 (1) 21:27	21:45
31	07:59	07:01	09:01 (27) 06:00	06:45 (28) 05:34	06:43 (1) 04:43	04:38
1	16:44	17:46	42 19:40	15 07:24 (28) 20:38	17 06:49 (1) 21:28	21:45
Sonnenscheinstunden	248	272	367	421	496	512
astr.max.mögl.Beschattung	391	898	605	823	441	496
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.51
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
Reduktion Windrichtung	0.59	0.59	0.64	0.68	0.68	0.68
Gesamte Reduktion	0.09	0.12	0.18	0.25	0.25	0.25
Met.wahrsch.Beschattung	36	112	108	205	205	205

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 98

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AU - IO47

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1.017 1.220 930 354 7.936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:38 05:19		06:14	06:57 (23) 07:08	08:00 (29) 07:07	08:30 (27) 08:03
2	21:45 21:09		20:01	27 07:24 (23) 18:46	32 08:32 (29) 16:35	46 09:16 (27) 15:50
3	04:39 05:20		06:16	06:56 (23) 07:10	08:01 (29) 07:09	08:30 (27) 08:05
4	21:44 21:07		19:59	27 07:23 (23) 18:44	30 08:31 (29) 16:33	46 09:16 (27) 15:49
5	04:40 05:22		06:18	06:57 (23) 07:12	08:01 (29) 07:11	08:30 (27) 08:06
6	21:44 21:05		19:56	25 07:22 (23) 18:42	28 08:29 (29) 16:31	46 09:16 (27) 15:48
7	04:41 05:24		06:19	06:58 (23) 07:14	08:01 (29) 07:13	08:31 (27) 08:08
8	21:43 21:03		19:54	23 07:21 (23) 18:39	27 08:28 (29) 16:29	45 09:16 (27) 15:48
9	04:41 05:26		06:21	06:59 (23) 07:15	08:03 (29) 07:15	08:31 (27) 08:09
10	21:43 21:01		19:51	21 07:20 (23) 18:37	23 08:26 (29) 16:27	45 09:16 (27) 15:47
11	04:42 05:27		06:23	06:59 (23) 07:17	08:04 (29) 07:17	08:31 (27) 08:10
12	21:42 20:59		19:49	18 07:17 (23) 18:34	20 08:24 (29) 16:25	45 09:16 (27) 15:46
13	04:43 05:29		06:25	07:01 (23) 07:19	08:07 (29) 07:19	08:31 (27) 08:12
14	21:41 20:57		19:46	14 07:15 (23) 18:32	14 08:21 (29) 16:23	45 09:16 (27) 15:46
15	04:44 05:31		06:27	07:00 (28) 07:21	08:11 (29) 07:21	08:31 (27) 08:13
16	21:41 20:55		19:44	16 07:16 (28) 18:29	6 08:17 (29) 16:21	44 09:15 (27) 15:46
17	04:45 05:33		06:28	06:58 (28) 07:23	07:23	08:31 (27) 08:14
18	21:40 20:53		19:41	18 07:16 (28) 18:27	16:20	44 09:15 (27) 15:45
19	04:47 05:34		06:30	06:57 (28) 07:25	07:25	08:32 (27) 08:16
20	21:39 20:51		19:39	19 07:16 (28) 18:24	16:18	42 09:14 (27) 15:45
21	04:48 05:36		06:32	06:59 (28) 07:27	07:27	08:33 (27) 08:17
22	21:38 20:49		19:36	18 07:17 (28) 18:22	16:16	42 09:15 (27) 15:45
23	04:49 05:38		06:34	07:01 (28) 07:29	07:29	08:34 (27) 08:18
24	21:37 20:47		19:34	15 07:16 (28) 18:20	16:14	40 09:14 (27) 15:44
25	04:50 05:40		06:36	07:02 (28) 07:30	07:30	08:35 (27) 08:19
26	21:36 20:45		19:31	13 07:15 (28) 18:17	16:13	39 09:14 (27) 15:44
27	04:51 05:42	06:48 (1) 06:37	07:04 (28) 07:32	07:33	08:35 (27) 08:20	
28	21:35 20:43	6 06:54 (1) 19:29	11 07:15 (28) 18:15	16:11	38 09:13 (27) 15:44	
29	04:53 05:43	06:45 (1) 06:39	07:06 (28) 07:34	07:35	08:36 (27) 08:21	
30	21:34 20:40	12 06:57 (1) 19:26	8 07:14 (28) 18:13	16:09	36 09:12 (27) 15:44	
31	04:54 05:45	06:42 (1) 06:41	07:08 (28) 07:36	07:37	08:37 (27) 08:22	
32	21:33 20:38	16 06:58 (1) 19:24	5 07:13 (28) 18:10	16:08	34 09:11 (27) 15:44	
33	04:55 05:47	06:41 (1) 06:43	07:09 (28) 07:38	07:38	08:38 (27) 08:23	
34	21:32 20:36	19 07:00 (1) 19:21	7 08:23 (29) 18:08	16:06	32 09:10 (27) 15:44	
35	04:57 05:49	06:40 (1) 06:44	08:12 (29) 07:40	07:40	08:40 (27) 08:23	
36	21:30 20:34	21 07:01 (1) 19:19	16 08:28 (29) 18:06	16:05	29 09:09 (27) 15:45	
37	04:58 05:51	06:39 (1) 06:46	08:10 (29) 07:42	09:46 (27) 07:42	08:41 (27) 08:24	
38	21:29 20:32	22 07:01 (1) 19:16	20 08:30 (29) 18:03	15 10:01 (27) 16:03	27 09:08 (27) 15:45	
39	05:00 05:52	06:38 (1) 06:48	08:08 (29) 07:44	09:42 (27) 07:44	08:44 (27) 08:25	
40	21:28 20:29	27 07:15 (23) 19:14	24 08:32 (29) 18:01	23 10:05 (27) 16:02	24 09:08 (27) 15:45	
41	05:01 05:54	06:38 (1) 06:50	08:06 (29) 07:46	09:40 (27) 07:46	08:45 (27) 08:25	
42	21:26 20:27	37 07:20 (23) 19:11	27 08:33 (29) 17:59	27 10:07 (27) 16:01	22 09:07 (27) 15:46	
43	05:03 05:56	06:37 (1) 06:52	08:04 (29) 07:48	09:38 (27) 07:48	08:48 (27) 08:26	
44	21:25 20:25	42 07:22 (23) 19:09	29 08:33 (29) 17:56	31 10:09 (27) 15:59	17 09:05 (27) 15:46	
45	05:04 05:58	06:36 (1) 06:54	08:03 (29) 07:50	09:36 (27) 07:50	08:51 (27) 08:27	
46	21:23 20:22	45 07:22 (23) 19:06	31 08:34 (29) 17:54	34 10:10 (27) 15:58	11 09:02 (27) 15:47	
47	05:06 06:00	06:37 (1) 06:55	08:03 (29) 07:52	09:35 (27) 07:51	08:27	
48	21:22 20:20	47 07:24 (23) 19:04	31 08:34 (29) 17:52	36 10:11 (27) 15:57	15:47	
49	05:07 06:01	06:37 (1) 06:57	08:02 (29) 06:53	08:34 (27) 07:53	08:27	
50	21:20 20:18	48 07:25 (23) 19:01	32 08:34 (29) 16:50	38 09:12 (27) 15:56	15:48	
51	05:09 06:03	06:36 (1) 06:59	08:02 (29) 06:55	08:33 (27) 07:55	08:28	
52	21:19 20:15	48 07:24 (23) 18:59	33 08:35 (29) 16:48	40 09:13 (27) 15:55	15:49	
53	05:10 06:05	06:37 (1) 07:01	08:00 (29) 06:57	08:32 (27) 07:57	08:28	
54	21:17 20:13	48 07:25 (23) 18:56	34 08:34 (29) 16:45	41 09:13 (27) 15:54	15:49	
55	05:12 06:07	06:38 (1) 07:03	08:00 (29) 06:59	08:32 (27) 07:58	08:28	
56	21:16 20:11	47 07:25 (23) 18:54	33 08:33 (29) 16:43	43 09:15 (27) 15:53	15:50	
57	05:14 06:09	06:38 (1) 07:04	08:00 (29) 07:01	08:32 (27) 08:00	08:28	
58	21:14 20:08	46 07:25 (23) 18:51	33 08:33 (29) 16:41	43 09:15 (27) 15:52	15:51	
59	05:15 06:10	06:39 (1) 07:06	08:00 (29) 07:03	08:31 (27) 08:01	08:28	
60	21:12 20:06	44 07:25 (23) 18:49	33 08:33 (29) 16:39	44 09:15 (27) 15:51	15:52	
61	05:17 06:12	06:42 (1)	07:05	08:31 (27)	08:28	
62	21:10 20:04	37 07:24 (23)	16:37	45 09:16 (27)	15:53	
63	Sonnenscheinstunden	514 461	383	328	257	231
64	astr.max.mögl.Beschattung	612	661	640	839	
65	Red.Sonnenscheinwahrsch.	0.48	0.40	0.33	0.21	
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	
67	Reduktion Windrichtung	0.68	0.65	0.60	0.59	
68	Gesamte Reduktion	0.29	0.23	0.18	0.11	
69	Met.wahrsch.Beschattung	180	155	113	92	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 99
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersiezug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AV - IO48

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) (HEILIGENDAMM)
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28	09:15 (24) 07:57	06:59	08:33 (27) 06:43	07:07 (28) 05:33	04:42	
2	15:54 18	09:33 (24) 16:46	17:43	08:39 (27) 19:42	07:22 (28) 20:39	21:30 22	
3	08:28	09:16 (24) 07:55	06:57	06:40	07:06 (28) 05:31	04:41	
4	15:56 18	09:34 (24) 16:48	17:45	19:44	14 07:20 (28) 20:40	21:31 22	
5	08:28	09:15 (24) 07:54	06:54	06:38	07:05 (28) 05:29	04:41	
6	15:57 18	09:33 (24) 16:50	17:47	19:46	16 07:21 (28) 20:42	21:32 23	
7	08:27	09:17 (24) 07:52	08:35 (27) 06:52	06:36	07:03 (28) 05:27	04:40	
8	15:58 17	09:34 (24) 16:52	4 08:39 (27) 17:49	19:48	19 07:22 (28) 20:44	21:33 23	
9	08:27	09:17 (24) 07:50	06:51	06:33	07:02 (28) 05:25	04:39	
10	15:59	09:34 (24) 16:54	13 08:44 (27) 17:51	19:50	20 07:22 (28) 20:46	21:34 23	
11	08:27	09:17 (24) 07:48	06:47	06:31	07:01 (28) 05:23	04:38	
12	16:01 17	09:34 (24) 16:57	19 08:47 (27) 17:53	19:52	21 07:22 (28) 20:48	21:35 24	
13	08:26	09:18 (24) 07:46	06:45	06:28	07:01 (28) 05:21	04:37	
14	16:02 17	09:35 (24) 16:59	23 08:49 (27) 17:55	19:54	21 07:22 (28) 20:50	21:36 24	
15	08:26	09:19 (24) 07:44	06:42	06:26	06:50 (1) 05:19	04:37	
16	16:03 15	09:34 (24) 17:01	26 08:50 (27) 17:57	19:56	28 07:23 (28) 20:51	21:37 23	
17	08:25	09:20 (24) 07:42	06:40	07:16 (29) 06:23	06:47 (1) 05:17	04:36	
18	16:05 14	09:34 (24) 17:03	28 08:51 (27) 17:59	10 07:26 (29) 19:57	32 07:22 (28) 20:53	21:38 24	
19	08:24	09:20 (24) 07:40	06:37	07:14 (29) 06:21	06:45 (1) 05:15	04:36	
20	16:06 14	09:34 (24) 17:05	30 08:52 (27) 18:01	15 07:29 (29) 19:59	35 07:21 (28) 20:55	21:39 24	
21	08:24	09:22 (24) 07:38	06:35	07:11 (29) 06:18	06:43 (1) 05:13	04:35	
22	16:08 11	09:33 (24) 17:07	31 08:53 (27) 18:03	19 07:30 (29) 20:01	37 07:21 (28) 20:57	21:40 24	
23	08:23	09:23 (24) 07:36	06:32	07:10 (29) 06:16	06:41 (1) 05:11	04:35	
24	16:09 10	09:33 (24) 17:09	33 08:54 (27) 18:04	22 07:32 (29) 20:03	37 07:19 (28) 20:59	21:41 24	
25	08:22	09:25 (24) 07:34	06:30	07:08 (29) 06:14	06:40 (1) 05:09	04:35	
26	16:11 7	09:32 (24) 17:11	34 08:55 (27) 18:06	24 07:32 (29) 20:05	37 07:18 (28) 21:00	21:41 24	
27	08:21	07:32	08:21 (27) 06:28	07:08 (29) 06:11	06:40 (1) 05:08	04:34	
28	16:13	17:13	34 08:55 (27) 18:08	25 07:33 (29) 20:07	33 07:16 (28) 21:02	21:42 23	
29	08:20	07:30	08:19 (27) 06:25	07:07 (29) 06:09	06:39 (1) 05:06	04:34	
30	16:14	17:15	36 08:55 (27) 18:10	26 07:33 (29) 20:09	27 07:12 (28) 21:04	21:43 24	
31	08:19	07:28	08:19 (27) 06:23	07:06 (29) 06:07	06:39 (1) 05:04	04:34	
32	16:16	17:17	36 08:55 (27) 18:12	27 07:33 (29) 20:11	21 07:00 (1) 21:05	21:43 24	
33	08:18	07:26	08:20 (27) 06:20	07:06 (29) 06:04	06:40 (1) 05:02	04:34	
34	16:18	17:19	36 08:56 (27) 18:14	26 07:32 (29) 20:12	19 06:59 (1) 21:07	21:44 23	
35	08:17	07:24	08:20 (27) 06:18	07:06 (29) 06:02	06:39 (1) 05:01	04:34	
36	16:20	17:21	36 08:56 (27) 18:16	26 07:32 (29) 20:14	19 06:58 (1) 21:09	21:44 23	
37	08:16	07:22	08:19 (27) 06:15	07:05 (29) 06:00	06:40 (1) 04:59	04:34	
38	16:21	17:23	36 08:55 (27) 18:18	26 07:31 (29) 20:16	17 06:57 (1) 21:10	21:45 24	
39	08:15	07:19	08:21 (27) 06:30	07:07 (29) 06:07	06:40 (1) 04:58	04:34	
40	16:23	17:25	35 08:55 (27) 18:20	25 07:31 (29) 20:18	14 06:55 (1) 21:12	21:45 24	
41	08:14	07:17	08:20 (27) 06:10	07:06 (29) 05:55	06:43 (1) 04:56	04:34	
42	16:25	17:27	34 08:54 (27) 18:22	23 07:29 (29) 20:20	10 06:53 (1) 21:14	21:45 24	
43	08:12	07:15	08:20 (27) 06:08	07:07 (29) 05:53	04:55	04:34	
44	16:27	17:29	33 08:53 (27) 18:24	21 07:28 (29) 20:22	21:15 5	05:30 (19) 21:45 24	
45	08:11	07:13	08:21 (27) 06:05	07:08 (29) 05:50	04:53	05:27 (19) 21:45 24	
46	16:29	17:31	32 08:53 (27) 18:25	18 07:26 (29) 20:24	11 05:38 (19) 21:45	24 05:50 (19)	
47	08:10	07:10	08:22 (27) 06:03	07:10 (29) 05:48	04:52	05:26 (19) 21:45 24	
48	16:31	17:33	30 08:52 (27) 18:27	14 07:24 (29) 20:26	21:18	13 05:39 (19) 21:46 24	
49	08:08	07:08	08:23 (27) 06:00	07:13 (29) 05:46	04:51	13 05:25 (19) 21:46 24	
50	16:33	17:35	27 08:50 (27) 18:29	7 07:20 (29) 20:27	21:20	15 05:40 (19) 21:46 23	
51	08:07	07:06	08:24 (27) 05:58	05:44	04:49	15 05:24 (19) 21:46 23	
52	16:35	17:37	25 08:49 (27) 18:31	20:29	21:21	17 05:41 (19) 21:46 23	
53	08:05	07:04	08:25 (27) 05:55	05:41	04:48	17 05:23 (19) 21:46 23	
54	16:36	17:39	21 08:46 (27) 18:33	4 06:23 (28) 20:31	21:23	19 05:42 (19) 21:45 24	
55	08:04	07:01	08:28 (27) 05:53	05:39	04:47	19 05:23 (19) 21:45 24	
56	16:38	17:41	16 08:44 (27) 18:35	6 06:23 (28) 20:33	21:24	19 05:42 (19) 21:45 24	
57	08:02		06:50	05:37	04:46	20 05:23 (19) 21:45 23	
58	16:40		19:37	20:35	21:26	20 05:43 (19) 21:45 23	
59	08:01		06:48	05:35	04:44	21 05:22 (19) 21:45 24	
60	16:42		19:39	20:37	21:27	21 05:43 (19) 21:45 24	
61	07:59		06:45	07:09 (28)	04:43	22 05:22 (19)	
62	16:44		19:40	20:28	21:28	22 05:44 (19)	
63	Sonnenscheinstunden	248	272	367	421	496	512
64	astr.max.mögl.Beschattung	193	708	403	492	162	706
65	Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41	0.51	0.45
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91
67	Reduktion Windrichtung	0.59	0.61	0.64	0.68	0.70	0.70
68	Gesamte Reduktion	0.09	0.13	0.18	0.25	0.32	0.28
69	Met.wahrsch.Beschattung	18	92	71	122	51	198

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 100

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

André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AV - IO48

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember			
1	04:38	05:28 (19) 05:19	06:14	06:42 (1) 07:08	07:48 (29) 07:07	07:52 (27) 08:03	09:04 (24)		
2	21:45	23 05:51 (19) 21:09	20:01	37 07:20 (23) 18:47	23 08:11 (29) 16:35	29 08:21 (27) 15:50	11 09:15 (24)		
3	04:39	05:28 (19) 05:20	06:16	06:43 (1) 07:10	07:49 (29) 07:09	07:53 (27) 08:05	09:04 (24)		
4	21:44	24 05:52 (19) 21:07	19:59	35 07:19 (23) 18:44	21 08:10 (29) 16:33	27 08:20 (27) 15:49	13 09:13 (24)		
5	04:40	05:28 (19) 05:22	06:18	06:45 (1) 07:12	07:50 (29) 07:11	07:54 (27) 08:06	09:04 (24)		
6	21:44	23 05:51 (19) 21:05	19:56	32 07:20 (23) 18:42	17 08:07 (29) 16:31	25 08:19 (27) 15:48	14 09:18 (24)		
7	04:41	05:28 (19) 05:24	06:19	06:47 (1) 07:14	07:52 (29) 07:13	07:56 (27) 08:08	09:03 (24)		
8	21:43	24 05:52 (19) 21:03	19:54	28 07:20 (23) 18:39	13 08:05 (29) 16:29	22 08:18 (27) 15:48	15 09:18 (24)		
9	04:41	05:28 (19) 05:26	06:21	06:58 (23) 07:15	07:56 (29) 07:15	07:58 (27) 08:09	09:04 (24)		
10	21:43	24 05:52 (19) 21:01	19:51	22 07:20 (23) 18:37	4 08:00 (29) 16:27	18 08:16 (27) 15:47	16 09:20 (24)		
11	04:42	05:29 (19) 05:27	06:23	06:57 (23) 07:17	07:17	08:01 (27) 08:10	09:03 (24)		
12	21:42	23 05:52 (19) 20:59	19:49	21 07:18 (23) 18:34	16:25	13 08:14 (27) 15:46	17 09:20 (24)		
13	04:43	05:29 (19) 05:29	06:25	06:57 (23) 07:19	07:19	08:12	09:04 (24)		
14	21:41	23 05:52 (19) 20:57	19:46	21 07:18 (23) 18:32	16:23	15:46	17 09:21 (24)		
15	04:44	05:29 (19) 05:31	06:27	06:58 (23) 07:21	07:21	08:13	09:04 (24)		
16	21:41	24 05:53 (19) 20:55	19:44	19 07:17 (23) 18:29	16:21	15:46	17 09:21 (24)		
17	04:45	05:30 (19) 05:33	06:28	06:58 (23) 07:23	07:23	08:14	09:05 (24)		
18	21:40	23 05:53 (19) 20:53	19:41	17 07:15 (23) 18:27	16:20	15:45	18 09:23 (24)		
19	04:47	05:30 (19) 05:34	06:30	06:59 (28) 07:25	07:25	08:16	09:05 (24)		
20	21:39	23 05:53 (19) 20:51	19:39	14 07:13 (23) 18:24	16:18	15:45	18 09:23 (24)		
21	04:48	05:30 (19) 05:36	06:32	06:59 (28) 07:27	07:27	08:17	09:05 (24)		
22	21:38	22 05:52 (19) 20:49	19:36	15 07:14 (28) 18:22	16:16	15:45	18 09:23 (24)		
23	04:49	05:30 (19) 05:38	06:34	07:01 (28) 07:29	07:29	08:18	09:05 (24)		
24	21:37	22 05:52 (19) 20:47	19:34	13 07:14 (28) 18:20	16:14	15:44	18 09:23 (24)		
25	04:50	05:31 (19) 05:40	06:36	07:02 (28) 07:30	07:30	08:19	09:06 (24)		
26	21:36	21 05:52 (19) 20:45	19:32	12 07:14 (28) 18:17	11 09:15 (27) 16:13	15:44	19 09:24 (24)		
27	04:51	05:31 (19) 05:42	06:37	07:04 (28) 07:32	07:32	08:20	09:06 (24)		
28	21:35	21 05:52 (19) 20:43	19:29	9 07:13 (28) 18:15	18 09:18 (27) 16:11	15:44	18 09:24 (24)		
29	04:53	05:32 (19) 05:43	06:39	07:06 (28) 07:34	07:35	08:21	09:06 (24)		
30	21:34	20 05:52 (19) 20:40	19:27	7 07:13 (28) 18:13	22 09:20 (27) 16:09	15:44	19 09:25 (24)		
31	04:54	05:33 (19) 05:45	06:41	07:08 (28) 07:36	07:37	08:22	09:07 (24)		
1	21:33	18 05:51 (19) 20:38	19:24	4 07:12 (28) 18:10	25 09:21 (27) 16:08	15:44	18 09:25 (24)		
2	04:55	05:33 (19) 05:47	06:43	07:09 (28) 07:38	07:38	08:23	09:07 (24)		
3	21:32	18 05:51 (19) 20:36	19:22	1 07:10 (28) 18:08	29 09:23 (27) 16:06	15:44	19 09:26 (24)		
4	04:57	05:34 (19) 05:49	06:45	08:02 (29) 07:40	08:53 (27) 07:40	08:23	09:08 (24)		
5	21:30	16 05:50 (19) 20:34	19:19	3 08:05 (29) 18:06	30 09:23 (27) 16:05	15:45	19 09:27 (24)		
6	04:58	05:35 (19) 05:51	06:48	07:57 (29) 07:42	08:52 (27) 07:42	08:24	09:09 (24)		
7	21:29	15 05:50 (19) 20:32	19:16	13 08:10 (29) 18:03	32 09:24 (27) 16:03	15:45	18 09:27 (24)		
8	05:00	05:36 (19) 05:52	06:48	07:55 (29) 07:44	08:51 (27) 07:44	08:25	09:08 (24)		
9	21:28	12 05:48 (19) 20:29	19:14	17 08:12 (29) 18:01	34 09:25 (27) 16:02	15:45	19 09:27 (24)		
10	05:01	05:38 (19) 05:54	06:50	07:53 (29) 07:46	08:51 (27) 07:46	08:26	09:09 (24)		
11	21:26	8 05:46 (19) 20:27	4 06:55 (1) 19:11	21 08:14 (29) 17:59	34 09:25 (27) 16:01	15:46	19 09:28 (24)		
12	05:03	05:56	06:48 (1) 06:52	07:51 (29) 07:48	08:50 (27) 07:48	08:26	09:09 (24)		
13	21:25	20:25	10 06:58 (1) 19:09	23 08:14 (29) 17:56	35 09:25 (27) 15:59	15:46	19 09:28 (24)		
14	05:04	05:58	06:45 (1) 06:54	07:50 (29) 07:50	08:50 (27) 07:50	08:27	09:10 (24)		
15	21:23	20:22	14 06:59 (1) 19:06	24 08:14 (29) 17:54	35 09:25 (27) 15:58	15:47	19 09:29 (24)		
16	05:06	06:00	06:44 (1) 06:55	07:49 (29) 07:52	08:49 (27) 07:51	08:27	09:11 (24)		
17	21:22	20:20	17 07:01 (1) 19:04	26 08:15 (29) 17:52	36 09:25 (27) 15:57	15:47	18 09:29 (24)		
18	05:07	06:01	06:43 (1) 06:57	07:49 (29) 06:53	07:49 (27) 07:53	08:27	09:11 (24)		
19	21:20	20:18	19 07:02 (1) 19:01	26 08:15 (29) 16:50	36 08:25 (27) 15:56	15:48	19 09:30 (24)		
20	05:09	06:03	06:41 (1) 06:59	07:48 (29) 06:55	07:49 (27) 07:55	08:28	09:11 (24)		
21	21:19	20:15	20 07:01 (1) 18:59	27 08:15 (29) 16:48	36 08:25 (27) 15:55	15:49	19 09:30 (24)		
22	05:10	06:05	06:41 (1) 07:01	07:47 (29) 06:57	07:49 (27) 07:57	08:28	09:12 (24)		
23	21:17	20:13	21 07:02 (1) 18:56	27 08:14 (29) 16:45	35 08:24 (27) 15:54	15:49	19 09:31 (24)		
24	05:12	06:07	06:41 (1) 07:03	07:47 (29) 06:59	07:50 (27) 07:58	08:28	09:13 (24)		
25	21:16	20:11	28 07:14 (23) 18:54	27 08:14 (29) 16:43	35 08:25 (27) 15:53	15:50	19 09:32 (24)		
26	05:14	06:09	06:41 (1) 07:04	07:47 (29) 07:01	07:50 (27) 08:00	09:06 (24)	08:28	09:13 (24)	
27	21:14	20:08	34 07:17 (23) 18:51	26 08:13 (29) 16:41	34 08:24 (27) 15:52	7 09:13 (24)	15:51	19 09:32 (24)	
28	05:15	06:10	06:40 (1) 07:06	07:48 (29) 07:03	07:51 (27) 08:01	09:05 (24)	08:28	09:13 (24)	
29	21:12	20:06	36 07:18 (23) 18:49	24 08:12 (29) 16:39	32 08:23 (27) 15:51	10 09:15 (24)	15:52	19 09:32 (24)	
30	05:17	06:12	06:40 (1)	07:05	07:51 (27)	08:28	09:14 (24)		
31	21:10	20:04	38 07:19 (23)	16:37	31 08:22 (27)	15:53	18 09:32 (24)		
Sonnenscheinstunden	514	461	383	328	257	231	548		
astr.max.mögl.Beschattung	427	241	591	658	151	548			
Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14			
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91			
Reduktion Windrichtung	0.70	0.68	0.66	0.62	0.61	0.59			
Gesamte Reduktion	0.28	0.29	0.23	0.18	0.11	0.07			
Met.wahrsch.Beschattung	118	71	139	119	17	40			

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 101
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AW - IO49

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

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

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 102
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersiezug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AW - IO49

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember		
1	04:38	05:17 (19) 05:19	06:14	06:47 (23) 07:08	07:07	07:53 (27) 08:03	09:01 (24)	
2	21:45	11 05:28 (19) 21:09	20:01	20 07:07 (23) 18:47	16:35	15 08:08 (27) 15:50	17 09:18 (24)	
3	04:39	05:18 (19) 05:20	06:16	06:47 (23) 07:10	07:09	07:59 (27) 08:05	09:01 (24)	
4	21:44	10 05:28 (19) 21:07	19:59	18 07:05 (23) 18:44	16:33	2 08:01 (27) 15:49	18 09:19 (24)	
5	04:40	05:18 (19) 05:22	06:18	06:49 (23) 07:12	07:11		08:06 09:02 (24)	
6	21:44	8 05:26 (19) 21:05	19:56	14 07:03 (23) 18:42	16:31		15:48 18 09:20 (24)	
7	04:41	05:20 (19) 05:24	06:19	06:51 (23) 07:14	07:13		08:08 09:01 (24)	
8	21:43	6 05:26 (19) 21:03	19:54	14 07:05 (28) 18:39	16:29		15:48 19 09:20 (24)	
9	04:41	05:26	06:21	06:54 (28) 07:15	07:15		08:09 09:02 (24)	
10	21:43	21:01	19:51	13 07:07 (28) 18:37	16:27		15:47 19 09:21 (24)	
11	04:42	05:27	06:23	06:52 (28) 07:17	07:17		08:10 09:02 (24)	
12	21:42	20:59	19:49	15 07:07 (28) 18:34	16:25		15:46 19 09:21 (24)	
13	04:43	05:29	06:25	06:52 (28) 07:19	08:57 (27) 07:19		08:12 09:02 (24)	
14	21:41	20:57	19:46	16 07:08 (28) 18:32	14 09:11 (27) 16:23		15:46 20 09:22 (24)	
15	04:44	05:31	06:27	06:54 (28) 07:21	08:53 (27) 07:21		08:13 09:02 (24)	
16	21:41	20:55	19:44	14 07:08 (28) 18:29	21 09:14 (27) 16:21		15:46 20 09:22 (24)	
17	04:45	05:33	06:28	07:02 (28) 07:23	08:51 (27) 07:23		08:14 09:03 (24)	
18	21:40	20:53	19:41	12 07:07 (28) 18:27	25 09:16 (27) 16:20		15:45 20 09:22 (24)	
19	04:47	05:34	06:30	06:57 (28) 07:25	08:49 (27) 07:25		08:16 09:03 (24)	
20	21:39	20:51	19:39	10 07:07 (28) 18:24	29 09:18 (27) 16:18		15:45 20 09:23 (24)	
21	04:48	05:36	06:32	06:59 (28) 07:27	08:48 (27) 07:27		08:17 09:04 (24)	
22	21:38	20:49	19:36	8 07:07 (28) 18:22	31 09:19 (27) 16:16		15:45 20 09:24 (24)	
23	04:49	05:38	06:34	07:01 (28) 07:29	08:47 (27) 07:29		08:18 09:04 (24)	
24	21:37	20:47	19:34	13 08:01 (29) 18:20	33 09:20 (27) 16:14		15:44 20 09:24 (24)	
25	04:50	05:40	06:36	07:02 (29) 07:30	08:46 (27) 07:31		08:19 09:05 (24)	
26	21:36	20:45	19:32	17 08:04 (29) 18:17	35 09:21 (27) 16:13		15:44 20 09:24 (24)	
27	04:51	05:42	06:37	07:46 (29) 07:32	08:45 (27) 07:33		08:20 09:05 (24)	
28	21:35	20:43	19:29	19 08:05 (29) 18:15	36 09:21 (27) 16:11		15:44 20 09:25 (24)	
29	04:53	05:43	06:40 (1) 06:39	07:45 (29) 07:34	08:44 (27) 07:35		08:21 09:05 (24)	
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31	04:54	05:45	06:37 (1) 06:41	07:44 (29) 07:36	08:43 (27) 07:37		08:22 09:06 (24)	
32	21:33	20:38	12 06:49 (1) 19:24	24 08:08 (29) 18:10	39 09:22 (27) 16:08		15:44 20 09:25 (24)	
33	04:55	05:47	06:36 (1) 06:43	07:42 (29) 07:38	08:43 (27) 07:38		08:23 09:06 (24)	
34	21:32	20:36	15 06:51 (1) 19:21	26 08:08 (29) 18:08	39 09:22 (27) 16:06		15:44 20 09:26 (24)	
35	04:57	05:49	06:35 (1) 06:45	07:41 (29) 07:40	08:43 (27) 07:40		08:23 09:07 (24)	
36	21:30	20:34	17 06:52 (1) 19:19	27 08:08 (29) 18:06	39 09:22 (27) 16:05		15:45 20 09:27 (24)	
37	04:58	05:51	06:33 (1) 06:48	07:41 (29) 07:42	08:42 (27) 07:42		08:24 09:08 (24)	
38	21:29	20:32	19 06:52 (1) 19:16	27 08:08 (29) 18:03	40 09:22 (27) 16:03		15:45 20 09:28 (24)	
39	05:00	05:52	06:32 (1) 06:48	07:40 (29) 07:44	08:42 (27) 07:44		08:25 09:08 (24)	
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41	05:01	05:54	06:32 (1) 06:50	07:40 (29) 07:46	08:42 (27) 07:46		08:26 09:09 (24)	
42	21:26	20:27	34 07:06 (23) 19:11	28 08:08 (29) 17:59	39 09:21 (27) 16:01		15:46 20 09:29 (24)	
43	05:03	05:56	06:32 (1) 06:52	07:39 (29) 07:48	08:42 (27) 07:48		08:26 09:09 (24)	
44	21:25	20:25	36 07:08 (23) 19:09	28 08:07 (29) 17:56	39 09:21 (27) 15:59		15:46 20 09:29 (24)	
45	05:04	05:58	06:31 (1) 06:54	07:39 (29) 07:50	08:42 (27) 07:50		08:27 09:10 (24)	
46	21:23	20:22	37 07:08 (23) 19:06	28 08:07 (29) 17:54	38 09:20 (27) 15:58		15:47 20 09:30 (24)	
47	05:06	06:00	06:31 (1) 06:55	07:39 (29) 07:52	08:43 (27) 07:51		08:27 09:10 (24)	
48	21:22	20:20	38 07:09 (23) 19:04	27 08:06 (29) 17:52	36 09:19 (27) 15:57		15:47 20 09:30 (24)	
49	05:07	06:01	06:32 (1) 06:57	07:40 (29) 06:53	07:43 (27) 07:53		08:27 09:10 (24)	
50	21:20	20:18	38 07:10 (23) 19:01	25 08:05 (29) 16:50	35 08:18 (27) 15:56		15:48 20 09:30 (24)	
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56	21:16	20:11	34 07:09 (23) 18:54	16 07:59 (29) 16:43	30 08:16 (27) 15:53	13 09:15 (24) 15:50	20 09:32 (24)	
57	05:14	06:09	06:37 (1) 07:04	07:45 (29) 07:01	07:47 (27) 08:00	09:02 (24) 08:28	09:11 (24)	
58	21:14	20:08	32 07:09 (23) 18:51	12 07:57 (29) 16:41	28 08:15 (27) 15:52	14 09:16 (24) 15:51	21 09:32 (24)	
59	05:15	06:10	06:38 (1) 07:06		07:03	07:49 (27) 08:01	09:02 (24) 08:28	09:12 (24)
60	21:12	20:06	26 07:08 (23) 18:49		16:39	24 08:13 (27) 15:51	15 09:17 (24) 15:52	20 09:32 (24)
61	05:17	06:12	06:46 (23)		07:05	07:51 (27)		08:28 09:13 (24)
62	21:10	20:04	21 07:07 (23)		16:37	20 08:11 (27)		15:53 20 09:33 (24)
63	Sonnenscheinstunden	514	461	383	328	257	231	611
64	astr.max.mögl.Beschattung	35	470	564	812	75	611	0.14
65	Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.14	0.31
66	Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	0.59
67	Reduktion Windrichtung	0.70	0.68	0.66	0.62	0.60	0.60	0.07
68	Gesamte Reduktion	0.27	0.29	0.23	0.18	0.11	0.07	0.45
69	Met.wahrsch.Beschattung	10	138	132	148	8	45	

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 103
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersiezug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AX - IO50

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28	09:03 (24) 07:57	06:59	07:52 (27) 06:43	07:44 (29) 05:33	04:42
2	15:54	15 09:18 (24) 16:46	17:43	38 08:30 (27) 19:42	20 08:04 (29) 20:39	21:30
3	08:28	09:03 (24) 07:55	06:57	07:51 (27) 06:40	07:04 (28) 05:31	04:41
4	15:57	16 09:19 (24) 16:48	17:45	38 08:29 (27) 19:44	21 08:02 (29) 20:40	21:31
5	08:27	09:02 (24) 07:54	06:54	07:52 (27) 06:38	07:02 (28) 05:29	04:41
6	15:57	17 09:19 (24) 16:50	17:47	37 08:29 (27) 19:46	17 07:59 (29) 20:42	21:32
7	08:27	09:02 (24) 07:52	06:52	07:51 (27) 06:36	06:59 (28) 05:27	04:40
8	15:58	18 09:20 (24) 16:52	17:49	37 08:28 (27) 19:48	9 07:08 (28) 20:44	21:33
9	08:27	09:02 (24) 07:50	06:49	07:52 (27) 06:33	06:57 (28) 05:25	04:39
10	15:59	19 09:21 (24) 16:54	17:51	36 08:28 (27) 19:50	11 07:08 (28) 20:46	21:34
11	08:27	09:02 (24) 07:48	06:47	07:52 (27) 06:31	06:54 (28) 05:23	04:38
12	16:01	19 09:21 (24) 16:57	17:53	34 08:26 (27) 19:52	13 07:07 (28) 20:48	21:35
13	08:26	09:03 (24) 07:46	06:45	07:53 (27) 06:28	06:52 (28) 05:21	04:37
14	16:02	19 09:22 (24) 16:59	17:55	33 08:26 (27) 19:54	15 07:07 (28) 20:50	21:36
15	08:26	09:03 (24) 07:44	06:42	07:53 (27) 06:26	06:52 (28) 05:19	04:37
16	16:03	19 09:22 (24) 17:01	17:57	31 08:24 (27) 19:56	14 07:06 (28) 20:51	21:37
17	08:25	09:03 (24) 07:42	06:40	07:54 (27) 06:23	06:52 (28) 05:17	04:36
18	16:05	20 09:23 (24) 17:03	17:59	29 08:23 (27) 19:57	12 07:04 (28) 20:53	21:38
19	08:24	09:03 (24) 07:40	06:37	07:56 (27) 06:21	06:55 (28) 05:15	04:36
20	16:06	20 09:23 (24) 17:05	18:01	26 08:22 (27) 19:59	7 07:02 (28) 20:55	21:39
21	08:24	09:04 (24) 07:38	06:35	07:57 (27) 06:18	06:45 (23) 05:13	04:35
22	16:08	19 09:23 (24) 17:07	18:03	22 08:19 (27) 20:01	10 06:55 (23) 20:57	21:40
23	08:23	09:04 (24) 07:36	06:32	08:00 (27) 06:16	06:42 (23) 05:11	04:35
24	16:09	20 09:24 (24) 17:09	18:04	16 08:16 (27) 20:03	15 06:57 (23) 20:59	21:41
25	08:22	09:04 (24) 07:34	06:30	08:03 (27) 06:14	06:41 (23) 05:09	04:34
26	16:11	20 09:24 (24) 17:11	18:06	8 08:11 (27) 20:05	17 06:58 (23) 21:00	21:41
27	08:21	09:05 (24) 07:32	06:28	06:11	06:40 (23) 05:08	04:34
28	16:13	20 09:25 (24) 17:13	18:08	20:07	19 06:59 (23) 21:02	21:42
29	08:20	09:06 (24) 07:30	06:25	06:09	06:33 (1) 05:06	04:34
30	16:14	19 09:25 (24) 17:15	18:10	20:09	25 06:59 (23) 21:04	21:43
31	08:19	09:06 (24) 07:28	06:23	06:07	06:31 (1) 05:04	04:34
1	16:16	19 09:25 (24) 17:17	18:12	28 06:59 (23) 21:05	15 06:58 (23) 21:05	21:43
2	08:18	09:07 (24) 07:26	06:20	06:04	06:29 (1) 05:02	04:34
3	16:18	18 09:25 (24) 17:19	8 08:16 (27) 18:14	20:12	31 07:00 (23) 21:07	21:44
4	08:17	09:08 (24) 07:24	06:18	06:55 (29) 06:02	06:26 (1) 05:01	04:34
5	16:20	17 09:25 (24) 17:21	17 08:21 (27) 18:16	8 07:03 (29) 20:14	33 06:59 (23) 21:09	21:44
6	08:16	09:09 (24) 07:22	06:15	06:51 (29) 06:00	06:24 (1) 04:59	04:34
7	16:21	16 09:25 (24) 17:23	21 08:22 (27) 18:18	14 07:05 (29) 20:16	34 06:58 (23) 21:10	21:45
8	08:15	09:10 (24) 07:19	06:13	06:49 (29) 05:57	06:23 (1) 04:58	04:34
9	16:23	15 09:25 (24) 17:25	25 08:24 (27) 18:20	19 07:08 (29) 20:18	35 06:58 (23) 21:12	21:45
10	08:14	09:11 (24) 07:17	06:10	06:47 (29) 05:55	06:23 (1) 04:56	04:34
11	16:25	12 09:23 (24) 17:27	28 08:26 (27) 18:22	21 07:08 (29) 20:20	34 06:57 (23) 21:14	21:45
12	08:12	09:13 (24) 07:15	06:08	06:46 (29) 05:53	06:22 (1) 04:55	04:34
13	16:27	10 09:23 (24) 17:29	31 08:27 (27) 18:24	24 07:10 (29) 20:22	34 06:56 (23) 21:15	21:45
14	08:11	09:16 (24) 07:13	06:05	06:44 (29) 05:50	06:22 (1) 04:53	04:34
15	16:29	4 09:20 (24) 17:31	33 08:29 (27) 18:25	25 07:09 (29) 20:24	32 06:54 (23) 21:17	21:45
16	08:10	07:10	06:03	06:44 (29) 05:48	06:22 (1) 04:52	04:35
17	16:31	17:33	34 08:29 (27) 18:27	26 07:10 (29) 20:26	31 06:53 (23) 21:18	21:46
18	08:08	07:08	06:00	06:43 (29) 05:46	06:23 (1) 04:51	04:35
19	16:33	17:35	36 08:29 (27) 18:29	27 07:10 (29) 20:27	25 06:50 (23) 21:20	21:46
20	08:07	07:06	06:58	06:43 (29) 05:44	06:23 (1) 04:49	04:35
21	16:35	17:37	36 08:29 (27) 18:31	27 07:10 (29) 20:29	18 06:41 (1) 21:21	21:46
22	08:05	07:04	06:55	06:42 (29) 05:41	06:24 (1) 04:48	04:36
23	16:36	17:39	37 08:29 (27) 18:33	27 07:09 (29) 20:31	16 06:40 (1) 21:23	21:45
24	08:04	07:01	06:53	06:43 (29) 05:39	06:25 (1) 04:47	04:36
25	16:38	17:41	37 08:29 (27) 18:35	26 07:09 (29) 20:33	13 06:38 (1) 21:24	21:45
26	08:02		06:50	07:42 (29) 05:37	06:27 (1) 04:46	04:37
27	16:40		19:37	26 08:08 (29) 20:35	9 06:36 (1) 21:26	21:45
28	08:01		06:48	07:43 (29) 05:35		04:45
29	16:42		19:39	24 08:07 (29) 20:37		21:27
30	07:59		06:45	07:43 (29)		04:43
31	16:44		19:40	22 08:05 (29)		21:28
Sonnenscheinstunden	248	272	367	421	496	512
astr.max.mögl.Beschattung	391	343	701	598		330
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31	0.41		0.45
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91		0.91
Reduktion Windrichtung	0.59	0.63	0.64	0.68		0.70
Gesamte Reduktion	0.09	0.13	0.18	0.25		0.28
Met.wahrsch.Beschattung	36	46	126	148		93

Tabellen-Layout: Die Daten für jeden Tag 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	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 104

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AX - IO50

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38	05:15 (19) 05:19	06:14	06:44 (23) 07:08	08:40 (27) 07:07	08:03	08:46 (24)
2	21:45	12 05:27 (19) 21:09	20:01	10 06:54 (23) 18:47	14 08:54 (27) 16:35	15:50	20 09:06 (24)
3	04:39	05:16 (19) 05:20	06:16	06:52 (28) 07:10	08:37 (27) 07:09	08:05	08:46 (24)
4	21:44	11 05:27 (19) 21:07	19:59	8 07:00 (28) 18:44	20 08:57 (27) 16:33	15:49	20 09:06 (24)
5	04:40	05:16 (19) 05:22	06:18	06:50 (28) 07:12	08:34 (27) 07:11	08:06	08:47 (24)
6	21:44	10 05:26 (19) 21:05	19:56	12 07:02 (28) 18:42	24 08:58 (27) 16:31	15:48	20 09:07 (24)
7	04:41	05:17 (19) 05:24	06:19	06:49 (28) 07:14	08:32 (27) 07:13	08:08	08:47 (24)
8	21:43	9 05:26 (19) 21:03	19:54	14 07:03 (28) 18:39	27 08:59 (27) 16:29	15:48	19 09:06 (24)
9	04:41	05:19 (19) 05:26	06:21	06:49 (28) 07:15	08:30 (27) 07:15	08:09	08:48 (24)
10	21:43	6 05:25 (19) 21:01	19:51	15 07:04 (28) 18:37	31 09:01 (27) 16:27	15:47	19 09:07 (24)
11	04:42	05:27	06:23	06:50 (28) 07:17	08:29 (27) 07:17	08:10	08:48 (24)
12	21:42	20:59	19:49	13 07:03 (28) 18:34	32 09:01 (27) 16:25	15:46	19 09:07 (24)
13	04:43	05:29	06:25	06:52 (28) 07:19	08:28 (27) 07:19	08:12	08:49 (24)
14	21:41	20:57	19:46	11 07:03 (28) 18:32	34 09:02 (27) 16:23	15:46	19 09:08 (24)
15	04:44	05:31	06:27	06:54 (28) 07:21	08:27 (27) 07:21	08:13	08:49 (24)
16	21:41	20:55	19:44	9 07:03 (28) 18:29	36 09:03 (27) 16:21	15:46	18 09:07 (24)
17	04:45	05:33	06:28	06:55 (28) 07:23	08:27 (27) 07:23	08:14	08:51 (24)
18	21:40	20:53	19:41	18 07:52 (29) 18:27	36 09:03 (27) 16:20	15:45	17 09:08 (24)
19	04:47	05:34	06:30	06:57 (28) 07:25	08:26 (27) 07:25	08:16	08:52 (24)
20	21:39	20:51	19:39	21 07:55 (29) 18:24	37 09:03 (27) 16:18	15:45	16 09:08 (24)
21	04:48	05:36	06:32	06:59 (28) 07:27	08:26 (27) 07:27	08:17	08:53 (24)
22	21:38	20:49	19:36	20 07:56 (29) 18:22	37 09:03 (27) 16:16	15:45	15 09:08 (24)
23	04:49	05:38	06:34	07:35 (29) 07:29	08:25 (27) 07:29	08:18	08:54 (24)
24	21:37	20:47	19:34	22 07:57 (29) 18:20	38 09:03 (27) 16:14	15:44	14 09:08 (24)
25	04:50	05:40	06:36	07:33 (29) 07:30	08:25 (27) 07:31	08:19	09:09 (24)
26	21:36	20:45	19:32	24 07:57 (29) 18:17	38 09:03 (27) 16:13	15:44	13 09:08 (24)
27	04:51	05:42	06:34 (1) 06:37	07:33 (29) 07:32	08:25 (27) 07:33	08:20	08:56 (24)
28	21:35	20:43	10 06:44 (1) 19:29	25 07:58 (29) 18:15	37 09:02 (27) 16:11	15:44	12 09:08 (24)
29	04:53	05:43	06:33 (1) 06:39	07:32 (29) 07:34	08:25 (27) 07:35	08:21	08:57 (24)
30	21:34	20:40	13 06:46 (1) 19:27	26 07:58 (29) 18:13	37 09:02 (27) 16:09	15:44	12 09:09 (24)
31	04:54	05:45	06:30 (1) 06:41	07:32 (29) 07:36	08:25 (27) 07:37	08:22	08:58 (24)
1	21:33	20:38	16 06:46 (1) 19:24	26 07:58 (29) 18:10	36 09:01 (27) 16:08	15:44	11 09:09 (24)
2	04:55	05:47	06:30 (1) 06:43	07:30 (29) 07:38	08:26 (27) 07:38	08:23	08:59 (24)
3	21:32	20:36	17 06:47 (1) 19:22	27 07:57 (29) 18:08	35 09:01 (27) 16:06	15:44	11 09:10 (24)
4	04:57	05:49	06:29 (1) 06:45	07:30 (29) 07:40	08:26 (27) 07:40	08:23	09:00 (24)
5	21:30	20:34	27 06:57 (23) 19:19	27 07:57 (29) 18:06	34 09:00 (27) 16:05	15:45	10 09:10 (24)
6	04:58	05:51	06:28 (1) 06:48	07:31 (29) 07:42	08:27 (27) 07:42	08:24	09:01 (24)
7	21:29	20:32	31 06:59 (23) 19:16	26 07:57 (29) 18:03	32 08:59 (27) 16:03	4 08:54 (24)	10 09:11 (24)
8	05:00	05:52	06:28 (1) 06:48	07:31 (29) 07:44	08:28 (27) 07:44	08:45 (24)	08:25 09:01 (24)
9	21:28	20:29	23 07:00 (23) 19:14	25 07:56 (29) 18:01	29 08:57 (27) 16:02	10 08:58 (24)	15:45 9 09:10 (24)
10	05:01	05:54	06:28 (1) 06:50	07:31 (29) 07:46	08:29 (27) 07:46	08:47 (24)	08:26 09:02 (24)
11	21:26	20:27	33 07:01 (23) 19:11	24 07:55 (29) 17:59	27 08:56 (27) 16:01	12 08:59 (24)	15:46 9 09:11 (24)
12	05:03	05:56	06:28 (1) 06:52	07:31 (29) 07:48	08:30 (27) 07:48	08:46 (24)	08:26 09:02 (24)
13	21:25	20:25	34 07:02 (23) 19:09	22 07:53 (29) 17:56	24 08:54 (27) 15:59	15 09:01 (24)	15:46 9 09:11 (24)
14	05:04	05:58	06:27 (1) 06:54	07:32 (29) 07:50	08:32 (27) 07:50	08:46 (24)	08:27 09:03 (24)
15	21:23	20:22	35 07:02 (23) 19:06	20 07:52 (29) 17:54	20 08:52 (27) 15:58	16 08:02 (24)	15:47 9 09:12 (24)
16	05:06	06:00	06:28 (1) 06:55	07:34 (29) 07:52	08:34 (27) 07:51	08:46 (24)	08:27 09:03 (24)
17	21:22	20:20	34 07:02 (23) 19:04	16 07:50 (29) 17:52	15 08:49 (27) 15:57	17 09:03 (24)	15:47 10 09:13 (24)
18	05:07	06:01	06:30 (1) 06:57	07:37 (29) 06:53	07:40 (27) 07:53	08:45 (24)	08:27 09:03 (24)
19	21:20	20:18	32 07:02 (23) 19:01	10 07:47 (29) 16:50	3 07:43 (27) 15:56	18 09:03 (24)	15:48 10 09:13 (24)
20	05:09	06:03	06:31 (1) 06:59	06:55	07:55	08:45 (24)	08:28 09:03 (24)
21	21:19	20:15	30 07:01 (23) 18:59	16:48	15:56	18 09:03 (24)	15:49 10 09:13 (24)
22	05:10	06:05	06:33 (1) 07:01	06:57	07:57	08:45 (24)	08:28 09:04 (24)
23	21:17	20:13	28 07:01 (23) 18:56	16:45	15:54	19 09:04 (24)	15:49 11 09:15 (24)
24	05:12	06:07	06:35 (1) 07:03	06:59	07:58	08:45 (24)	08:28 09:04 (24)
25	21:16	20:11	24 07:01 (23) 18:54	16:43	15:53	20 09:05 (24)	15:50 11 09:15 (24)
26	05:14	06:09	06:41 (23) 07:04	07:01	08:00	08:45 (24)	08:28 09:04 (24)
27	21:14	20:08	19 07:00 (23) 18:51	16:41	15:52	20 09:05 (24)	15:51 12 09:16 (24)
28	05:15	06:10	06:41 (23) 07:06	07:03	08:01	08:46 (24)	08:28 09:03 (24)
29	21:12	20:06	17 06:59 (23) 18:49	16:39	15:51	20 09:06 (24)	15:52 13 09:16 (24)
30	05:17	06:12	06:42 (23)	07:05		08:28	09:03 (24)
31	21:10	20:04	15 06:57 (23)	16:37		15:53	14 09:17 (24)
Sonnenscheinstunden	514	461	383	328	257	231	422
astr.max.mögl.Beschattung	48	447	471	733	189	21	0.14
Red.Sonnenscheinwahrsch.	0.44	0.48	0.40	0.33	0.21	0.21	0.31
Reduktion Betriebsdauer	0.91	0.91	0.91	0.91	0.91	0.91	0.59
Reduktion Windrichtung	0.70	0.68	0.66	0.63	0.59	0.59	0.07
Gesamte Reduktion	0.27	0.29	0.24	0.19	0.11	0.11	0.07
Met.wahrsch.Beschattung	13	131	111	136	21	31	

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 105
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersieglug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AY - IO51

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28 07:57		06:59	06:43	07:19 (25) 05:33	04:42
2	15:54 16:46		17:43	19:42	17 07:36 (25) 20:39	21:30
3	08:28 07:56		06:57	06:40	07:19 (25) 05:31	04:41
4	15:55 16:48		17:45	19:44	15 07:34 (25) 20:41	21:31
5	08:28 07:54		06:54	06:38	07:20 (25) 05:29	04:40
6	15:57 16:50		17:47	19:46	13 07:33 (25) 20:42	21:32
7	08:28 07:52		06:52	07:16 (21) 06:36	07:21 (25) 05:27	04:40
8	15:58 16:52		17:49	6 07:22 (21) 19:48	10 07:31 (25) 20:44	21:33
9	08:27 07:50		06:49	07:14 (21) 06:33		05:25 04:39
10	15:59 16:54		17:51	11 07:25 (21) 19:50		20:46 21:34
11	08:27 07:48		06:47	07:11 (21) 06:31		05:23 04:38
12	16:01 16:57		17:53	14 07:25 (21) 19:52		20:48 21:35
13	08:26 07:46	08:14 (18) 06:45	07:10 (21) 06:28		05:21 04:37	
14	16:02 16:59	2 08:16 (18) 17:55	16 07:26 (21) 19:54		20:50 21:36	
15	08:26 07:45	08:12 (18) 06:42	07:10 (21) 06:26		05:19 04:37	
16	16:03 17:01	8 08:20 (18) 17:57	17 07:27 (21) 19:56		20:52 21:37	
17	08:25 07:43	08:09 (18) 06:40	07:09 (21) 06:23		05:17 04:36	
18	16:05 17:03	11 08:20 (18) 17:59	17 07:26 (21) 19:57		20:53 21:38	
19	08:25 07:41	08:07 (18) 06:37	07:10 (21) 06:21		05:15 04:36	
20	16:06 17:05	15 08:22 (18) 18:01	16 07:26 (21) 19:59		20:55 21:39	
21	08:24 07:39	08:06 (18) 06:35	07:09 (21) 06:18		05:13 04:35	
22	16:08 17:07	16 08:22 (18) 18:03	16 07:25 (21) 20:01		20:57 21:40	
23	08:23 07:37	08:06 (18) 06:33	07:10 (21) 06:16		05:11 04:35	
24	16:09 17:09	17 08:23 (18) 18:04	14 07:24 (21) 20:03		20:59 21:41	
25	08:22 07:34	08:06 (18) 06:30	07:11 (21) 06:14		05:09 04:34	
26	16:11 17:11	17 08:23 (18) 18:06	11 07:22 (21) 20:05		21:00 21:42	
27	08:21 07:32	08:07 (18) 06:28	06:52 (30) 06:11		05:08 04:34	
28	16:13 17:13	17 08:24 (18) 18:08	10 07:20 (21) 20:07		21:02 21:42	
29	08:20 07:30	08:06 (18) 06:25	06:49 (30) 06:09		05:06 04:34	
30	16:14 17:15	17 08:23 (18) 18:10	8 06:57 (30) 20:09		21:04 21:43	
31	08:19 07:28	08:07 (18) 06:23	06:47 (30) 06:07		05:04 04:34	
32	16:16 17:17	15 08:22 (18) 18:12	12 06:59 (30) 20:11		21:06 21:43	
33	08:18 07:26	08:08 (18) 06:20	06:44 (30) 06:04		05:02 04:34	
34	16:18 17:19	14 08:22 (18) 18:14	15 06:59 (30) 20:13		21:07 21:44	
35	08:17 07:24	08:09 (18) 06:18	06:43 (30) 06:02		05:01 04:34	
36	16:20 17:21	11 08:20 (18) 18:16	17 07:00 (30) 20:14		21:09 21:44	
37	08:16 07:22	08:11 (18) 06:15	06:42 (30) 05:59		04:59 04:34	
38	16:21 17:23	6 08:17 (18) 18:18	17 06:59 (30) 20:16		21:11 21:45	
39	08:15 07:20	08:13	06:42 (30) 05:57		04:58 04:34	
40	16:23 17:25	18:20	17 06:59 (30) 20:18		21:12 21:45	
41	08:14 07:17	06:10	06:42 (30) 05:55		04:56 04:34	
42	16:25 17:27	18:22	16 06:58 (30) 20:20		21:14 21:45	
43	08:12 07:15	06:08	06:43 (30) 05:53		04:55 04:34	
44	16:27 17:29	18:24	14 06:57 (30) 20:22		21:15 21:45	
45	08:11 07:13	06:05	06:43 (30) 05:50		04:53 04:34	
46	16:29 17:31	18:25	12 06:55 (30) 20:24		21:17 21:46	
47	08:10 07:11	06:03	06:29 (25) 05:48		04:52 04:34	
48	16:31 17:33	18:27	8 06:52 (30) 20:26		21:19 21:46	
49	08:08 07:08	06:00	06:24 (25) 05:46		04:50 04:35	
50	16:33 17:35	18:29	11 06:35 (25) 20:28		21:20 21:46	
51	08:07 07:06	05:58	06:23 (25) 05:44		04:49 04:35	
52	16:34 17:37	18:31	14 06:37 (25) 20:29		21:21 21:46	
53	08:05 07:04	05:55	06:21 (25) 05:41		04:48 04:36	
54	16:36 17:39	18:33	16 06:37 (25) 20:31		21:23 21:46	
55	08:04 07:01	05:53	06:20 (25) 05:39		04:47 04:36	
56	16:38 17:41	18:35	18 06:38 (25) 20:33		21:24 21:45	
57	08:02	06:50	07:19 (25) 05:37		04:46 04:37	
58	16:40	19:37	18 07:37 (25) 20:35		21:26 21:45	
59	08:01	06:48	07:19 (25) 05:35		04:44 04:37	
60	16:42	19:39	18 07:37 (25) 20:37		21:27 21:45	
61	07:59	06:45	07:18 (25)		04:43	
62	16:44	19:41	18 07:36 (25)		21:28	
63	Sonnenscheinstunden	272	367	421	496	513
64	astr.max.mögl.Beschattung	166	397	55		
65	Red.Sonnenscheinwahrsch.	0.24	0.31	0.41		
66	Reduktion Betriebsdauer	0.91	0.91	0.91		
67	Reduktion Windrichtung	0.62	0.65	0.67		
68	Gesamte Reduktion	0.13	0.18	0.25		
69	Met.wahrsch.Beschattung	22	73	14		

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
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Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AY - IO51

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:38	05:19	06:14	07:08	07:50 (21) 07:07	07:37 (18) 08:03
2	04:39	05:20	06:16	07:10	07:49 (21) 07:09	07:39 (18) 08:05
3	04:40	05:22	06:18	07:12	07:48 (21) 07:11	07:41 (18) 08:06
4	04:41	05:24	06:19	07:14	07:46 (21) 07:13	07:48 (18) 08:08
5	04:42	05:27	06:23	07:17	07:46 (21) 07:17	07:46 (18) 08:11
6	04:43	05:29	06:25	07:19	07:46 (21) 07:19	07:46 (18) 08:12
7	04:44	05:31	06:27	07:21	07:48 (21) 07:21	07:48 (18) 08:13
8	04:45	05:33	06:28	07:23	07:50 (21) 07:23	07:50 (18) 08:15
9	04:46	05:34	06:30	07:25	07:52 (21) 07:25	07:52 (18) 08:16
10	04:47	05:36	06:32	07:27	07:54 (21) 07:27	07:54 (18) 08:17
11	04:48	05:38	06:34	07:29	07:56 (21) 07:29	07:56 (18) 08:18
12	04:49	05:40	06:36	07:31	07:58 (21) 07:31	07:58 (18) 08:19
13	04:50	05:42	06:38	07:33	08:00 (21) 07:33	08:00 (18) 08:20
14	04:51	05:44	06:40	07:35	08:02 (21) 07:35	08:02 (18) 08:21
15	04:52	05:46	06:42	07:37	08:04 (21) 07:37	08:04 (18) 08:22
16	04:53	05:48	06:44	07:39	08:06 (21) 07:39	08:06 (18) 08:23
17	04:54	05:50	06:46	07:41	08:08 (21) 07:41	08:08 (18) 08:24
18	04:55	05:52	06:48	07:43	08:10 (21) 07:43	08:10 (18) 08:25
19	04:56	05:54	06:50	07:45	08:12 (21) 07:45	08:12 (18) 08:26
20	04:57	05:56	06:52	07:47	08:14 (21) 07:47	08:14 (18) 08:27
21	04:58	05:58	06:54	07:49	08:16 (21) 07:49	08:16 (18) 08:28
22	04:59	06:00	06:56	07:51	08:18 (21) 07:51	08:18 (18) 08:29
23	05:00	06:02	06:58	07:53	08:20 (21) 07:53	08:20 (18) 08:30
24	05:01	06:04	07:00	07:55	08:22 (21) 07:55	08:22 (18) 08:31
25	05:02	06:06	07:02	07:57	08:24 (21) 07:57	08:24 (18) 08:32
26	05:03	06:08	07:04	07:59	08:26 (21) 07:59	08:26 (18) 08:33
27	05:04	06:10	07:06	08:01	08:28 (21) 08:01	08:28 (18) 08:34
28	05:05	06:12	07:08	08:03	08:30 (21) 08:03	08:30 (18) 08:35
29	05:06	06:14	07:10	08:05	08:32 (21) 08:05	08:32 (18) 08:36
30	05:07	06:16	07:12	08:07	08:34 (21) 08:07	08:34 (18) 08:37
31	05:08	06:18	07:14	08:09	08:36 (21) 08:09	08:36 (18) 08:38
32	05:09	06:20	07:16	08:11	08:38 (21) 08:11	08:38 (18) 08:39
33	05:10	06:22	07:18	08:13	08:40 (21) 08:13	08:40 (18) 08:40
34	05:11	06:24	07:20	08:15	08:42 (21) 08:15	08:42 (18) 08:41
35	05:12	06:26	07:22	08:17	08:44 (21) 08:17	08:44 (18) 08:42
36	05:13	06:28	07:24	08:19	08:46 (21) 08:19	08:46 (18) 08:43
37	05:14	06:30	07:26	08:21	08:48 (21) 08:21	08:48 (18) 08:44
38	05:15	06:32	07:28	08:23	08:50 (21) 08:23	08:50 (18) 08:45
39	05:16	06:34	07:30	08:25	08:52 (21) 08:25	08:52 (18) 08:46
40	05:17	06:36	07:32	08:27	08:54 (21) 08:27	08:54 (18) 08:47
41	05:18	06:38	07:34	08:29	08:56 (21) 08:29	08:56 (18) 08:48
42	05:19	06:40	07:36	08:31	08:58 (21) 08:31	08:58 (18) 08:49
43	05:20	06:42	07:38	08:33	09:00 (21) 08:33	09:00 (18) 08:50
44	05:21	06:44	07:40	08:35	09:02 (21) 08:35	09:02 (18) 08:51
45	05:22	06:46	07:42	08:37	09:04 (21) 08:37	09:04 (18) 08:52
46	05:23	06:48	07:44	08:39	09:06 (21) 08:39	09:06 (18) 08:53
47	05:24	06:50	07:46	08:41	09:08 (21) 08:41	09:08 (18) 08:54
48	05:25	06:52	07:48	08:43	09:10 (21) 08:43	09:10 (18) 08:55
49	05:26	06:54	07:50	08:45	09:12 (21) 08:45	09:12 (18) 08:56
50	05:27	06:56	07:52	08:47	09:14 (21) 08:47	09:14 (18) 08:57
51	05:28	06:58	07:54	08:49	09:16 (21) 08:49	09:16 (18) 08:58
52	05:29	07:00	07:56	08:51	09:18 (21) 08:51	09:18 (18) 08:59
53	05:30	07:02	07:58	08:53	09:20 (21) 08:53	09:20 (18) 09:00
54	05:31	07:04	08:00	08:55	09:22 (21) 08:55	09:22 (18) 09:01
55	05:32	07:06	08:02	08:57	09:24 (21) 08:57	09:24 (18) 09:02
56	05:33	07:08	08:04	08:59	09:26 (21) 08:59	09:26 (18) 09:03
57	05:34	07:10	08:06	09:01	09:28 (21) 09:01	09:28 (18) 09:04
58	05:35	07:12	08:08	09:03	09:30 (21) 09:03	09:30 (18) 09:05
59	05:36	07:14	08:10	09:05	09:32 (21) 09:05	09:32 (18) 09:06
60	05:37	07:16	08:12	09:07	09:34 (21) 09:07	09:34 (18) 09:07
61	05:38	07:18	08:14	09:09	09:36 (21) 09:09	09:36 (18) 09:08
62	05:39	07:20	08:16	09:11	09:38 (21) 09:11	09:38 (18) 09:09
63	05:40	07:22	08:18	09:13	09:40 (21) 09:13	09:40 (18) 09:10
64	05:41	07:24	08:20	09:15	09:42 (21) 09:15	09:42 (18) 09:11
65	05:42	07:26	08:22	09:17	09:44 (21) 09:17	09:44 (18) 09:12
66	05:43	07:28	08:24	09:19	09:46 (21) 09:19	09:46 (18) 09:13
67	05:44	07:30	08:26	09:21	09:48 (21) 09:21	09:48 (18) 09:14
68	05:45	07:32	08:28	09:23	09:50 (21) 09:23	09:50 (18) 09:15
69	05:46	07:34	08:30	09:25	09:52 (21) 09:25	09:52 (18) 09:16
70	05:47	07:36	08:32	09:27	09:54 (21) 09:27	09:54 (18) 09:17
71	05:48	07:38	08:34	09:29	09:56 (21) 09:29	09:56 (18) 09:18
72	05:49	07:40	08:36	09:31	09:58 (21) 09:31	09:58 (18) 09:19
73	05:50	07:42	08:38	09:33	10:00 (21) 09:33	10:00 (18) 09:20
74	05:51	07:44	08:40	09:35	10:02 (21) 09:35	10:02 (18) 09:21
75	05:52	07:46	08:42	09:37	10:04 (21) 09:37	10:04 (18) 09:22
76	05:53	07:48	08:44	09:39	10:06 (21) 09:39	10:06 (18) 09:23
77	05:54	07:50	08:46	09:41	10:08 (21) 09:41	10:08 (18) 09:24
78	05:55	07:52	08:48	09:43	10:10 (21) 09:43	10:10 (18) 09:25
79	05:56	07:54	08:50	09:45	10:12 (21) 09:45	10:12 (18) 09:26
80	05:57	07:56	08:52	09:47	10:14 (21) 09:47	10:14 (18) 09:27
81	05:58	07:58	08:54	09:49	10:16 (21) 09:49	10:16 (18) 09:28
82	05:59	08:00	08:56	09:51	10:18 (21) 09:51	10:18 (18) 09:29
83	06:00	08:02	08:58	09:53	10:20 (21) 09:53	10:20 (18) 09:30
84	06:01	08:04	09:00	09:55	10:22 (21) 09:55	10:22 (18) 09:31
85	06:02	08:06	09:02	09:57	10:24 (21) 09:57	10:24 (18) 09:32
86	06:03	08:08	09:04	09:59	10:26 (21) 09:59	10:26 (18) 09:33
87	06:04	08:10	09:06	10:01	10:28 (21) 10:01	10:28 (18) 09:34
88	06:05	08:12	09:08	10:03	10:30 (21) 10:03	10:30 (18) 09:35
89	06:06	08:14	09:10	10:05	10:32 (21) 10:05	10:32 (18) 09:36
90	06:07	08:16	09:12	10:07	10:34 (21) 10:07	10:34 (18) 09:37
91	06:08	08:18	09:14	10:09	10:36 (21) 10:09	10:36 (18) 09:38
92	06:09	08:20	09:16	10:11	10:38 (21) 10:11	10:38 (18) 09:39
93	06:10	08:22	09:18	10:13	10:40 (21) 10:13	10:40 (18) 09:40
94	06:11	08:24	09:20	10:15	10:42 (21) 10:15	10:42 (18) 09:41
95	06:12	08:26	09:22	10:17	10:44 (21) 10:17	10:44 (18) 09:42
96	06:13	08:28	09:24	10:19	10:46 (21) 10:19	10:46 (18) 09:43
97	06:14	08:30	09:26	10:21	10:48 (21) 10:21	10:48 (18) 09:44
98	06:15	08:32	09:28	10:23	10:50 (21) 10:23	10:50 (18) 09:45
99	06:16	08:34	09:30	10:25	10:52 (21) 10:25	10:52 (18) 09:46
100	06:17	08:36	09:32	10:27	10:54 (21) 10:27	10:54 (18) 09:47
101	06:18	08:38	09:34	10:29	10:56 (21) 10:29	10:56 (18) 09:48
102	06:19	08:40	09:36	10:31	10:58 (21) 10:31	10:58 (18) 09:49
103	06:20	08:42	09:38	10:33	11:00 (21) 10:33	11:00 (18) 09:50
104	06:21	08:44	09:40	10:35	11:02 (21) 10:35	11:02 (18) 09:51
105	06:22	08:46	09:42	10:37	11:04 (21) 10:37	11:04 (18) 09:52
106	06:23	08:48	09:44	10:39	11:06 (21) 10:39	11:06 (18) 09:53
107	06:24	08:50	09:46	10:41	11:08 (21) 10:41	11:08 (18) 09:54
108	06:25	08:52	09:48	10:43	11:10 (21) 10:43	11:10 (18) 09:55
109	06:26	08:54	09:50	10:45	11:12 (21) 10:45	11:12 (18) 09:56
110	06:27	08:56	09:52	10:47	11:14 (21) 10:47	11:14 (18) 09:57
111	06:28	08:58	09:54	10:49	11:16 (21) 10:49	11:16 (18) 09:58
112	06:29	09:00	09:56	10:51	11:18 (21) 10:51	11:18 (18) 09:59
113	06:30	09:02	09:58	10:53	11:20 (21) 10:53	11:20 (18) 10:00
114	06:31	09:04	10:00	10:55	11:22 (21) 10:55	11:22 (18) 10:01
115	06:32	09:06	10:02	10:57	11:24 (21) 10:57	11:24 (18) 10:02
116	06:33	09:08	10:04	10:59	11:26 (21) 10:59	11:26 (18) 10:03
117	06:34	09:10	10:06	11:01	11:28 (21) 11:01	11:28 (18) 10:04
118	06:35	09:12	10:08	11:03	11:30 (21) 11:03	11:30 (18) 10:05
119	06:36	09:14	10:10	11:05	11:32 (21) 11:05	11:32 (18) 10:06
120	06:37	09:16	10:12	11:07	11:34 (21) 11:07	11:34 (18) 10:07
121	06:38	09:18	10:14	11:09	11:36 (21) 11:09	11:36 (18) 10:08
122	06:39	09:20	10:16	11:11	11:38 (21) 11:11	11:38 (18) 10:09
123	06:40	09:22	10:18	11:13	11	

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 107
Lizenzierter Anwender:
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DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AZ - IO52

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28	07:57	08:54 (18) 06:59	07:24 (30) 06:43	05:33	04:42
	15:54	16:46	4 08:58 (18) 17:43	11 07:35 (30) 19:42	20:39	21:30
2	08:28	07:56	06:57	07:21 (30) 06:40	05:31	04:41
	15:55	16:48	17:45	14 07:35 (30) 19:44	20:41	21:31
3	08:28	07:54	06:54	07:19 (30) 06:38	05:29	04:40
	15:57	16:50	17:47	17 07:36 (30) 19:46	20:42	21:32
4	08:28	07:52	06:52	07:18 (30) 06:36	05:27	04:40
	15:58	16:52	17:49	18 07:36 (30) 19:48	20:44	21:33
5	08:27	07:50	06:49	07:18 (30) 06:33	05:25	04:39
	15:59	16:54	17:51	18 07:36 (30) 19:50	20:46	21:34
6	08:27	07:48	06:47	07:13 (25) 06:31	05:23	04:38
	16:00	16:56	17:53	22 07:35 (30) 19:52	20:48	21:35
7	08:26	07:46	06:45	07:11 (25) 06:28	05:21	04:37
	16:02	16:59	17:55	24 07:35 (30) 19:54	20:50	21:36
8	08:26	07:45	06:42	07:10 (25) 06:26	05:19	04:37
	16:03	17:01	17:57	24 07:34 (30) 19:56	20:52	21:37
9	08:25	07:43	06:40	07:08 (25) 06:23	05:17	04:36
	16:05	17:03	17:59	24 07:32 (30) 19:57	20:53	21:38
10	08:25	07:41	06:37	07:08 (25) 06:21	05:15	04:36
	16:06	17:05	18:01	23 07:31 (30) 19:59	20:55	21:39
11	08:24	07:39	06:35	07:07 (25) 06:18	05:13	04:35
	16:08	17:07	18:03	20 07:27 (25) 20:01	20:57	21:40
12	08:23	07:37	06:33	07:07 (25) 06:16	05:11	04:35
	16:09	17:09	18:04	20 07:27 (25) 20:03	20:59	21:41
13	08:22	07:34	06:30	07:07 (25) 06:14	05:09	04:34
	16:11	17:11	18:06	19 07:26 (25) 20:05	21:00	21:42
14	08:21	07:32	07:59 (21) 06:28	07:08 (25) 06:11	05:07	04:34
	16:13	17:13	8 08:07 (21) 18:08	18 07:26 (25) 20:07	21:02	21:42
15	08:20	07:30	07:56 (21) 06:25	07:08 (25) 06:09	05:06	04:34
	16:14	17:15	12 08:08 (21) 18:10	16 07:24 (25) 20:09	21:04	21:43
16	08:19	08:51 (18) 07:28	07:55 (21) 06:23	07:09 (25) 06:07	05:04	04:34
	16:16	4 08:55 (18) 17:17	15 08:10 (21) 18:12	14 07:23 (25) 20:11	21:06	21:43
17	08:18	08:50 (18) 07:26	07:54 (21) 06:20	07:10 (25) 06:04	05:02	04:34
	16:18	7 08:57 (18) 17:19	16 08:10 (21) 18:14	11 07:21 (25) 20:13	21:07	21:44
18	08:17	08:48 (18) 07:24	07:54 (21) 06:18	06:02	05:01	04:34
	16:20	9 08:57 (18) 17:21	17 08:11 (21) 18:16	20:14	21:09	21:44
19	08:16	08:47 (18) 07:22	07:53 (21) 06:15	05:59	04:59	04:34
	16:21	12 08:59 (18) 17:23	18 08:11 (21) 18:18	20:16	21:11	21:45
20	08:15	08:46 (18) 07:20	07:53 (21) 06:13	05:57	04:58	04:34
	16:23	14 09:00 (18) 17:25	18 08:11 (21) 18:20	20:18	21:12	21:45
21	08:14	08:45 (18) 07:17	07:54 (21) 06:10	05:55	04:56	04:34
	16:25	16 09:01 (18) 17:27	17 08:11 (21) 18:22	20:20	21:14	21:45
22	08:12	08:45 (18) 07:15	07:54 (21) 06:08	05:53	04:55	04:34
	16:27	17 09:02 (18) 17:29	15 08:09 (21) 18:24	20:22	21:15	21:45
23	08:11	08:45 (18) 07:13	07:55 (21) 06:05	05:50	04:53	04:34
	16:29	17 09:02 (18) 17:31	14 08:09 (21) 18:25	20:24	21:17	21:46
24	08:10	08:46 (18) 07:11	07:57 (21) 06:03	05:48	04:52	04:34
	16:31	17 09:03 (18) 17:33	10 08:07 (21) 18:27	20:26	21:19	21:46
25	08:08	08:46 (18) 07:08	07:59 (21) 06:00	05:46	04:50	04:35
	16:33	17 09:03 (18) 17:35	5 08:04 (21) 18:29	20:28	21:20	21:46
26	08:07	08:46 (18) 07:06	05:58	05:44	04:49	04:35
	16:34	16 09:02 (18) 17:37	18:31	20:29	21:21	21:46
27	08:05	08:47 (18) 07:04	05:55	05:41	04:48	04:36
	16:36	16 09:03 (18) 17:39	18:33	20:31	21:23	21:46
28	08:04	08:47 (18) 07:01	07:26 (30) 05:53	05:39	04:47	04:36
	16:38	16 09:03 (18) 17:41	6 07:32 (30) 18:35	20:33	21:24	21:46
29	08:02	08:48 (18)	06:50	05:37	04:46	04:37
	16:40	14 09:02 (18)	19:37	20:35	21:26	21:45
30	08:01	08:49 (18)	06:48	05:35	04:44	04:37
	16:42	12 09:01 (18)	19:39	20:37	21:27	21:45
31	07:59	08:50 (18)	06:45	05:31	04:43	04:37
	16:44	10 09:00 (18)	19:41	20:38	21:28	21:45
Sonnenscheinstunden	248	272	367	421	496	513
astr.max.mögl.Beschattung	214	175	313			
Red.Sonnenscheinwahrsch.	0.17	0.24	0.31			
Reduktion Betriebsdauer	0.91	0.91	0.91			
Reduktion Windrichtung	0.59	0.63	0.63			
Gesamte Reduktion	0.09	0.14	0.18			
Met.wahrsch.Beschattung	20	24	56			

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) Schattende (WEA mit letztem Schatten)
	Minuten mit Schatten	

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:53 / 108
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender

Berechnung: Gesamtbelastung Schattenrezeptor: AZ - IO52

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember
1	04:38	05:19	06:14	07:08	07:46 (25) 07:07	08:03
	21:45	21:09	20:01	18:47	20 08:06 (25) 16:35	15:50
2	04:39	05:20	06:16	07:10	07:46 (25) 07:09	08:05
	21:44	21:07	19:59	18:44	20 08:06 (25) 16:33	15:49
3	04:40	05:22	06:18	07:12	07:46 (25) 07:11	08:06
	21:44	21:05	19:56	18:42	21 08:07 (30) 16:31	15:48
4	04:40	05:24	06:19	07:14	07:45 (25) 07:13	08:08
	21:43	21:03	19:54	18:39	24 08:09 (30) 16:29	15:48
5	04:41	05:26	06:21	07:16	07:46 (25) 07:15	08:09
	21:43	21:01	19:51	18:37	24 08:10 (30) 16:27	15:47
6	04:42	05:27	06:23	07:17	07:47 (25) 07:17	08:11
	21:42	20:59	19:49	18:34	24 08:11 (30) 16:25	15:46
7	04:43	05:29	06:25	07:19	07:48 (25) 07:19	08:12
	21:42	20:57	19:46	18:32	23 08:11 (30) 16:23	15:46
8	04:44	05:31	06:27	07:21	07:51 (25) 07:21	08:13
	21:41	20:55	19:44	18:29	20 08:11 (30) 16:21	15:45
9	04:45	05:33	06:28	07:23	07:53 (30) 07:23	08:15
	21:40	20:53	19:42	18:27	18 08:11 (30) 16:20	15:45
10	04:46	05:34	06:30	07:25	07:53 (30) 07:25	08:25 (18) 08:16
	21:39	20:51	19:39	18:24	17 08:10 (30) 16:18	4 08:29 (18) 15:45
11	04:48	05:36	06:32	07:27	07:54 (30) 07:27	08:22 (18) 08:17
	21:38	20:49	19:37	18:22	16 08:10 (30) 16:16	10 08:32 (18) 15:45
12	04:49	05:38	06:34	07:29	07:56 (30) 07:29	08:21 (18) 08:18
	21:37	20:47	19:34	18:20	13 08:09 (30) 16:14	12 08:33 (18) 15:44
13	04:50	05:40	06:36	07:30	07:58 (30) 07:31	08:20 (18) 08:15
	21:36	20:45	19:32	18:17	9 08:07 (30) 16:13	14 08:34 (18) 15:44
14	04:51	05:42	06:37	07:32	08:00 (30) 07:33	08:19 (18) 08:20
	21:35	20:43	19:29	18:15	4 08:04 (30) 16:11	16 08:35 (18) 15:44
15	04:53	05:43	06:39	07:34	07:35	08:19 (18) 08:21
	21:34	20:41	19:27	18:13	16:09	16 08:35 (18) 15:44
16	04:54	05:45	06:41	07:36	07:37	08:19 (18) 08:22
	21:33	20:38	19:24	18:10	16:08	16 08:35 (18) 15:44
17	04:55	05:47	06:43	07:38	08:29 (21) 07:39	08:19 (18) 08:23
	21:32	20:36	19:22	18:08	8 08:37 (21) 16:06	17 08:36 (18) 15:44
18	04:57	05:49	06:45	07:40	08:27 (21) 07:40	08:20 (18) 08:24
	21:31	20:34	19:19	18:06	12 08:39 (21) 16:05	17 08:37 (18) 15:45
19	04:58	05:50	06:46	07:42	08:26 (21) 07:42	08:20 (18) 08:24
	21:29	20:32	19:17	18:03	14 08:40 (21) 16:03	17 08:37 (18) 15:45
20	05:00	05:52	06:48	07:44	08:25 (21) 07:44	08:20 (18) 08:25
	21:28	20:29	19:14	18:01	16 08:41 (21) 16:02	17 08:37 (18) 15:45
21	05:01	05:54	06:50	07:46	08:24 (21) 07:46	08:21 (18) 08:26
	21:27	20:27	19:12	17:59	17 08:41 (21) 16:01	16 08:37 (18) 15:46
22	05:03	05:56	06:52	07:48	08:23 (21) 07:48	08:22 (18) 08:26
	21:25	20:25	19:09	17:56	18 08:41 (21) 15:59	14 08:36 (18) 15:46
23	05:04	05:58	06:54	07:50	08:23 (21) 07:50	08:24 (18) 08:27
	21:24	20:23	19:06	17:54	18 08:41 (21) 15:58	12 08:36 (18) 15:47
24	05:06	06:00	06:55	07:52	08:23 (21) 07:51	08:26 (18) 08:27
	21:22	20:20	19:04	17:52	17 08:40 (21) 15:57	10 08:36 (18) 15:47
25	05:07	06:01	06:57	06:54	07:24 (21) 07:53	08:28 (18) 08:27
	21:21	20:18	19:01	16:50	16 07:40 (21) 15:56	7 08:35 (18) 15:48
26	05:09	06:03	06:59	06:56	07:24 (21) 07:55	08:30 (18) 08:28
	21:19	20:16	18:59	8 08:02 (25) 16:48	15 07:39 (21) 15:55	4 08:34 (18) 15:49
27	05:10	06:05	07:01	07:50 (25) 06:57	07:27 (21) 07:57	08:28
	21:17	20:13	18:56	14 08:04 (25) 16:45	11 07:38 (21) 15:53	15:49
28	05:12	06:07	07:03	07:49 (25) 06:59	07:29 (21) 07:58	08:28
	21:16	20:11	18:54	16 08:05 (25) 16:43	7 07:36 (21) 15:52	15:50
29	05:14	06:09	07:04	07:48 (25) 07:01	08:00	08:28
	21:14	20:08	18:51	18 08:06 (25) 16:41	15:52	15:51
30	05:15	06:10	07:06	07:47 (25) 07:03	08:02	08:28
	21:12	20:06	18:49	19 08:06 (25) 16:39	15:51	15:52
31	05:17	06:12	07:05	07:05		08:28
	21:10	20:04		16:37		15:53
Sonneneinstunden	515	461	383	328	257	231
astr.max.mögl.Beschattung				422		219
Red.Sonneneinwahrsh.			0.40	0.33		0.21
Reduktion Betriebsdauer			0.91	0.91		0.91
Reduktion Windrichtung			0.63		0.63	0.59
Gesamte Reduktion			0.23	0.19		0.11
Met.wahrsch.Beschattung			17	79		24

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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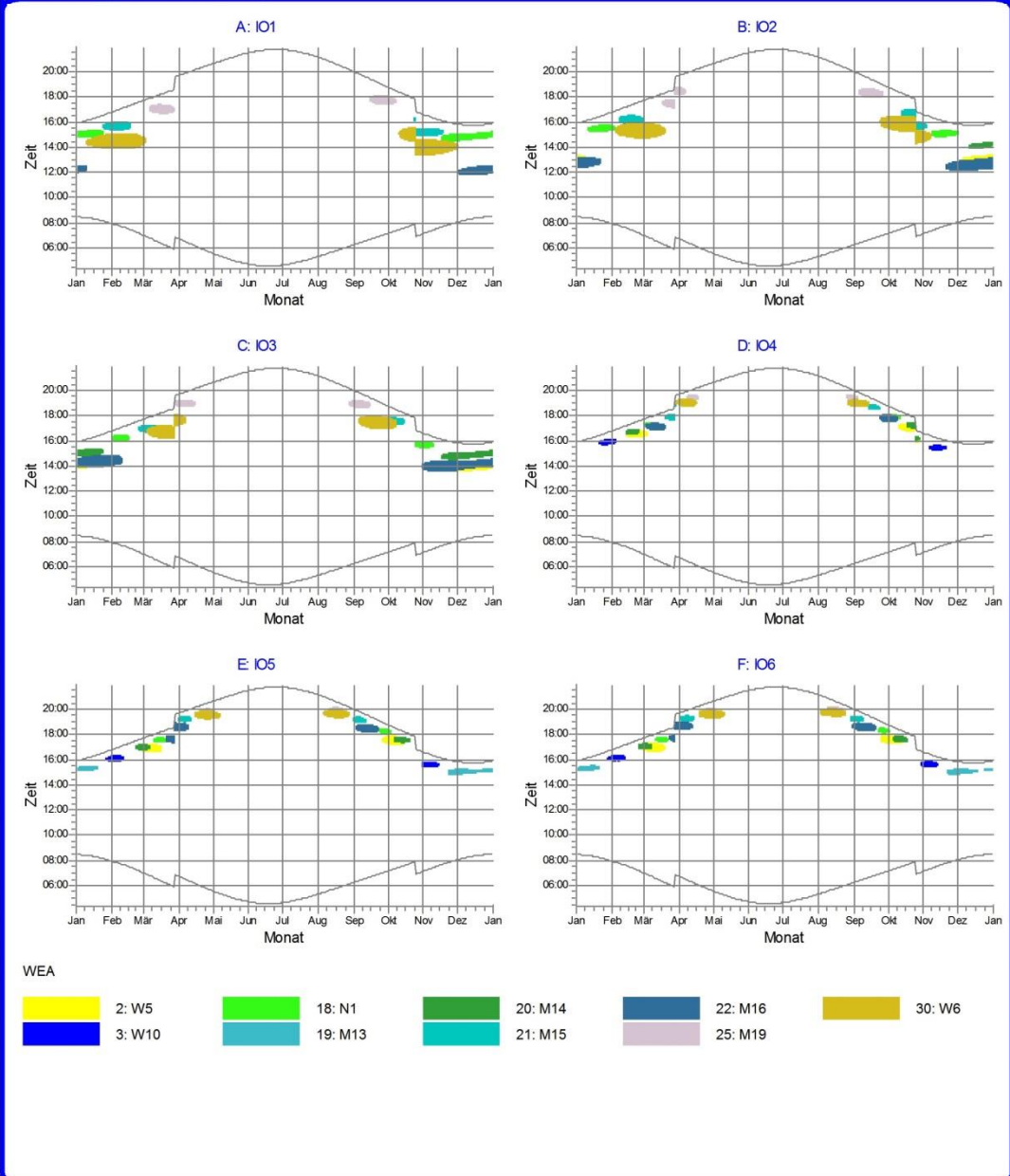
WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Grafischer Kalender

Berechnung: Gesamtbelastung



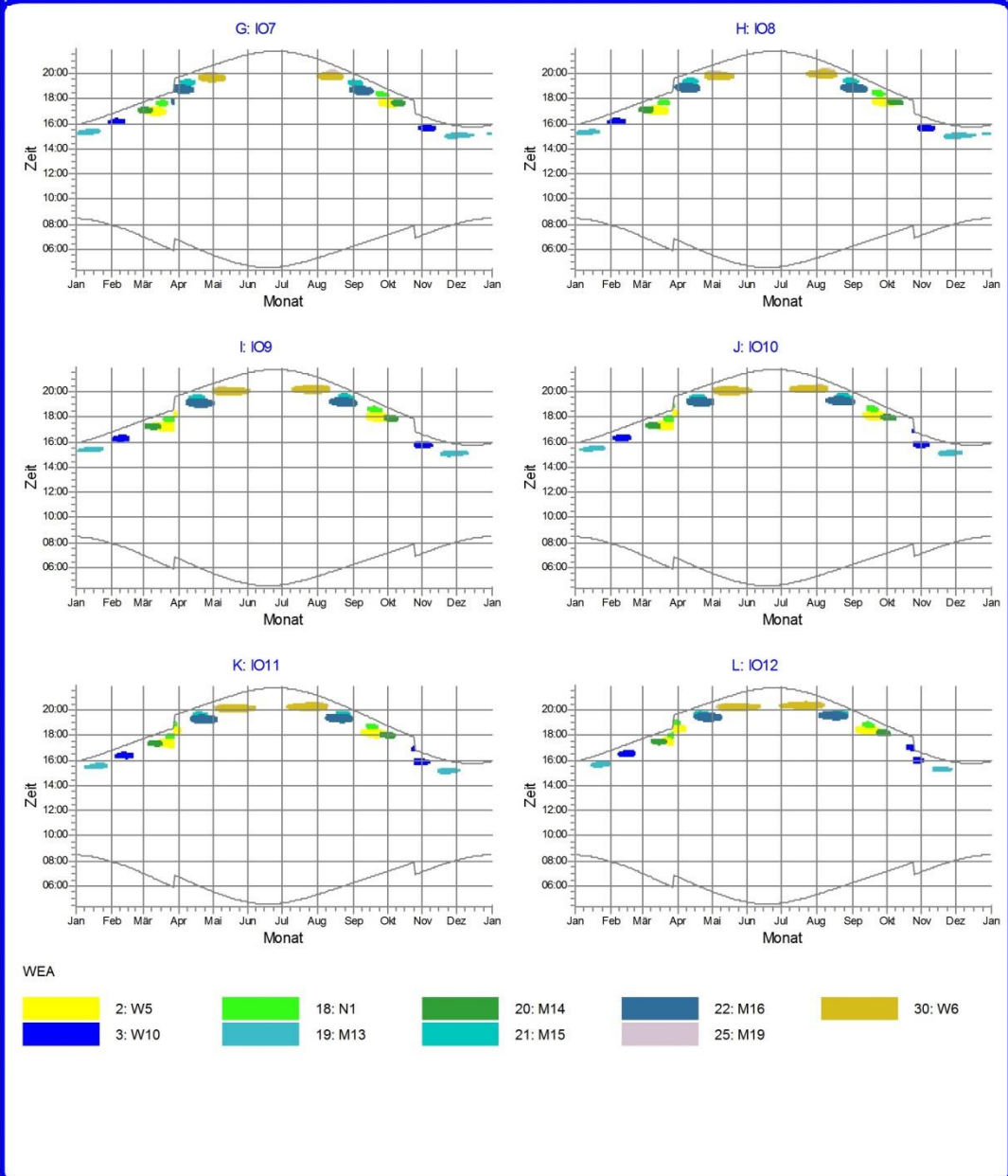
WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

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12/10/2015 15:41/2.9.285

SHADOW - Grafischer Kalender

Berechnung: Gesamtbelastung



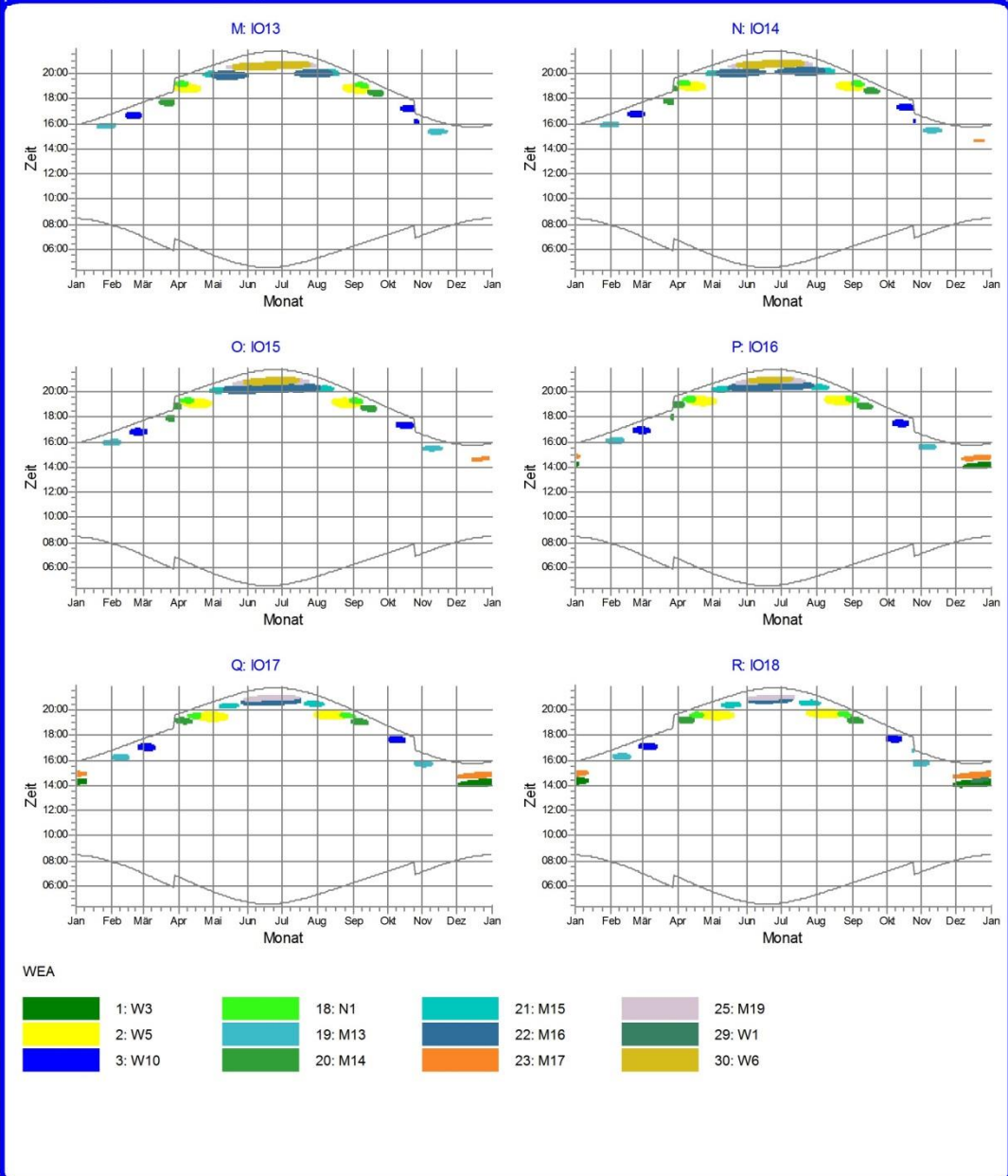
WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

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12/10/2015 15:41/2.9.285

SHADOW - Grafischer Kalender

Berechnung: Gesamtbelastung



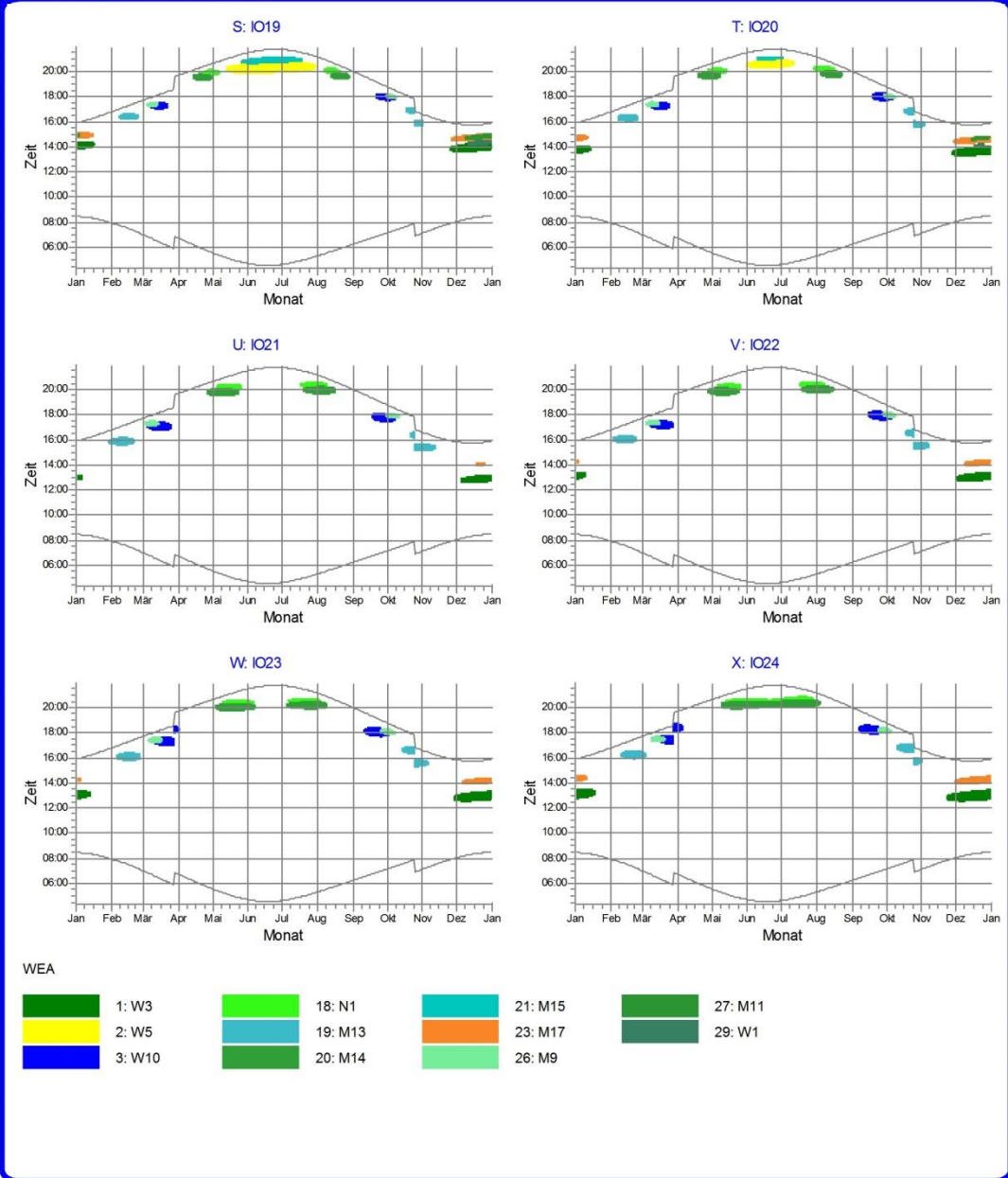
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12/10/2015 15:41/2.9.285

SHADOW - Grafischer Kalender

Berechnung: Gesamtbelastung



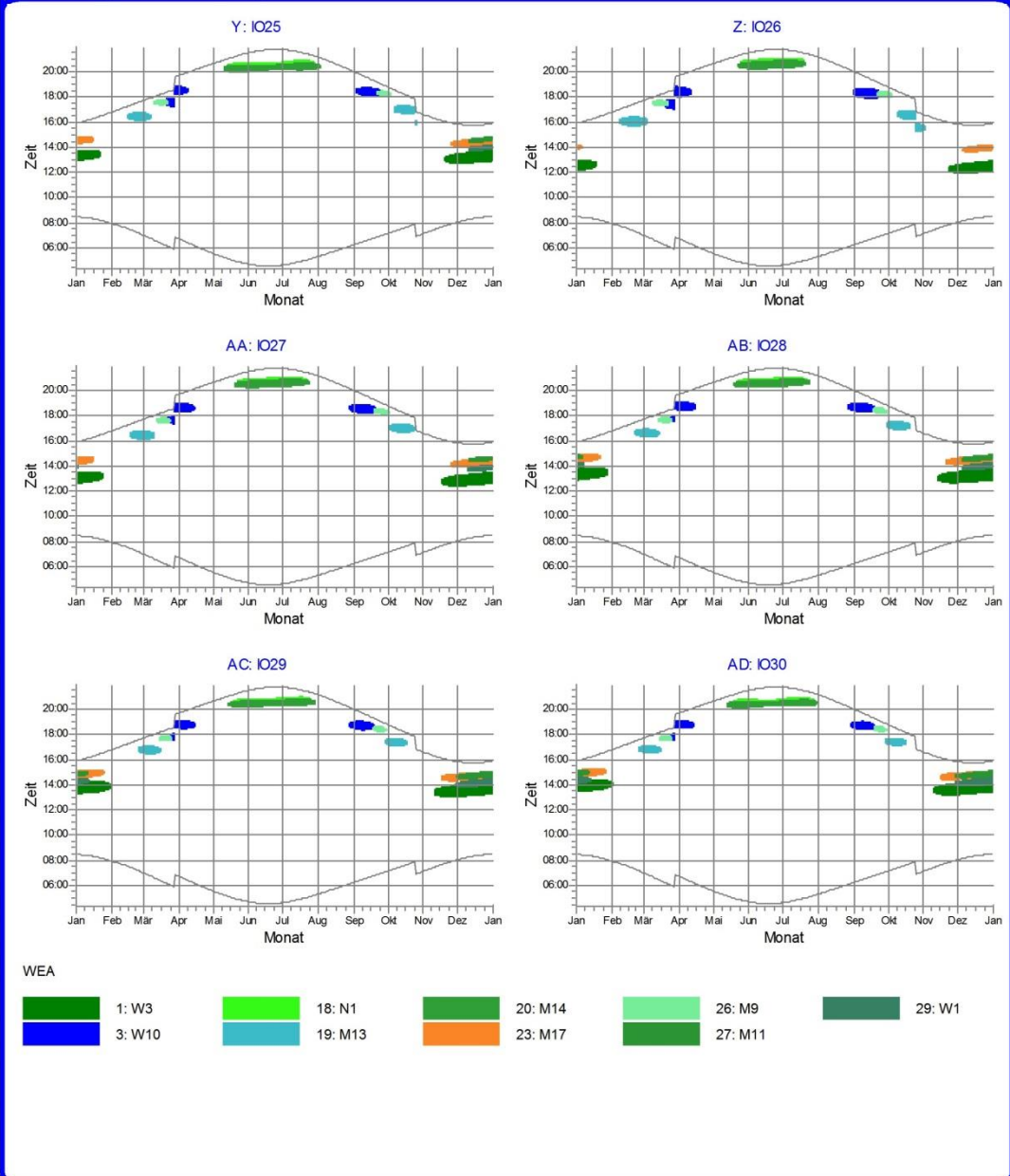
WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

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Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Grafischer Kalender

Berechnung: Gesamtbelastung



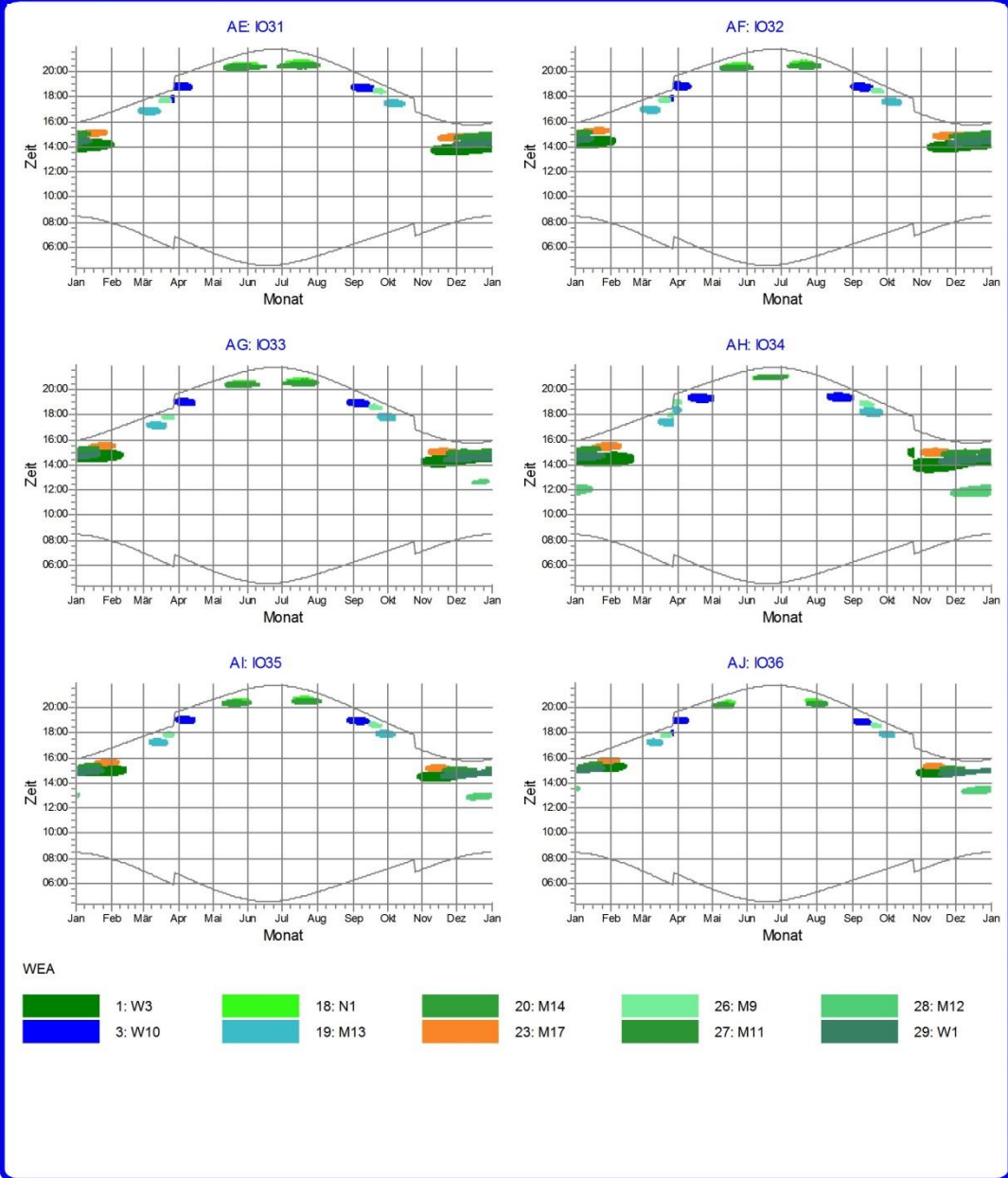
WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

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Am Westersielzug 11
DE-25840 Friedrichstadt
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André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Grafischer Kalender

Berechnung: Gesamtbelastung



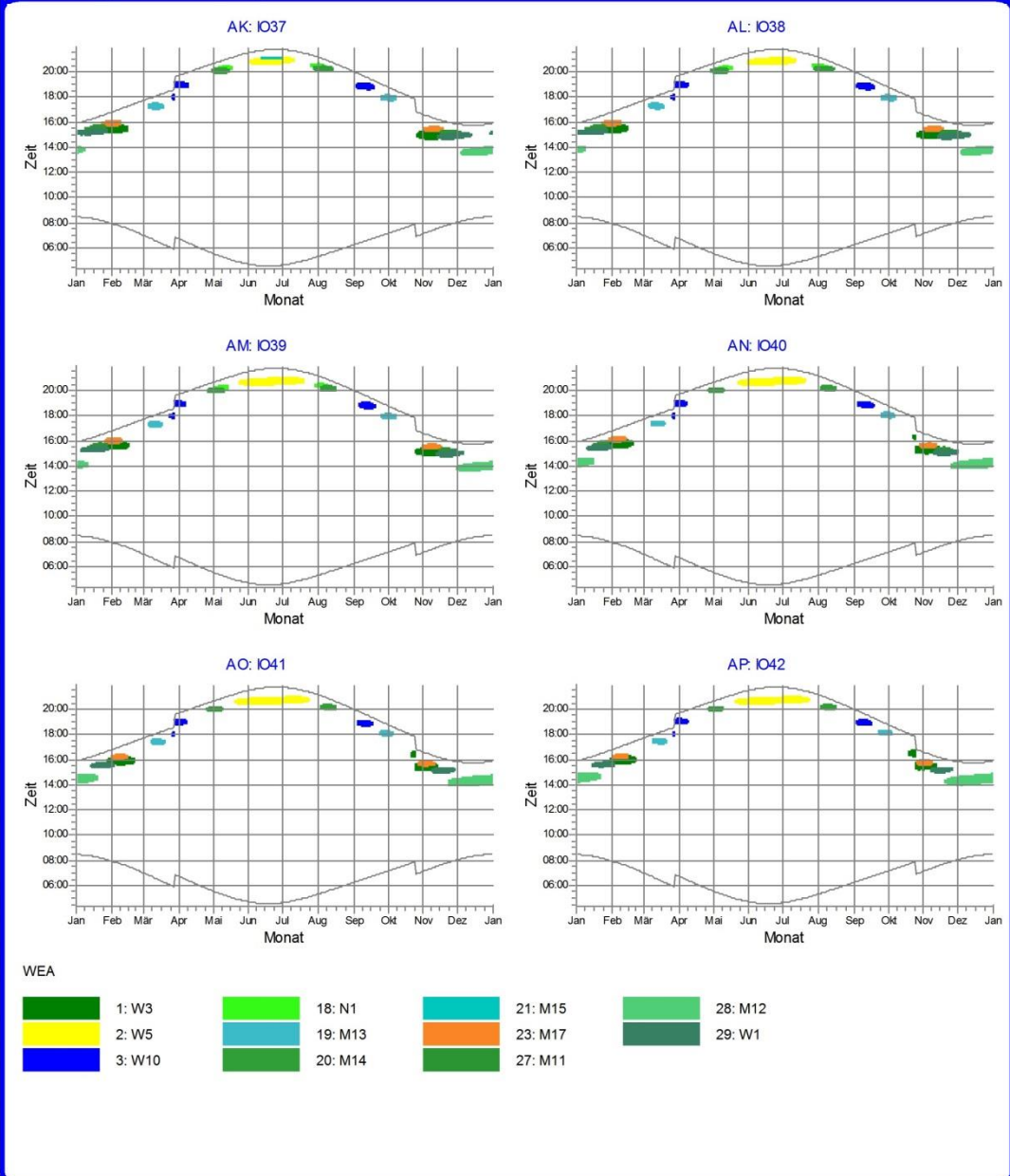
WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

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Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Grafischer Kalender

Berechnung: Gesamtbelastung



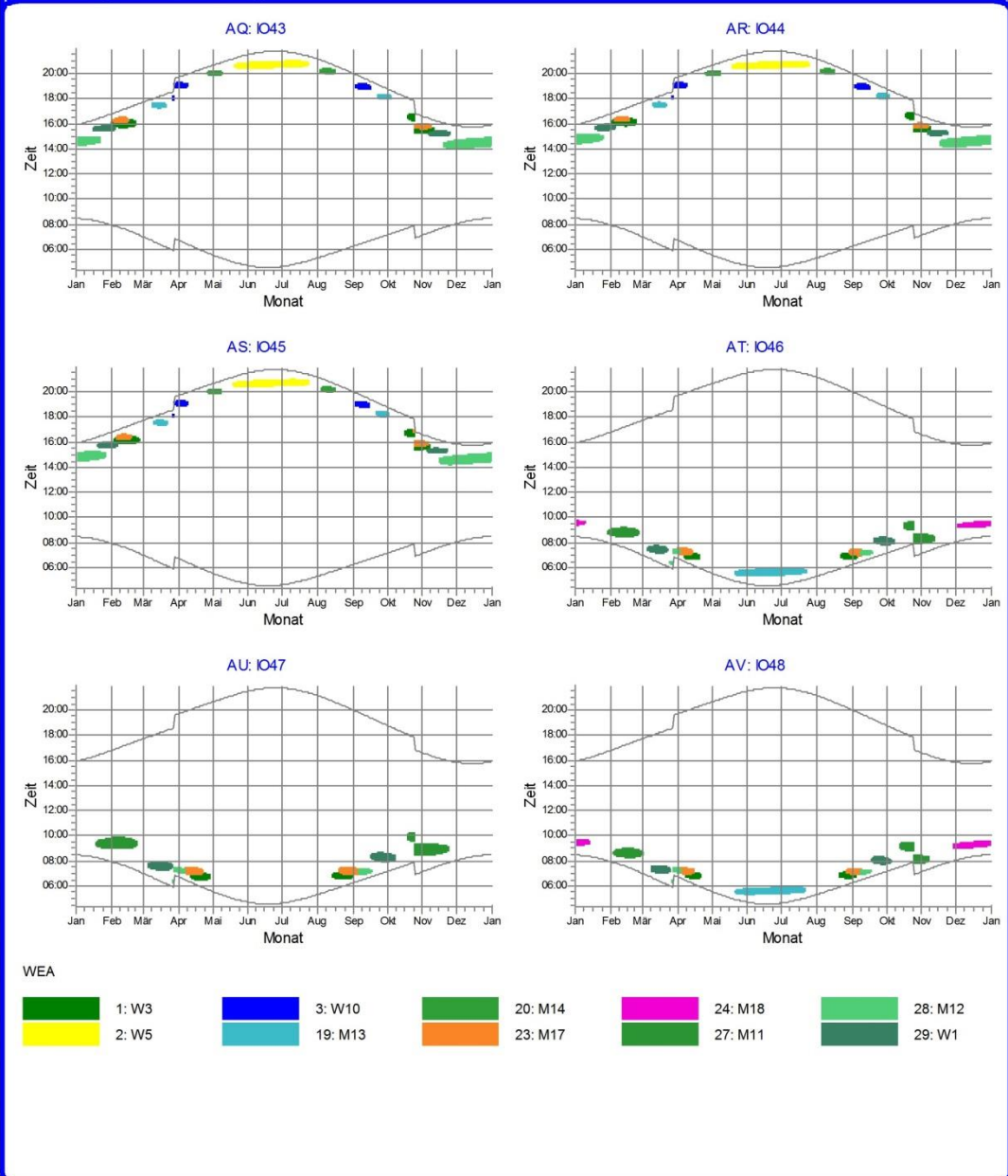
WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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Lizenzierter Anwender:
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André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Grafischer Kalender

Berechnung: Gesamtbelastung



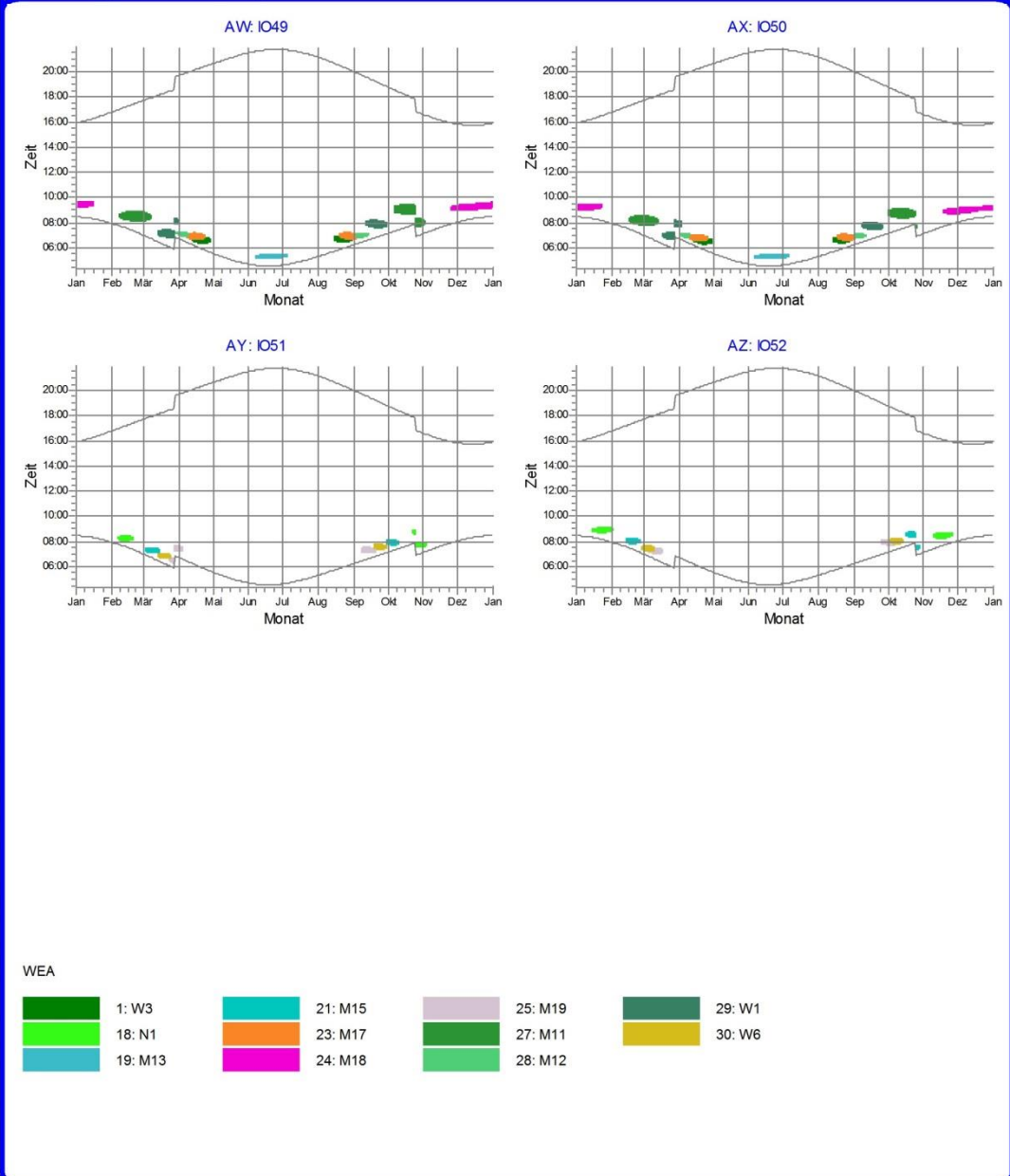
WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

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Lizenzierter Anwender:
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André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Grafischer Kalender

Berechnung: Gesamtbelastung



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Projekt:
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Lizenzierter Anwender:
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Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 1 - W3

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28 12:11-14:29/138	07:57 13:58-16:06/128	06:59	06:43	05:33	04:42	
	15:54 14:28-14:47/19	16:46	17:43	19:42	20:39	21:29	
2	08:28 12:12-14:30/138	07:55 13:58-16:09/131	06:56	06:40	05:31	04:41	
	15:55 14:29-14:48/19	16:48	17:45	19:44	20:40	21:31	
3	08:28 12:12-14:51/159	07:54 13:58-16:11/133	06:54	06:38	05:29	04:40	
	15:57 14:05-14:30/25	16:50	17:47	19:46	20:42	21:32	
4	08:27 12:14-14:55/161	07:52 14:00-16:13/133	06:52	06:35	05:27	04:40	
	15:58 14:05-14:31/26	16:52 16:13-16:14/1	17:49	19:48	20:44	21:33	
5	08:27 12:14-14:57/163	07:50 14:00-16:16/136	06:49	06:33	05:24	04:39	
	15:59 14:04-14:32/28	16:54	17:51	19:50	20:46	21:34	
6	08:27 12:14-14:58/164	07:48 14:00-16:19/139	06:47	06:31	05:22	04:38	
	16:00 14:03-14:33/30	16:56	17:53	19:52	20:48	21:35	
7	08:26 12:16-15:00/164	07:46 14:00-16:20/140	06:45	06:28 06:52-07:00/8	05:21	04:37	
	16:02 14:03-14:35/32	16:58	17:55	19:54	20:50	21:36	
8	08:26 12:16-15:02/166	07:44 14:00-16:22/142	06:42	06:26 06:50-06:57/7	05:19	04:37	
	16:03 14:03-14:36/33	17:01	17:57	19:55 06:57-07:03/6	20:51	21:37	
9	08:25 12:17-15:03/166	07:42 14:01-16:23/142	06:40	06:23 06:47-06:58/11	05:17	04:36	
	16:05 14:02-14:37/35	17:03	17:59	19:57 06:58-07:03/5	20:53	21:38	
10	08:24 12:18-15:04/166	07:40 14:02-16:24/142	06:37	06:21 06:45-07:00/15	05:15	04:36	
	16:06 14:02-14:38/36	17:05	18:01	19:59 07:00-07:04/4	20:55	21:39	
11	08:24 12:19-15:05/166	07:38 14:03-16:25/142	06:35	06:18 06:43-07:01/18	05:13	04:35	
	16:08	17:07	18:02	20:01 07:01-07:05/4	20:57	21:40	
12	08:23 12:20-15:14/174	07:36 14:04-16:25/141	06:32	06:16 06:41-07:01/20	05:11	04:35	
	16:09	17:09	18:04	20:03 07:01-07:04/3	20:59	21:41	
13	08:22 12:21-15:17/176	07:34 14:05-14:52/47 15:11-16:26/75	06:30	06:14 06:38-06:45/7	05:09	04:34	
	16:11	17:11 14:53-15:08/15	18:06	20:05 06:43-07:05/22	21:00	21:41	
14	08:21 12:23-15:19/176	07:32 14:05-14:50/45	06:27	06:11 06:36-06:49/13	05:07	04:34	
	16:13	17:13 15:15-16:25/70	18:08	20:07 06:47-07:05/18	21:02	21:42	
15	08:20 12:25-15:21/151	07:30 14:07-14:50/43	06:25	06:09 06:33-06:39/6	05:06	04:34	
	16:14 12:50-15:21/151	17:15 15:25-16:26/61	18:10	20:09 06:38-07:03/25	21:04	21:43	
16	08:19 12:27-15:24/153	07:28 14:08-14:48/40	06:23	06:06 06:31-06:44/13	05:04	04:34	
	16:16 12:51-15:24/153	17:17 15:36-16:26/50	18:12	20:10 06:41-07:03/22	21:05	21:43	
17	08:18 12:29-15:27/156	07:26 14:10-14:47/37	06:20	06:04 06:29-06:46/17	05:02	04:34	
	16:18 12:53-15:29/156	17:19 15:39-16:26/47	18:14	20:12 06:43-07:02/19	21:07	21:44	
18	08:17 12:31-15:31/158	07:24 14:13-14:46/33	06:18	06:02 06:26-06:46/20	05:01	04:34	
	16:19 12:53-15:31/158	17:21 15:41-16:25/44	18:16	20:14 06:43-07:00/17	21:09	21:44	
19	08:16 12:55-15:33/158	07:22 14:14-14:43/29	06:15	05:59 06:24-06:47/23	04:59	04:34	
	16:21	17:23 15:47-16:25/38	18:18	20:16 06:44-06:59/15	21:10	21:44	
20	08:15 12:56-15:35/159	07:19 14:18-14:40/22	06:13	05:57 06:23-06:46/23	04:58	04:34	
	16:23	17:25 15:50-16:24/34	18:20	20:18 06:44-06:58/14	21:12	21:45	
21	08:14 12:58-15:39/161	07:17 14:23-14:35/12	06:10	05:55 06:23-06:46/23	04:56	04:34	
	16:25	17:27 15:54-16:23/29	18:22	20:20 06:44-06:57/13	21:14	21:45	
22	08:12 13:00-15:41/161	07:15 15:56-16:21/25	06:08	05:53 06:22-06:44/22	04:55	04:34	
	16:27	17:29	18:23	20:22 06:43-06:56/13	21:15	21:45	
23	08:11 13:02-15:44/162	07:13 16:01-16:20/19	06:05	05:50 06:22-06:44/22	04:53	04:34	
	16:29	17:31	18:25	20:24 06:43-06:56/13	21:17	21:45	
24	08:10 13:05-15:45/160	07:10 16:05-16:18/13	06:03	05:48 06:22-06:44/22	04:52	04:34	
	16:31	17:33	18:27	20:25 06:43-06:55/12	21:18	21:46	
25	08:08 13:16-15:47/151	07:08 16:09-16:12/3	06:00	05:46 06:23-06:43/20	04:50	04:35	
	16:33	17:35	18:29	20:27 06:42-06:54/12	21:20	21:46	
26	08:07 13:18-15:51/153	07:06	05:58	05:44 06:23-06:43/20	04:49	04:35	
	16:34	17:37	18:31	20:29 06:42-06:53/11	21:21	21:46	
27	08:05 13:20-15:53/153	07:03	05:55	05:41 06:24-06:42/18	04:48	04:36	
	16:36	17:39	18:33	20:31 06:41-06:51/10	21:23	21:45	
28	08:04 13:24-13:36/12	07:01	05:53	05:39 06:25-06:40/15	04:47	04:36	
	16:38 13:40-15:56/136	17:41	18:35	20:33 06:40-06:49/9	21:24	21:45	
29	08:02 13:42-15:59/137		06:50	05:37 06:27-06:36/9	04:46	04:37	
	16:40		19:37	20:35	21:26	21:45	
30	08:00 13:44-16:02/138		06:48	05:35	04:44	04:37	
	16:42		19:39	20:37	21:27	21:45	
31	07:59 13:48-16:03/135		06:45		04:43		
	16:44		19:40		21:28		
	Sonnenscheinstunden	248		367	421	496	512
	Anzahl Minuten mit Schatten	4983	2481	0	612	0	0

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 120
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 2 - W5

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

[Januar		[Februar		[März		[April		[Mai		[Juni	
1	08:28 12:56-13:17/21	07:57		06:59 16:25-16:43/18	17:08-17:09/1	06:43 18:11-19:06/55	05:33 19:02-19:52/50	05:33 19:02-19:52/50	04:42 19:53-20:50/57		
	15:54 13:52-14:29/37	16:46		17:43 16:46-17:08/22		19:42	20:39		21:30		
2	08:28 12:57-13:18/21	07:55		08:56 16:27-16:40/13		06:40 18:12-19:07/55	05:31 19:03-19:52/49	05:31 19:03-19:52/49	04:41 19:54-20:52/58		
	15:55 13:52-14:29/37	16:48		17:45 16:44-17:10/26		19:44	20:40		21:31		
3	08:28 12:58-13:17/19	07:54		08:54 16:31-16:36/5		06:38 18:16-19:11/55	05:29 19:05-19:52/47	05:29 19:05-19:52/47	04:40 19:54-20:53/59		
	15:57 13:52-14:29/37	16:50		17:47 16:43-17:12/29		19:46	20:42		21:32 20:53-20:54/1		
4	08:27 12:59-13:17/18	07:52		08:52 16:42-17:13/31		06:35 18:19-19:12/53	05:26 19:06-19:52/44	05:26 19:06-19:52/44	04:40 19:54-20:54/60		
	15:58 13:53-14:30/37	16:52		17:49		19:46	20:44		21:33 20:53-20:54/1		
5	08:27 13:00-13:16/16	07:50		06:49 16:42-17:15/33		06:33 18:20-19:12/52	05:24 19:11-19:51/40	05:24 19:11-19:51/40	04:39 19:54-20:54/60 20:53-20:55/2		
	15:59 13:53-14:30/37	16:54		17:51		19:50 19:12-19:14/2	20:46		21:34 20:51-20:52/1		
6	08:27 13:03-13:16/13	07:48		06:47 16:40-17:17/37		06:31 18:22-19:15/53	05:22 19:12-19:51/39	05:22 19:12-19:51/39	04:38 19:54-20:55/61 20:54-20:56/2		
	16:00 13:54-14:31/37	16:56		17:53		19:52	20:48		21:35 20:52-20:53/1		
7	08:26 13:04-13:15/11	07:46		06:45 16:41-17:18/37		06:28 18:25-19:17/52	05:20 19:12-19:50/38	05:20 19:12-19:50/38	04:37 19:54-20:55/61 20:52-20:53/1		
	16:02 13:54-14:31/37	16:58		17:55		19:54	20:50		21:36 20:50-20:51/1 20:54-20:57/3		
8	08:26 13:07-13:12/5	07:44		06:42 16:40-17:19/39		06:26 18:33-19:19/46	05:19 19:13-19:50/37	05:19 19:13-19:50/37	04:37 19:55-20:56/61 20:55-20:56/3		
	16:03 13:55-14:31/36	17:01		17:57		19:55	20:51		21:37 20:51-20:52/1		
9	08:25 13:55-14:32/37	07:42		06:40 16:40-17:20/40		06:23 18:32-19:20/48	05:17 19:14-19:50/36	05:17 19:14-19:50/36	04:36 19:54-20:55/61 20:54-20:58/4		
	16:05	17:03		17:59		19:57	20:53		21:38 20:52-20:53/1		
10	08:24 13:55-14:32/37	07:40		06:37 16:40-17:23/43		06:21 18:33-19:21/48	05:15 19:15-19:49/34	05:15 19:15-19:49/34	04:36 19:55-20:56/61 20:53-20:54/1		
	16:06	17:05		18:01		19:59	20:55		21:39 20:51-20:52/1 20:55-20:59/4		
11	08:24 13:56-14:32/36	07:38		06:35 16:41-17:26/45		06:18 18:32-19:24/52	05:13 19:16-19:48/32	05:13 19:16-19:48/32	04:35 19:55-20:57/2		
	16:08	17:07		18:02		20:01	20:57		21:40 20:56-21:00/4		
12	08:23 13:56-14:32/36	07:36		06:32 16:41-17:27/46		06:16 18:33-19:27/54	05:11 19:18-19:48/30	05:11 19:18-19:48/30	04:35 19:55-20:56/61 20:53-20:54/1		
	16:09	17:09		18:04		20:03	20:59		21:41 20:51-20:52/1 20:55-21:00/5		
13	08:22 13:57-14:32/35	07:34		06:30 16:42-17:31/49		06:14 18:33-19:29/56	05:09 19:20-19:47/27	05:09 19:20-19:47/27	04:34 19:55-20:56/61		
	16:11	17:11		18:06		20:05	21:00		21:41 20:51-21:01/10		
14	08:21 13:58-14:33/35	07:32 16:31-16:39/8		06:27 16:43-17:32/49		06:11 18:33-19:29/56	05:07 19:21-19:46/25	05:07 19:21-19:46/25	04:34 19:56-20:57/61 20:54-20:55/1		
	16:13	17:13		18:08		20:07	21:02 20:07-20:16/9	21:02 20:07-20:16/9	21:42 20:52-20:53/1 20:56-21:01/5		
15	08:20 13:58-14:33/35	07:30 16:28-16:42/14		06:25 16:45-17:35/50		06:09 18:35-19:30/55	05:06 19:22-19:46/24	05:06 19:22-19:46/24	04:34 19:56-20:57/61 20:54-21:02/8		
	16:14	17:15		18:10		20:09	21:04 20:04-20:19/15	21:04 20:04-20:19/15	21:43 20:52-20:53/1		
16	08:19 13:59-14:33/34	07:28 16:28-16:44/18		06:23 16:45-17:36/51		06:06 18:36-19:31/55	05:04 19:23-19:44/21	05:04 19:23-19:44/21	04:34 19:56-20:57/61		
	16:16	17:17		18:12		20:11	21:05 20:02-20:21/19	21:05 20:02-20:21/19	21:43 20:52-21:02/10		
17	08:18 14:00-14:33/33	07:26 16:25-16:45/20		06:20 16:42-17:38/51		06:04 18:37-19:33/56	05:02 19:25-19:43/18	05:02 19:25-19:43/18	04:34 19:57-20:57/60		
	16:18	17:19		18:14		20:12	21:07 20:01-20:23/22	21:07 20:01-20:23/22	21:44 20:53-21:03/11		
18	08:17 14:00-14:33/33	07:24 16:24-16:46/22		06:18 16:48-17:38/50		06:02 18:39-19:37/58	05:01 19:26-19:41/15	05:01 19:26-19:41/15	04:33 19:57-20:58/61 20:57-21:03/6		
	16:19	17:21		18:16		20:14	21:09 19:59-20:24/25	21:09 19:59-20:24/25	21:44 20:55-20:56/1		
19	08:16 14:02-14:33/31	07:22 16:23-16:46/23		06:15 16:49-17:43/54		05:59 18:43-19:39/56	04:59 19:28-19:39/10 20:31-20:38/7	04:59 19:28-19:39/10 20:31-20:38/7	04:34 19:57-20:58/61 20:55-21:03/8		
	16:21	17:23		18:18		20:16	21:10 19:58-20:25/27	21:10 19:58-20:25/27	21:45 20:53-20:54/1		
20	08:15 14:03-14:33/30	07:19 16:22-16:47/25		06:13 16:49-17:45/56		05:57 18:44-19:41/57	04:58 19:58-20:27/29	04:58 19:58-20:27/29	04:34 19:57-20:58/61 20:55-21:03/8		
	16:23	17:25		18:20		20:18	21:12 20:28-20:38/10	21:12 20:28-20:38/10	21:45 20:53-20:54/1		
21	08:14 14:04-14:32/28	07:17 16:22-16:48/26		06:10 16:51-17:47/56		05:55 18:46-19:42/56	04:56 19:56-20:40/44	04:56 19:56-20:40/44	04:34 19:57-20:58/61 20:55-21:03/8		
	16:25	17:27		18:22		20:20	21:14		21:45 20:53-20:54/1		
22	08:12 14:05-14:32/27	07:15 16:21-16:47/26		06:08 16:52-17:48/56		05:53 18:46-19:44/58	04:55 19:56-20:42/46	04:55 19:56-20:42/46	04:34 19:57-20:58/61 20:55-21:03/8		
	16:27	17:29		18:23		20:22	21:15		21:45 20:53-20:54/1		
23	08:11 14:06-14:31/25	07:13 16:21-16:47/26		06:05 16:55-17:49/54		05:50 18:48-19:46/58	04:53 19:56-20:44/48	04:53 19:56-20:44/48	04:34 19:58-20:59/61 20:56-21:04/8		
	16:29	17:31		18:25		20:24	21:17		21:46 20:54-20:55/1		
24	08:10 14:07-14:29/22	07:10 16:22-16:48/26		06:03 16:57-17:49/52		05:48 18:49-19:48/59	04:52 19:55-20:44/49	04:52 19:55-20:44/49	04:34 19:58-20:59/61 20:56-21:04/8		
	16:31	17:33		18:27		20:26	21:18		21:46 20:54-20:55/1		
25	08:08 14:10-14:29/19	07:08 16:21-16:47/26		06:00 16:58-17:50/52		05:46 18:50-19:49/59	04:50 19:54-20:46/52	04:50 19:54-20:46/52	04:35 19:58-20:58/60		
	16:32	17:35		18:29		20:27	21:20		21:46 20:53-21:04/11		
26	08:07 14:12-14:26/14	07:06 16:22-16:46/24		05:58 16:58-17:49/51		05:44 18:51-19:50/59	04:49 19:54-20:47/53	04:49 19:54-20:47/53	04:35 19:59-20:59/60		
	16:34	17:37 16:53-17:01/8		18:31		20:29	21:21		21:46 20:54-21:04/10		
27	08:05 14:16-14:23/7	07:04 16:22-16:45/23		05:55 16:59-17:50/51		05:41 18:53-19:50/57	04:48 19:54-20:47/53	04:48 19:54-20:47/53	04:36 19:58-20:59/61 20:56-21:04/8		
	16:36	17:39 16:49-17:04/15		18:33		20:31	21:23		21:46 20:54-20:55/1		
28	08:04	07:01 16:24-16:44/20 17:05-17:06/1		05:53 17:00-17:56/56		05:39 18:55-19:51/56	04:47 19:54-20:48/54	04:47 19:54-20:48/54	04:36 19:59-21:00/61 20:57-20:58/1		
	16:38	17:41 16:47-17:05/18		18:35		20:33	21:24		21:45 20:55-20:56/1 20:59-21:04/5		
29	08:02			06:50 18:02-19:01/59		05:37 18:59-19:51/52	04:45 19:54-20:49/55	04:45 19:54-20:49/55	04:37 19:59-21:00/61 20:59-21:04/5		
	16:40			19:37		20:35	21:26		21:45 20:57-20:58/1		
30	08:01			06:48 18:05-19:03/58		05:35 19:01-19:52/51	04:44 19:54-20:49/55	04:44 19:54-20:49/55	04:37 19:59-21:00/61 20:57-21:04/7		
	16:42			19:39		20:37	21:27		21:45 20:55-20:56/1		
31	07:59			06:45 18:08-19:04/56			04:43 19:54-20:50/56				
	16:44			19:40			21:28				
	Sonnenscheinstunden	248	272	369	367	421	496	1344	512	1929	
	Anzahl Minuten mit Schatten	973	369	1476	1639	1344					

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 121

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

André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 2 - W5

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:38 20:00-21:01/61 21:00-21:04/4	05:19 19:28-19:59/31	06:14 18:32-19:24/52	07:08 17:21-18:09/48	07:07	08:03 13:38-14:14/36
	21:45 20:58-20:59/1	21:09	20:01	18:46	16:35	15:50
2	04:39 19:59-21:00/61 20:57-20:58/1	05:20 19:26-19:59/33	06:16 18:31-19:19/48	07:10 17:20-18:05/45	07:09	08:05 13:38-14:15/37
	21:44 20:55-20:56/1 20:59-21:04/5	21:07	19:59	18:44 18:05-18:06/1	16:33	15:49
3	04:40 20:00-21:01/61	05:22 19:25-20:00/35	06:17 18:30-19:18/48	07:12 17:18-18:02/44	07:11	08:06 13:39-14:16/37
	21:44 21:00-21:04/4	21:05	19:56	18:41	16:31	15:48
4	04:40 20:00-21:01/61 20:58-20:59/1	05:24 19:23-20:00/37	06:19 18:30-19:16/46	07:14 17:17-17:57/40	07:13	08:08 12:52-12:56/4
	21:43 20:56-20:57/1 21:00-21:04/4	21:03	19:54	18:39	16:29	15:48 13:39-14:16/37
5	04:41 20:00-21:01/61 21:00-21:03/3	05:26 19:23-20:00/37	06:21 18:21-19:13/52	07:15 17:17-17:56/39	07:15	08:09 12:50-12:59/9
	21:43 20:58-20:59/1	21:01	19:51	18:37	16:27	15:47 13:39-14:16/37
6	04:42 20:01-21:01/60	05:27 19:22-20:01/39	06:23 18:18-19:11/53	07:17 17:17-17:55/38	07:17	08:10 12:48-13:01/13
	21:42 21:00-21:03/3	20:59	19:49	18:34	16:25	15:46 13:39-14:16/37
7	04:43 20:01-21:01/60 21:00-21:03/3	05:29 19:21-20:00/39	06:25 18:16-19:08/52	07:19 17:16-17:53/37	07:19	08:12 12:47-13:03/16
	21:41 20:57-20:58/1	20:57	19:46	19:08-19:09/1	18:32	16:23
8	04:44 20:01-21:01/60 21:00-21:02/2	05:31 19:21-20:01/40	06:26 18:14-19:07/53	07:21 17:16-17:52/36	07:21	08:13 12:47-13:04/17
	21:41 20:57-20:58/1	20:55	19:44	18:29	16:21	15:45 13:40-14:17/37
9	04:45 20:01-21:01/60	05:33 19:16-20:01/45	06:28 18:10-19:04/54	07:23 17:17-17:49/32	07:23	08:14 12:47-13:06/19
	21:40 21:00-21:01/1	20:53	19:41	18:27	16:20	15:45 13:41-14:18/37
10	04:46 20:02-21:00/58	05:34 19:13-20:00/47	06:30 18:06-19:01/55	07:25 17:17-17:47/30	07:25	08:16 12:46-13:07/21
	21:39	20:51	19:39	18:24	17:47-17:48/1	16:18
11	04:48 20:02-20:59/57	05:36 19:11-20:00/49	06:32 18:03-18:58/55	07:27 17:03-17:12/9	07:27	08:17 12:46-13:07/21
	21:38	20:49	19:36	18:22	17:18-17:46/28	16:16
12	04:49 20:02-20:59/57	05:38 19:10-20:00/50	06:34 18:00-18:57/57	07:29 17:00-17:15/15	07:29	08:18 12:46-13:08/22
	21:37	20:47	19:34	18:20	17:18-17:43/25	16:14
13	04:50 20:02-20:58/56	05:40 19:08-19:59/51	06:35 17:56-18:54/58	07:30 16:58-17:16/18	07:31	08:19 12:46-13:09/23
	21:36	20:45	19:31	18:17	17:19-17:41/22	16:13
14	04:51 20:02-20:58/56	05:41 19:06-19:59/53	06:37 17:53-18:52/59	07:32 16:56-17:18/22	07:33	08:20 12:46-13:10/24
	21:35	20:43	19:29	18:15	17:21-17:38/18	16:11
15	04:53 20:02-20:57/55	05:43 19:02-19:58/56	06:39 17:51-18:48/57	07:34 16:55-17:18/23	07:35 13:49-13:56/7	08:21 12:46-13:10/24
	21:34	20:40	19:26	18:12	17:23-17:36/13	16:09
16	04:54 20:04-20:57/53	05:45 18:59-19:57/58	06:41 17:49-18:39/50	07:36 16:54-17:19/25	07:37 13:45-13:59/14	08:22 12:46-13:11/25
	21:33	20:38	19:24	18:10	16:08	15:44 13:44-14:20/36
17	04:55 20:04-20:56/52	05:47 18:58-19:56/58	06:43 17:47-18:38/51	07:38 16:53-17:19/26	07:38 13:43-14:02/19	08:23 12:47-13:12/25
	21:32	20:36	19:21	18:08	16:06	15:44 13:45-14:21/36
18	04:57 20:04-20:56/52	05:49 18:56-19:55/59	06:44 17:46-18:37/51	07:40 16:53-17:19/26	07:40 13:41-14:03/22	08:23 12:47-13:13/26
	21:30	20:34	19:19	18:05	16:05	15:45 13:45-14:22/37
19	04:58 20:04-20:54/50	05:50 18:54-19:53/59	06:46 17:45-18:37/52	07:42 16:53-17:19/26	07:42 13:41-14:06/25	08:24 12:48-13:14/26
	21:29	20:32	19:16	18:03	16:03	15:45 13:46-14:22/36
20	04:59 20:05-20:54/49	05:52 18:53-19:52/59	06:48 17:43-18:36/53	07:44 16:52-17:18/26	07:44 13:40-14:07/27	08:25 12:48-13:14/26
	21:28	20:29	19:14	18:01	16:02	15:45 13:46-14:22/36
21	05:01 20:05-20:52/47	05:54 18:51-19:49/58	06:50 17:38-18:33/55	07:46 16:53-17:18/25	07:46 13:40-14:08/28	08:26 12:48-13:15/27
	21:26	20:27	19:11	17:59	16:01	15:46 13:47-14:23/36
22	05:02 20:07-20:52/45	05:56 18:49-19:46/57	06:52 17:36-18:32/56	07:48 16:53-17:17/24	07:48 13:39-14:09/30	08:26 12:48-13:15/27
	21:25	20:25	19:09	17:56	15:59	15:46 13:47-14:23/36
23	05:04 20:07-20:37/30	05:58 18:48-19:45/57	06:53 17:34-18:30/56	07:50 16:53-17:17/24	07:50 13:39-14:10/31	08:27 12:50-13:16/26
	21:23 20:38-20:50/12	20:22	19:06	17:54	15:58	15:47 13:48-14:24/36
24	05:06 19:41-19:47/6 20:39-20:48/9	05:59 18:46-19:43/57	06:55 17:33-18:28/55	07:52 16:54-17:16/22	07:51 13:39-14:11/32	08:27 12:50-13:16/26
	21:22 20:07-20:36/29	20:20	19:04	17:52	15:57	15:47 13:48-14:24/36
25	05:07 19:38-19:51/13 20:43-20:47/4	06:01 18:42-19:40/58	06:57 17:32-18:24/52	06:53 15:55-16:14/19	07:53 13:37-14:10/33	08:27 12:50-13:16/26
	21:20 20:09-20:35/26	20:18	19:01	16:50	15:56	15:48 13:48-14:25/37
26	05:09 19:36-19:52/16	06:03 18:39-19:34/55	06:59 17:30-18:20/50	06:55 15:56-16:13/17	07:55 13:37-14:11/34	08:28 12:50-13:16/26
	21:19 20:10-20:34/24	20:15	18:59	16:48	15:55	15:48 13:48-14:25/37
27	05:10 19:35-19:54/19	06:05 18:38-19:33/55	07:01 17:28-18:18/50	06:57 15:58-16:10/12	07:57 13:37-14:12/35	08:28 12:52-13:17/25
	21:17 20:12-20:33/21	20:13	18:56	16:45	15:53	15:49 13:50-14:26/36
28	05:12 19:33-19:55/22	06:07 18:36-19:32/56	07:03 17:26-18:16/50	06:59 16:01-16:07/6	07:58 13:38-14:13/35	08:28 12:53-13:17/24
	21:16 20:13-20:31/18	20:11	18:54	16:43	15:52	15:50 13:50-14:27/37
29	05:14 19:32-19:56/24	06:08 18:34-19:30/56	07:04 17:24-18:14/50	07:01	08:00 13:38-14:14/36	08:28 12:53-13:18/25
	21:14 20:16-20:29/13	20:08	18:51	16:41	15:51	15:51 13:51-14:27/36
30	05:15 19:31-19:57/26	06:10 18:33-19:29/56	07:06 17:22-18:10/48	07:03	08:01 13:38-14:14/36	08:28 12:53-13:17/24
	21:12 20:19-20:24/5	20:06	18:49 18:10-18:11/1	16:39	15:51	15:52 13:50-14:27/37
31	05:17 19:29-19:58/29	06:12 18:33-19:27/54		07:05		08:28 12:54-13:17/23
	21:10	20:03		16:37		15:53 13:51-14:28/37
Sonnenscheinstunden	514	461	383	328	257	231
Anzahl Minuten mit Schatten	1598	1554	1580	862	444	1756

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 122
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 3 - W10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1 08:28	07:57	15:49-16:14/25	06:59	16:40-17:16/36	06:43	18:06-19:16/70	
15:54	16:46	17:43	17:43	19:42	20:39	21:30	
2 08:28	07:55	15:50-16:16/26	06:57	16:41-17:17/36	06:40	18:05-19:15/70	
15:55	16:48	17:45	17:45	19:44	20:40	21:31	
3 08:28	07:54	15:52-16:19/27	06:54	16:43-17:18/35	06:38	18:06-19:15/69	
15:57	16:50	17:47	17:47	19:46	20:42	21:32	
4 08:27	07:52	15:54-16:21/27	06:52	16:46-17:18/32	06:35	18:06-19:14/68	
15:58	16:52	17:49	17:49	19:48	20:44	21:33	
5 08:27	07:50	15:59-16:23/24	06:49	16:48-17:15/27	06:33	18:07-19:14/67	
15:59	16:54	17:51	17:51	19:50	20:46	21:34	
6 08:27	07:48	15:59-16:26/27	06:47	16:49-17:17/28	06:31	18:07-19:13/66	
16:00	16:56	17:53	17:53	19:52	20:48	21:35	
7 08:26	07:46	15:59-16:27/28	06:45	16:52-17:20/28	06:28	18:08-19:12/64	
16:02	16:59	17:55	17:55	19:54	20:50	21:36	
8 08:26	07:44	16:00-16:29/29	06:42	16:53-17:22/29	06:26	18:10-19:11/61	
16:03	17:01	17:57	17:57	19:55	20:51	21:37	
9 08:25	07:42	16:01-16:32/31	06:40	16:54-17:26/32	06:23	18:11-19:04/53	
16:05	17:03	17:59	17:59	19:57	20:53	21:38	
10 08:24	07:40	16:03-16:34/31	06:37	16:52-17:27/35	06:21	18:13-19:01/48	
16:06	17:05	18:01	18:01	19:59	20:55	21:39	
11 08:24	07:38	16:04-16:36/32	06:35	16:52-17:27/35	06:18	18:16-19:10/54	
16:08	17:07	18:02	18:02	19:58	20:54	21:40	
12 08:23	07:36	16:05-16:39/34	06:32	16:51-17:30/39	06:16	18:26-19:09/43	
16:09	17:09	18:04	18:04	19:59	20:55	21:41	
13 08:22	07:34	16:07-16:41/34	06:30	16:50-17:32/42	06:14	18:28-19:08/40	
16:11	17:11	18:06	18:06	19:59	20:55	21:41	
14 08:21	07:32	16:09-16:43/34	06:28	16:49-17:32/43	06:11	18:32-19:05/33	
16:13	17:13	18:08	18:08	19:59	20:55	21:42	
15 08:20	07:30	16:10-16:45/35	06:25	16:50-17:33/43	06:09	18:36-18:47/11	
16:14	17:15	18:10	18:10	19:59	20:55	21:43	
16 08:19	07:28	16:12-16:47/35	06:23	16:49-17:35/46	06:06	19:06-19:33/27	
16:16	17:17	18:12	18:12	19:59	20:55	21:43	
17 08:18	07:26	16:15-16:50/35	06:20	16:49-17:38/49	06:04	19:05-19:34/29	
16:18	17:19	18:14	18:14	19:59	20:55	21:44	
18 08:17	07:24	16:18-16:52/34	06:18	16:49-17:34/45	06:02	19:04-19:33/29	
16:20	17:21	18:16	18:16	19:59	20:55	21:44	
19 08:16	07:22	16:20-16:54/34	06:15	16:50-17:39/49	05:59	19:03-19:34/31	
16:21	17:23	18:18	18:18	19:59	20:55	21:45	
20 08:15	07:19	16:24-16:56/32	06:13	16:50-17:41/51	05:57	19:03-19:34/31	
16:23	17:25	18:20	18:20	19:59	20:55	21:45	
21 08:14	07:17	16:25-16:59/34	06:10	16:51-17:43/52	05:55	19:03-19:34/31	
16:25	17:27	18:22	18:22	19:59	20:55	21:45	
22 08:12	15:50-15:53/3	07:15	16:27-17:00/33	06:08	16:51-17:43/52	05:53	19:02-19:33/31
16:27	17:29	18:23	18:23	19:59	20:55	21:45	
23 08:11	15:48-15:54/6	07:13	16:31-17:03/32	06:05	16:53-17:48/55	05:50	19:02-19:33/31
16:29	17:31	18:25	18:25	19:59	20:55	21:45	
24 08:10	15:47-15:56/9	07:10	16:31-17:05/34	06:03	16:54-17:50/56	05:48	19:03-19:32/29
16:31	17:33	18:27	18:27	19:59	20:55	21:46	
25 08:08	15:48-15:59/11	07:08	16:32-17:07/35	06:00	16:58-18:02/64	05:46	19:03-19:32/29
16:33	17:35	18:29	18:29	19:59	20:55	21:46	
26 08:07	15:47-16:01/14	07:06	16:33-17:09/36	05:58	17:01-18:04/63	05:44	19:04-19:31/27
16:34	17:37	18:31	18:31	19:59	20:55	21:46	
27 08:05	15:47-16:03/16	07:04	16:35-17:11/36	05:55	17:02-18:06/64	05:41	19:04-19:30/26
16:36	17:39	18:33	18:33	19:59	20:55	21:46	
28 08:04	15:48-16:06/18	07:01	16:38-17:13/35	05:53	17:02-18:07/65	05:39	19:05-19:29/24
16:38	17:41	18:35	18:35	19:59	20:55	21:46	
29 08:02	15:48-16:07/19	17:41	17:41	06:50	18:04-19:10/66	05:37	19:06-19:28/22
16:40	17:45	18:39	18:39	19:59	20:55	21:46	
30 08:01	15:48-16:10/22	17:45	17:45	06:48	18:06-19:11/65	05:35	19:08-19:27/19
16:42	17:49	18:43	18:43	19:59	20:55	21:46	
31 07:59	15:48-16:12/24	17:49	17:49	06:45	18:05-19:13/68	20:53	21:45
16:44	17:53	18:47	18:47	19:59	20:55	21:46	
Sonnenscheinstunden	248	272	367	421	496	512	
Anzahl Minuten mit Schatten	142	889	1486	1366	26	0	

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:53 / 123

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

André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 3 - W10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember		
1	04:38 21:45	05:19 21:09	06:14 20:01	18:16-19:10/54 19:15-19:25/10	07:08 18:46	17:30-18:10/40 18:10-18:11/1	07:07 16:35	15:32-16:03/31 15:50
2	04:39 21:44	05:20 21:07	06:16 19:59	18:11-18:59/48 18:58-19:10/12	07:10 18:44	17:31-18:08/37 18:07-18:10/3	07:09 16:33	15:30-16:01/31 15:49
3	04:40 21:44	05:22 21:05	06:18 19:56	18:09-19:02/53 19:01-19:10/9	07:12 18:42	17:30-18:06/36 18:05-18:08/3	07:11 16:31	15:29-15:59/30 15:48
4	04:40 21:43	05:24 21:03	06:19 19:54	18:07-19:08/61 19:07-19:11/4	07:14 18:39	17:31-18:04/33 18:03-18:07/4	07:13 16:29	15:29-15:56/27 15:48
5	04:41 21:43	05:26 21:01	06:21 19:51	18:04-19:08/64 19:08-19:10/2	07:15 18:37	17:30-18:01/31 18:00-18:05/5	07:15 16:27	15:29-15:55/26 15:47
6	04:42 21:42	05:27 20:59	06:23 19:49	18:03-19:09/66 19:09-19:10/1	07:17 18:34	17:29-17:55/26 17:53-18:03/10	07:17 16:25	15:29-15:53/24 15:46
7	04:43 21:41	05:29 20:57	06:25 19:46	18:02-19:09/67 18:01-19:09/68	07:19 18:32	17:26-17:55/29 17:55-18:00/5	07:19 16:23	15:24-15:51/27 15:46
8	04:44 21:41	05:31 20:55	06:27 19:44	18:01-19:09/68 17:59-19:08/69	07:21 18:29	17:24-17:52/28 17:52-17:54/2	07:21 16:21	15:22-15:49/27 15:45
9	04:45 21:40	05:33 20:53	06:28 19:41	17:59-19:08/69 17:59-19:08/69	07:23 18:27	17:22-17:53/31 17:19-17:53/34	07:23 16:20	15:20-15:46/26 15:45
10	04:46 21:39	05:34 20:51	06:30 19:39	17:59-19:08/69 17:58-19:08/70	07:25 18:24	17:19-17:53/34 17:16-17:52/36	07:25 16:18	15:20-15:44/24 15:45
11	04:48 21:38	05:36 20:49	06:32 19:36	17:58-19:08/70 17:58-19:06/68	07:27 18:22	17:16-17:52/36 17:14-17:50/36	07:27 16:16	15:20-15:43/23 15:45
12	04:49 21:37	05:38 20:47	06:34 19:34	17:58-19:06/68 17:57-19:03/66	07:29 18:20	17:14-17:50/36 17:12-17:48/36	07:29 16:14	15:20-15:41/21 15:44
13	04:50 21:36	05:40 20:45	06:35 19:31	17:57-19:03/66 17:55-19:00/65	07:30 18:17	17:12-17:48/36 17:11-17:45/34	07:31 16:13	15:20-15:39/19 15:44
14	04:51 21:35	05:41 20:43	06:37 19:29	17:55-19:00/65 17:53-18:58/65	07:32 18:15	17:11-17:45/34 17:07-17:43/36	07:33 16:11	15:20-15:37/17 15:44
15	04:53 21:34	05:43 20:40	06:39 19:26	17:53-18:58/65 17:52-18:56/64	07:34 18:13	17:07-17:43/36 17:05-17:41/36	07:35 16:09	15:20-15:35/15 15:44
16	04:54 21:33	05:45 20:38	06:41 19:24	17:52-18:56/64 17:50-19:03/66	07:36 18:10	17:05-17:41/36 17:04-17:38/34	07:37 16:08	15:20-15:34/14 15:44
17	04:55 21:32	05:47 20:36	06:43 19:21	17:50-18:53/63 17:47-18:50/63	07:38 18:08	17:04-17:38/34 17:02-17:36/34	07:38 16:06	15:21-15:32/11 15:44
18	04:57 21:30	05:49 20:34	06:44 19:19	17:47-18:50/63 17:43-18:38/55	07:40 18:06	17:02-17:36/34 17:02-17:33/31	07:40 16:05	15:21-15:30/9 15:45
19	04:58 21:29	05:50 20:32	06:46 19:16	17:43-18:38/55 18:43-18:48/5	07:42 18:03	17:02-17:33/31 16:57-17:31/34	07:42 16:03	15:22-15:28/6 15:45
20	05:00 21:28	05:52 20:29	06:48 19:14	17:40-18:36/56 17:37-18:29/52	07:44 18:01	16:57-17:31/34 16:55-17:28/33	07:44 16:02	15:25-15:28/3 15:45
21	05:01 21:26	05:54 20:27	06:50 19:11	17:37-18:29/52 18:29-18:33/4	07:46 17:59	16:55-17:28/33 16:54-17:26/32	07:46 16:01	15:25-15:28/3 15:46
22	05:03 21:25	05:56 20:25	06:52 19:09	17:36-18:28/52 18:27-18:32/5	07:48 17:56	16:54-17:26/32 16:49-17:24/35	07:48 15:59	15:26-15:29/3 15:46
23	05:04 21:23	05:58 20:22	06:53 19:06	17:35-18:26/51 18:25-18:30/5	07:50 17:54	16:49-17:24/35 16:47-17:21/34	07:50 15:58	15:27-15:30/3 15:47
24	05:06 21:22	05:59 20:20	06:55 19:04	17:34-18:24/50 18:23-18:27/4	07:52 17:52	16:47-17:21/34 15:44-16:19/35	07:51 15:57	15:27-15:30/3 15:47
25	05:07 21:20	06:01 20:18	06:57 19:01	17:33-18:20/47 18:13-18:24/5	06:53 16:50	15:44-16:19/35 15:41-16:16/35	07:53 15:56	15:27-15:30/3 15:48
26	05:09 21:19	06:03 20:15	06:59 18:59	17:31-18:21/50 18:48-18:53/5	06:55 16:48	15:41-16:16/35 15:39-16:14/35	07:55 15:55	15:28-15:31/3 15:49
27	05:10 21:17	06:05 20:13	07:01 18:56	17:31-18:18/47 18:38-18:43/5	06:57 16:45	15:39-16:14/35 15:33-16:06/33	07:57 15:53	15:28-15:31/3 15:49
28	05:12 21:16	06:07 20:11	07:03 18:54	17:30-18:14/44 18:53-19:04/11	06:59 16:43	15:38-16:12/34 15:36-16:10/34	07:58 15:52	15:28-15:31/3 15:51
29	05:14 21:14	06:09 20:08	07:04 18:51	17:30-18:13/43 18:51-19:02/32/23	07:01 16:41	15:36-16:10/34 15:33-16:08/34	08:00 15:51	15:28-15:31/3 15:51
30	05:15 21:12	06:10 20:06	07:06 18:49	17:30-18:12/42 19:12-19:28/16	07:03 16:39	15:34-16:08/34 15:33-16:06/33	08:01 15:51	15:28-15:31/3 15:52
31	05:17 21:10	06:12 20:03	07:08 18:47	18:25-19:09/44 19:12-19:28/16	07:05 16:37	15:33-16:06/33 15:33-16:06/33	08:02 15:53	15:28-15:31/3 15:53
Sonnenscheinstunden		514	461	383	1791	1074	257	231
Anzahl Minuten mit Schatten		0	669	1791	1074	411	0	0

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 124
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 4 - Ma3

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

Januar Februar März April Mai Juni Juli August September Oktober November Dezember

1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03	
1	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50	
2	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04	
1	15:56	16:48	17:45	19:44	20:40	21:30	21:44	21:07	19:59	18:44	16:33	15:49	
3	08:28	07:53	06:54	06:38	05:29	04:41	04:40	05:22	06:17	07:12	07:11	08:06	
1	15:57	16:50	17:47	19:46	20:42	21:32	21:43	21:05	19:96	18:41	16:31	15:48	
4	08:27	07:52	06:52	06:35	05:27	04:40	04:41	05:24	06:19	07:13	07:13	08:07	
1	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:48	
5	08:27	07:50	06:49	06:33	05:25	04:39	04:41	05:26	06:21	07:15	07:15	08:09	
1	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:37	16:27	15:47	
6	08:26	07:48	06:47	06:31	05:23	04:38	04:42	05:27	06:23	07:17	07:17	08:10	
1	16:01	16:56	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46	
7	08:26	07:46	06:44	06:28	05:21	04:37	04:43	05:29	06:25	07:19	07:19	08:12	
1	16:02	16:59	17:55	19:53	20:49	21:36	21:41	20:57	19:46	18:32	16:23	15:46	
8	08:25	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:26	07:21	07:21	08:13	
1	16:03	17:01	17:57	19:55	20:51	21:37	21:40	20:55	19:44	18:29	16:21	15:46	
9	08:25	07:42	06:40	06:23	05:17	04:36	04:45	05:33	06:28	07:23	07:23	08:14	
1	16:05	17:03	17:59	19:57	20:53	21:38	21:40	20:53	19:41	18:27	16:20	15:45	
10	08:24	07:40	06:37	06:21	05:15	04:36	04:47	05:34	06:30	07:25	07:25	08:15	
1	16:06	17:05	18:00	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45	
11	08:24	07:38	06:35	06:18	05:13	04:35	04:48	05:36	06:32	07:27	07:27	08:17	
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12	08:23	07:36	06:32	06:16	05:11	04:35	04:49	05:39	06:34	07:28	07:29	08:18	
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1	16:11	17:11	18:06	20:05	21:00	21:41	21:36	20:45	19:31	18:17	16:13	15:44	
14	08:21	07:32	06:27	06:11	05:08	04:34	04:51	05:42	06:37	07:32	07:33	08:20	
1	16:13	17:13	18:08	20:07	21:02	21:42	21:35	20:42	19:29	18:15	16:11	15:44	
15	08:20	07:30	06:25	06:09	05:06	04:34	04:53	05:43	06:39	07:34	07:34	08:21	
1	16:14	17:15	18:10	20:09	21:04	21:42	21:34	20:40	19:26	18:12	16:09	15:44	
16	08:19	07:28	06:22	06:06	05:04	04:34	04:54	05:45	06:41	07:36	07:36	08:22	
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17	08:18	07:26	06:20	06:04	05:02	04:34	04:55	05:47	06:43	07:38	07:38	08:22	
1	16:18	17:19	18:14	20:12	21:07	21:43	21:31	20:36	19:21	18:08	16:06	15:44	
18	08:17	07:24	06:18	06:02	05:01	04:34	04:57	05:49	06:44	07:40	07:40	08:23	
1	16:20	17:21	18:16	20:14	21:09	21:44	21:30	20:34	19:19	18:05	16:05	15:45	
19	08:16	07:21	06:15	05:59	04:59	04:34	04:58	05:50	06:46	07:42	07:42	08:24	
1	16:21	17:23	18:18	20:16	21:10	21:44	21:29	20:31	19:16	18:03	16:03	15:45	
20	08:15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:25	
1	16:23	17:25	18:20	20:18	21:12	21:45	21:28	20:29	19:14	18:01	16:02	15:45	
21	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25	
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22	08:12	07:15	06:08	05:53	04:55	04:34	05:03	05:56	06:52	07:47	07:48	08:26	
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23	08:11	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:49	07:49	08:26	
1	16:29	17:31	18:25	20:24	21:17	21:45	21:23	20:22	19:06	17:54	15:58	15:47	
24	08:09	07:10	06:03	05:48	04:52	04:35	05:06	05:59	06:55	07:51	07:51	08:27	
1	16:31	17:33	18:27	20:25	21:18	21:45	21:22	20:20	19:04	17:52	15:57	15:47	
25	08:08	07:08	06:00	05:46	04:51	04:35	05:07	06:01	06:57	06:53	07:53	08:27	
1	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48	
26	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27	
1	16:34	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49	
27	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28	
1	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:54	15:49	
28	08:04	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28	
1	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:11	18:54	16:43	15:53	15:50	
29	08:02	07:00	05:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28	
1	16:40	17:43	18:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51	
30	08:00	07:00	05:48	05:35	04:44	04:38	05:15	06:10	07:06	07:03	08:01	08:28	
1	16:42	17:45	18:39	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52	
31	07:59	07:00	05:45	05:32	04:43	04:38	05:17	06:12	07:08	07:05	08:03	08:28	
1	16:44	17:47	18:40	20:38	21:28	21:45	21:10	20:03	18:46	16:37	15:49	15:53	
	Sonnenscheinstunden	248	272	367	421	495	512	514	461	383	328	258	231
	Anzahl Minuten mit Schatten	0	0	0	0	0	0	0	0	0	0	0	0

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 125
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 5 - Ma4

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

Januar Februar März April Mai Juni Juli August September Oktober November Dezember

1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03
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2	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04
1	15:56	16:48	17:45	19:44	20:40	21:30	21:44	21:07	19:58	18:44	16:33	15:49
3	08:27	07:53	06:54	06:38	05:29	04:41	04:40	05:22	06:17	07:12	07:11	08:06
1	15:57	16:50	17:47	19:46	20:42	21:32	21:43	21:05	19:96	18:41	16:31	15:48
4	08:27	07:52	06:52	06:35	05:27	04:40	04:41	05:24	06:19	07:13	07:13	08:07
1	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:48
5	08:27	07:50	06:49	06:33	05:25	04:39	04:41	05:26	06:21	07:15	07:15	08:09
1	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:37	16:27	15:47
6	08:26	07:48	06:47	06:31	05:23	04:38	04:42	05:27	06:23	07:17	07:17	08:10
1	16:01	16:56	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46
7	08:26	07:46	06:44	06:28	05:21	04:37	04:43	05:29	06:25	07:19	07:19	08:12
1	16:02	16:59	17:55	19:53	20:49	21:36	21:41	20:57	19:46	18:32	16:23	15:46
8	08:25	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:26	07:21	07:21	08:13
1	16:03	17:01	17:57	19:55	20:51	21:37	21:40	20:55	19:44	18:29	16:21	15:46
9	08:25	07:42	06:40	06:23	05:17	04:36	04:45	05:33	06:28	07:23	07:23	08:14
1	16:05	17:03	17:59	19:57	20:53	21:38	21:40	20:53	19:41	18:27	16:20	15:45
10	08:24	07:40	06:37	06:21	05:15	04:36	04:47	05:34	06:30	07:25	07:25	08:15
1	16:06	17:05	18:00	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45
11	08:24	07:38	06:35	06:18	05:13	04:35	04:48	05:36	06:32	07:27	07:27	08:17
1	16:08	17:07	18:02	20:01	20:57	21:40	21:38	20:49	19:36	18:22	16:16	15:45
12	08:23	07:36	06:32	06:16	05:11	04:35	04:49	05:39	06:34	07:28	07:29	08:18
1	16:09	17:09	18:04	20:03	20:58	21:40	21:37	20:47	19:34	18:20	16:14	15:44
13	08:22	07:34	06:30	06:14	05:09	04:35	04:50	05:40	06:35	07:30	07:31	08:19
1	16:11	17:11	18:06	20:05	21:00	21:41	21:36	20:45	19:31	18:17	16:13	15:44
14	08:21	07:32	06:27	06:11	05:08	04:34	04:51	05:42	06:37	07:32	07:33	08:20
1	16:13	17:13	18:08	20:07	21:02	21:42	21:35	20:42	19:29	18:15	16:11	15:44
15	08:20	07:30	06:25	06:09	05:06	04:34	04:53	05:43	06:39	07:34	07:34	08:21
1	16:14	17:15	18:10	20:08	21:04	21:42	21:34	20:40	19:26	18:12	16:09	15:44
16	08:19	07:28	06:22	06:06	05:04	04:34	04:54	05:45	06:41	07:36	07:36	08:22
1	16:16	17:17	18:12	20:10	21:05	21:43	21:33	20:38	19:24	18:10	16:08	15:44
17	08:18	07:26	06:20	06:04	05:02	04:34	04:55	05:47	06:43	07:38	07:38	08:22
1	16:18	17:19	18:14	20:12	21:07	21:43	21:31	20:36	19:21	18:08	16:06	15:44
18	08:17	07:24	06:18	06:02	05:01	04:34	04:57	05:49	06:44	07:40	07:40	08:23
1	16:20	17:21	18:16	20:14	21:09	21:44	21:30	20:34	19:19	18:05	16:05	15:45
19	08:16	07:21	06:15	05:59	04:59	04:34	04:58	05:50	06:46	07:42	07:42	08:24
1	16:21	17:23	18:18	20:16	21:10	21:44	21:29	20:31	19:16	18:03	16:03	15:45
20	08:15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:25
1	16:23	17:25	18:20	20:18	21:12	21:45	21:28	20:29	19:14	18:01	16:02	15:45
21	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25
1	16:25	17:27	18:21	20:20	21:13	21:45	21:26	20:27	19:11	17:59	16:01	15:46
22	08:12	07:15	06:08	05:53	04:55	04:34	05:03	05:56	06:52	07:47	07:48	08:26
1	16:27	17:29	18:23	20:22	21:15	21:45	21:25	20:25	19:09	17:56	15:59	15:46
23	08:11	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:49	07:49	08:26
1	16:29	17:31	18:25	20:23	21:17	21:45	21:23	20:22	19:06	17:54	15:58	15:47
24	08:09	07:10	06:03	05:48	04:52	04:35	05:06	05:59	06:55	07:51	07:51	08:27
1	16:31	17:33	18:27	20:25	21:18	21:45	21:22	20:20	19:04	17:52	15:57	15:47
25	08:08	07:08	06:00	05:46	04:51	04:35	05:07	06:01	06:57	06:53	07:53	08:27
1	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48
26	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27
1	16:34	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49
27	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28
1	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:54	15:49
28	08:04	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28
1	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:11	18:54	16:43	15:53	15:50
29	08:02	07:00	05:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28
1	16:40	17:43	18:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51
30	08:00	07:00	05:48	05:35	04:45	04:38	05:15	06:10	07:06	07:03	08:01	08:28
1	16:42	17:45	18:39	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52
31	07:59	07:00	05:45	05:32	04:43	04:37	05:17	06:12	07:08	07:05	08:03	08:28
1	16:44	17:47	18:40	20:38	21:28	21:45	21:10	20:03	18:46	16:37	15:49	15:53
Sonnenscheinstunden 248												
Anzahl Minuten mit Schatten 0 0 0 0 0 0 0 0 0 0 0 0 0												

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 127
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 7 - Ma6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03	
2	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50	
3	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04	
4	15:55	16:48	17:45	19:44	20:40	21:30	21:44	21:07	19:58	18:44	16:33	15:49	
5	08:28	07:53	06:54	06:38	05:29	04:41	04:40	05:22	06:17	07:12	07:11	08:06	
6	15:57	16:50	17:47	19:46	20:42	21:32	21:43	21:05	19:96	18:41	16:31	15:48	
7	08:27	07:52	06:52	06:35	05:26	04:40	04:41	05:24	06:19	07:13	07:13	08:07	
8	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:48	
9	08:27	07:50	06:49	06:33	05:24	04:39	04:41	05:26	06:21	07:15	07:15	08:09	
10	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:37	16:27	15:47	
11	08:26	07:48	06:47	06:30	05:22	04:38	04:42	05:27	06:23	07:17	07:17	08:10	
12	16:01	16:56	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46	
13	08:26	07:46	06:44	06:28	05:20	04:37	04:43	05:29	06:25	07:19	07:19	08:12	
14	16:02	16:58	17:55	19:53	20:49	21:36	21:41	20:57	19:46	18:32	16:23	15:46	
15	08:25	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:26	07:21	07:21	08:13	
16	16:03	17:01	17:57	19:55	20:51	21:37	21:40	20:55	19:44	18:29	16:21	15:45	
17	08:25	07:42	06:40	06:23	05:17	04:36	04:45	05:33	06:28	07:23	07:23	08:14	
18	16:05	17:03	17:59	19:57	20:53	21:38	21:40	20:53	19:41	18:27	16:20	15:45	
19	08:24	07:40	06:37	06:21	05:15	04:36	04:47	05:34	06:30	07:25	07:25	08:15	
20	16:06	17:05	18:00	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45	
21	08:24	07:38	06:35	06:18	05:13	04:35	04:48	05:36	06:32	07:26	07:27	08:17	
22	16:08	17:07	18:02	20:01	20:57	21:40	21:38	20:49	19:36	18:22	16:16	15:45	
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24	16:09	17:09	18:04	20:03	20:58	21:40	21:37	20:47	19:34	18:20	16:14	15:44	
25	08:22	07:34	06:30	06:14	05:09	04:34	04:50	05:40	06:35	07:30	07:31	08:19	
26	16:11	17:11	18:06	20:05	21:00	21:41	21:36	20:45	19:31	18:17	16:13	15:44	
27	08:21	07:32	06:27	06:11	05:07	04:34	04:51	05:41	06:37	07:32	07:33	08:20	
28	16:13	17:13	18:08	20:07	21:02	21:42	21:35	20:42	19:29	18:15	16:11	15:44	
29	08:20	07:30	06:25	06:09	05:06	04:34	04:53	05:43	06:39	07:34	07:34	08:21	
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32	16:16	17:17	18:12	20:10	21:05	21:43	21:33	20:38	19:24	18:10	16:08	15:44	
33	08:18	07:26	06:20	06:04	05:02	04:34	04:55	05:47	06:43	07:38	07:38	08:22	
34	16:18	17:19	18:14	20:12	21:07	21:43	21:31	20:36	19:21	18:08	16:06	15:44	
35	08:17	07:24	06:18	06:02	05:01	04:34	04:57	05:49	06:44	07:40	07:40	08:23	
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37	08:16	07:21	06:15	05:59	04:59	04:34	04:58	05:50	06:46	07:42	07:42	08:24	
38	16:21	17:23	18:18	20:16	21:10	21:44	21:29	20:31	19:16	18:03	16:03	15:45	
39	08:15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:25	
40	16:23	17:25	18:20	20:18	21:12	21:45	21:28	20:29	19:14	18:01	16:02	15:45	
41	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25	
42	16:25	17:27	18:21	20:20	21:13	21:45	21:26	20:27	19:11	17:59	16:01	15:46	
43	08:12	07:15	06:08	05:52	04:55	04:34	05:03	05:56	06:52	07:47	07:48	08:26	
44	16:27	17:29	18:23	20:22	21:15	21:45	21:25	20:25	19:09	17:56	15:59	15:46	
45	08:11	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:49	07:49	08:26	
46	16:29	17:31	18:25	20:23	21:17	21:45	21:23	20:22	19:06	17:54	15:58	15:47	
47	08:09	07:10	06:03	05:48	04:52	04:35	05:06	05:59	06:55	07:51	07:51	08:27	
48	16:31	17:33	18:27	20:25	21:18	21:45	21:22	20:20	19:04	17:52	15:57	15:47	
49	08:08	07:08	06:00	05:46	04:50	04:35	05:07	06:01	06:57	06:53	07:53	08:27	
50	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48	
51	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27	
52	16:34	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49	
53	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28	
54	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:53	15:49	
55	08:04	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28	
56	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:11	18:54	16:43	15:52	15:50	
57	08:02		06:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28	
58	16:40		19:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51	
59	08:00		06:48	05:35	04:44	04:37	05:15	06:10	07:06	07:03	08:01	08:28	
60	16:42		19:38	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52	
61	07:59		06:45		04:43		05:17	06:12		07:05		08:28	
62	16:44		19:40		21:28		21:10	20:03		16:37		15:53	
63	Sonnenscheinstunden	248	272	367	421	496	512	514	461	383	328	258	231
64	Anzahl Minuten mit Schatten	0	0	0	0	0	0	0	0	0	0	0	0

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 128
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 8 - Ma7

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

Januar Februar März April Mai Juni Juli August September Oktober November Dezember

1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03	
1	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50	
2	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04	
1	15:55	16:48	17:45	19:44	20:40	21:31	21:44	21:07	19:59	18:44	16:33	15:49	
3	08:28	07:53	06:54	06:38	05:29	04:40	04:40	05:22	06:17	07:12	07:11	08:06	
1	15:57	16:50	17:47	19:46	20:42	21:32	21:43	21:05	19:56	18:41	16:31	15:48	
4	08:27	07:52	06:52	06:35	05:26	04:40	04:41	05:24	06:19	07:13	07:13	08:07	
1	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:48	
5	08:27	07:50	06:49	06:33	05:24	04:39	04:41	05:26	06:21	07:15	07:15	08:09	
1	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:37	16:27	15:47	
6	08:26	07:48	06:47	06:30	05:22	04:38	04:42	05:27	06:23	07:17	07:17	08:10	
1	16:00	16:56	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46	
7	08:26	07:46	06:44	06:28	05:20	04:37	04:43	05:29	06:25	07:19	07:19	08:12	
1	16:02	16:58	17:55	19:53	20:49	21:36	21:41	20:57	19:46	18:32	16:23	15:46	
8	08:25	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:26	07:21	07:21	08:13	
1	16:03	17:01	17:57	19:55	20:51	21:37	21:40	20:55	19:44	18:29	16:21	15:45	
9	08:25	07:42	06:40	06:23	05:17	04:36	04:45	05:33	06:28	07:23	07:23	08:14	
1	16:05	17:03	17:59	19:57	20:53	21:38	21:40	20:53	19:41	18:27	16:20	15:45	
10	08:24	07:40	06:37	06:21	05:15	04:36	04:46	05:34	06:30	07:25	07:25	08:15	
1	16:06	17:05	18:00	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45	
11	08:24	07:38	06:35	06:18	05:13	04:35	04:48	05:36	06:32	07:27	07:27	08:17	
1	16:08	17:07	18:02	20:01	20:57	21:40	21:38	20:49	19:36	18:22	16:16	15:45	
12	08:23	07:36	06:32	06:16	05:11	04:35	04:49	05:39	06:34	07:28	07:29	08:18	
1	16:09	17:09	18:04	20:03	20:58	21:40	21:37	20:47	19:34	18:20	16:14	15:44	
13	08:22	07:34	06:30	06:14	05:09	04:34	04:50	05:40	06:35	07:30	07:31	08:19	
1	16:11	17:11	18:06	20:05	21:00	21:41	21:36	20:45	19:31	18:17	16:13	15:44	
14	08:21	07:32	06:27	06:11	05:07	04:34	04:51	05:41	06:37	07:32	07:33	08:20	
1	16:13	17:13	18:08	20:07	21:02	21:42	21:35	20:42	19:29	18:15	16:11	15:44	
15	08:20	07:30	06:25	06:09	05:06	04:34	04:53	05:43	06:39	07:34	07:34	08:21	
1	16:14	17:15	18:10	20:09	21:04	21:42	21:34	20:40	19:26	18:12	16:09	15:44	
16	08:19	07:28	06:22	06:06	05:04	04:34	04:54	05:45	06:41	07:36	07:36	08:22	
1	16:16	17:17	18:12	20:10	21:05	21:43	21:33	20:38	19:24	18:10	16:08	15:44	
17	08:18	07:26	06:20	06:04	05:02	04:34	04:55	05:47	06:43	07:38	07:38	08:22	
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18	08:17	07:24	06:18	06:02	05:01	04:34	04:57	05:49	06:44	07:40	07:40	08:23	
1	16:20	17:21	18:16	20:14	21:09	21:44	21:30	20:34	19:19	18:05	16:05	15:45	
19	08:16	07:21	06:15	05:59	04:59	04:34	04:58	05:50	06:46	07:42	07:42	08:24	
1	16:21	17:23	18:18	20:16	21:10	21:44	21:29	20:31	19:16	18:03	16:03	15:45	
20	08:15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:25	
1	16:23	17:25	18:20	20:18	21:12	21:45	21:28	20:29	19:14	18:01	16:02	15:45	
21	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25	
1	16:25	17:27	18:21	20:20	21:13	21:45	21:26	20:27	19:11	17:59	16:01	15:46	
22	08:12	07:15	06:08	05:52	04:55	04:34	05:03	05:56	06:52	07:47	07:48	08:26	
1	16:27	17:29	18:23	20:22	21:15	21:45	21:25	20:25	19:09	17:56	15:59	15:46	
23	08:11	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:49	07:49	08:26	
1	16:29	17:31	18:25	20:24	21:17	21:45	21:23	20:22	19:06	17:54	15:58	15:47	
24	08:09	07:10	06:03	05:48	04:52	04:34	05:06	05:59	06:55	07:51	07:51	08:27	
1	16:31	17:33	18:27	20:25	21:18	21:45	21:22	20:20	19:04	17:52	15:57	15:47	
25	08:08	07:08	06:00	05:46	04:50	04:35	05:07	06:01	06:57	06:53	07:53	08:27	
1	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48	
26	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27	
1	16:34	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49	
27	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28	
1	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:53	15:49	
28	08:04	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28	
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29	08:02	07:00	05:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28	
1	16:40	17:43	18:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51	
30	08:00	07:00	05:48	05:35	04:44	04:37	05:15	06:10	07:06	07:03	08:01	08:28	
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31	07:59	07:00	05:45	05:32	04:43	04:37	05:17	06:12	07:08	07:05	08:03	08:28	
1	16:44	17:47	18:40	20:38	21:28	21:45	21:10	20:03	18:46	16:37	15:49	15:53	
	Sonnenscheinstunden	248	272	367	421	496	512	514	461	383	328	258	231
	Anzahl Minuten mit Schatten	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 129
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 9 - Ma8

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

Januar Februar März April Mai Juni Juli August September Oktober November Dezember

1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03
1	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50
2	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04
1	15:55	16:48	17:45	19:44	20:40	21:30	21:44	21:07	19:58	18:44	16:33	15:49
3	08:27	07:53	06:54	06:38	05:29	04:40	04:40	05:22	06:17	07:12	07:11	08:06
1	15:57	16:50	17:47	19:46	20:42	21:32	21:43	21:05	19:96	18:41	16:31	15:48
4	08:27	07:52	06:52	06:35	05:26	04:40	04:41	05:24	06:19	07:13	07:13	08:07
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5	08:27	07:50	06:49	06:33	05:24	04:39	04:41	05:26	06:21	07:15	07:15	08:09
1	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:36	16:27	15:47
6	08:26	07:48	06:47	06:30	05:22	04:38	04:42	05:27	06:23	07:17	07:17	08:10
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7	08:26	07:46	06:44	06:28	05:20	04:37	04:43	05:29	06:25	07:19	07:19	08:12
1	16:02	16:58	17:55	19:53	20:49	21:36	21:41	20:57	19:46	18:32	16:23	15:46
8	08:25	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:26	07:21	07:21	08:13
1	16:03	17:00	17:57	19:55	20:51	21:37	21:40	20:55	19:44	18:29	16:21	15:45
9	08:25	07:42	06:40	06:23	05:17	04:36	04:45	05:33	06:28	07:23	07:23	08:14
1	16:05	17:03	17:58	19:57	20:53	21:38	21:40	20:53	19:41	18:27	16:20	15:45
10	08:24	07:40	06:37	06:21	05:15	04:36	04:46	05:34	06:30	07:25	07:25	08:15
1	16:06	17:05	18:00	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45
11	08:23	07:38	06:35	06:18	05:13	04:35	04:48	05:36	06:32	07:26	07:27	08:17
1	16:08	17:07	18:02	20:01	20:57	21:40	21:38	20:49	19:36	18:22	16:16	15:45
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1	16:13	17:13	18:08	20:07	21:02	21:42	21:35	20:42	19:29	18:15	16:11	15:44
15	08:20	07:30	06:25	06:09	05:06	04:34	04:53	05:43	06:39	07:34	07:34	08:21
1	16:14	17:15	18:10	20:08	21:04	21:42	21:34	20:40	19:26	18:12	16:09	15:44
16	08:19	07:28	06:22	06:06	05:04	04:34	04:54	05:45	06:41	07:36	07:36	08:22
1	16:16	17:17	18:12	20:10	21:05	21:43	21:33	20:38	19:24	18:10	16:08	15:44
17	08:18	07:26	06:20	06:04	05:02	04:34	04:55	05:47	06:43	07:38	07:38	08:22
1	16:18	17:19	18:14	20:12	21:07	21:43	21:31	20:36	19:21	18:08	16:06	15:44
18	08:17	07:24	06:17	06:02	05:01	04:34	04:57	05:49	06:44	07:40	07:40	08:23
1	16:19	17:21	18:16	20:14	21:09	21:44	21:30	20:34	19:19	18:05	16:05	15:45
19	08:16	07:21	06:15	05:59	04:59	04:34	04:58	05:50	06:46	07:42	07:42	08:24
1	16:21	17:23	18:18	20:16	21:10	21:44	21:29	20:31	19:16	18:03	16:03	15:45
20	08:15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:25
1	16:23	17:25	18:20	20:18	21:12	21:45	21:27	20:29	19:14	18:01	16:02	15:45
21	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25
1	16:25	17:27	18:21	20:20	21:13	21:45	21:26	20:27	19:11	17:59	16:01	15:46
22	08:12	07:15	06:08	05:52	04:55	04:34	05:03	05:56	06:52	07:47	07:47	08:26
1	16:27	17:29	18:23	20:22	21:15	21:45	21:25	20:25	19:09	17:56	15:59	15:46
23	08:11	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:49	07:49	08:26
1	16:29	17:31	18:25	20:23	21:17	21:45	21:23	20:22	19:06	17:54	15:58	15:47
24	08:09	07:10	06:03	05:48	04:52	04:34	05:06	05:59	06:55	07:51	07:51	08:27
1	16:31	17:33	18:27	20:25	21:18	21:45	21:22	20:20	19:04	17:52	15:57	15:47
25	08:08	07:08	06:00	05:46	04:50	04:35	05:07	06:01	06:57	06:53	07:53	08:27
1	16:32	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48
26	08:07	07:06	05:58	05:43	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27
1	16:34	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49
27	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28
1	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:53	15:49
28	08:03	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28
1	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:10	18:54	16:43	15:52	15:50
29	08:02	07:00	05:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28
1	16:40	17:43	18:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51
30	08:00	07:00	05:48	05:35	04:44	04:37	05:15	06:10	07:06	07:03	08:01	08:28
1	16:42	17:45	18:39	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52
31	07:59	07:00	05:45	05:32	04:43	04:37	05:17	06:12	07:08	07:05	08:04	08:28
1	16:44	17:47	18:40	20:38	21:28	21:45	21:10	20:03	18:46	16:37	15:49	15:53
Sonnenscheinstunden 248												
Anzahl Minuten mit Schatten 0 0 0 0 0 0 0 0 0 0 0 0 0												

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 130
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 10 - Ma9

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03	
2	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50	
3	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04	
4	15:55	16:48	17:45	19:44	20:40	21:31	21:44	21:07	19:59	18:44	16:33	15:49	
5	08:28	07:54	06:54	06:38	05:29	04:41	04:40	05:22	06:17	07:12	07:11	08:06	
6	15:57	16:50	17:47	19:46	20:42	21:32	21:44	21:05	19:56	18:41	16:31	15:48	
7	08:27	07:52	06:52	06:35	05:27	04:40	04:41	05:24	06:19	07:13	07:13	08:07	
8	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:48	
9	08:27	07:50	06:49	06:33	05:24	04:39	04:41	05:26	06:21	07:15	07:15	08:09	
10	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:37	16:27	15:47	
11	08:27	07:48	06:47	06:30	05:22	04:38	04:42	05:27	06:23	07:17	07:17	08:10	
12	16:01	16:56	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46	
13	08:26	07:46	06:44	06:28	05:21	04:37	04:43	05:29	06:25	07:19	07:19	08:12	
14	16:02	16:58	17:55	19:53	20:49	21:36	21:41	20:57	19:46	18:32	16:23	15:46	
15	08:26	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:26	07:21	07:21	08:13	
16	16:03	17:01	17:57	19:55	20:51	21:37	21:40	20:55	19:44	18:29	16:21	15:45	
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19	08:24	07:40	06:37	06:21	05:15	04:36	04:47	05:34	06:30	07:25	07:25	08:15	
20	16:06	17:05	18:00	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45	
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24	16:09	17:09	18:04	20:03	20:58	21:40	21:37	20:47	19:34	18:20	16:14	15:44	
25	08:22	07:34	06:30	06:14	05:09	04:34	04:50	05:40	06:35	07:30	07:31	08:19	
26	16:11	17:11	18:06	20:05	21:00	21:41	21:36	20:45	19:31	18:17	16:13	15:44	
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40	16:23	17:25	18:20	20:18	21:12	21:45	21:28	20:29	19:14	18:01	16:02	15:45	
41	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25	
42	16:25	17:27	18:21	20:20	21:14	21:45	21:26	20:27	19:11	17:59	16:01	15:46	
43	08:12	07:15	06:08	05:53	04:55	04:34	05:03	05:56	06:52	07:48	07:48	08:26	
44	16:27	17:29	18:23	20:22	21:15	21:45	21:25	20:25	19:09	17:56	15:59	15:46	
45	08:11	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:49	07:49	08:26	
46	16:29	17:31	18:25	20:24	21:17	21:45	21:23	20:22	19:06	17:54	15:58	15:47	
47	08:09	07:10	06:03	05:48	04:52	04:34	05:06	05:59	06:55	07:51	07:51	08:27	
48	16:31	17:33	18:27	20:25	21:18	21:45	21:22	20:20	19:04	17:52	15:57	15:47	
49	08:08	07:08	06:00	05:46	04:50	04:35	05:07	06:01	06:57	06:53	07:53	08:27	
50	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48	
51	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27	
52	16:34	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49	
53	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28	
54	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:53	15:49	
55	08:04	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28	
56	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:11	18:54	16:43	15:52	15:50	
57	08:02		06:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28	
58	16:40		19:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51	
59	08:00		06:48	05:35	04:44	04:37	05:15	06:10	07:06	07:03	08:01	08:28	
60	16:42		19:38	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52	
61	07:59		06:45		04:43		05:17	06:12		07:05		08:28	
62	16:44		19:40		21:28		21:10	20:03		16:37		15:53	
63	Sonnenscheinstunden	248	272	367	421	496	512	514	461	383	328	258	231
64	Anzahl Minuten mit Schatten	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 131
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 11 - Ma10

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03	
2	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50	
3	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04	
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5	08:28	07:54	06:54	06:38	05:29	04:41	04:40	05:22	06:18	07:12	07:11	08:06	
6	15:57	16:50	17:47	19:46	20:42	21:32	21:43	21:05	19:96	18:41	16:31	15:48	
7	08:27	07:52	06:52	06:35	05:27	04:40	04:41	05:24	06:19	07:14	07:13	08:07	
8	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:46	
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13	08:26	07:46	06:44	06:28	05:21	04:37	04:43	05:29	06:25	07:19	07:19	08:12	
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39	08:15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:25	
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41	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25	
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43	08:12	07:15	06:08	05:53	04:55	04:34	05:03	05:56	06:52	07:48	07:48	08:26	
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47	08:09	07:10	06:03	05:48	04:52	04:35	05:06	05:59	06:55	07:51	07:51	08:27	
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49	08:08	07:08	06:00	05:46	04:51	04:35	05:07	06:01	06:57	06:53	07:53	08:27	
50	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48	
51	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27	
52	16:35	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49	
53	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28	
54	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:54	15:49	
55	08:04	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28	
56	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:11	18:54	16:43	15:53	15:50	
57	08:02		06:50	05:37	04:46	04:37	05:14	06:09	07:04	07:01	08:00	08:28	
58	16:40		19:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51	
59	08:00		06:48	05:35	04:45	04:38	05:15	06:10	07:06	07:03	08:01	08:28	
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61	07:59		06:45		04:43		05:17	06:12		07:05		08:28	
62	16:44		19:40		21:28		21:10	20:03		16:37		15:53	
63	Sonnenscheinstunden	248	272	367	421	495	512	514	461	383	328	258	231
64	Anzahl Minuten mit Schatten	0	0	0	0	0	0	0	0	0	0	0	0

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 132
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 12 - Ma11

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03	
2	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50	
3	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04	
4	15:56	16:48	17:45	19:44	20:40	21:30	21:44	21:07	19:59	18:44	16:33	15:49	
5	08:28	07:53	06:54	06:38	05:29	04:41	04:40	05:22	06:17	07:12	07:11	08:06	
6	15:57	16:50	17:47	19:46	20:42	21:32	21:43	21:05	19:56	18:41	16:31	15:48	
7	08:27	07:52	06:52	06:35	05:27	04:40	04:41	05:24	06:19	07:13	07:13	08:07	
8	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:46	
9	08:27	07:50	06:49	06:33	05:25	04:39	04:41	05:26	06:21	07:15	07:15	08:09	
10	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:37	16:27	15:47	
11	08:26	07:48	06:47	06:31	05:23	04:38	04:42	05:27	06:23	07:17	07:17	08:10	
12	16:01	16:56	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46	
13	08:26	07:46	06:44	06:28	05:21	04:37	04:43	05:29	06:25	07:19	07:19	08:12	
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15	08:25	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:26	07:21	07:21	08:13	
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49	08:08	07:08	06:00	05:46	04:51	04:35	05:07	06:01	06:57	06:53	07:53	08:27	
50	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48	
51	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27	
52	16:34	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49	
53	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28	
54	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:54	15:49	
55	08:04	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28	
56	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:11	18:54	16:43	15:53	15:50	
57	08:02		06:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28	
58	16:40		19:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51	
59	08:00		06:48	05:35	04:44	04:38	05:15	06:10	07:06	07:03	08:01	08:28	
60	16:42		19:38	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52	
61	07:59		06:45		04:43		05:17	06:12		07:05		08:28	
62	16:44		19:40		21:28		21:10	20:03		16:37		15:53	
63	Sonnenscheinstunden	248	272	367	421	496	512	514	461	383	328	258	231
64	Anzahl Minuten mit Schatten	0	0	0	0	0	0	0	0	0	0	0	0

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 133
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 13 - Ma12

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

Januar Februar März April Mai Juni Juli August September Oktober November Dezember

1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03
1	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50
2	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04
1	15:56	16:48	17:45	19:44	20:40	21:30	21:44	21:07	19:58	18:44	16:33	15:49
3	08:27	07:53	06:54	06:38	05:29	04:41	04:40	05:22	06:17	07:12	07:11	08:06
1	15:57	16:50	17:47	19:46	20:42	21:32	21:43	21:05	19:56	18:41	16:31	15:48
4	08:27	07:52	06:52	06:35	05:27	04:40	04:41	05:24	06:19	07:13	07:13	08:07
1	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:48
5	08:27	07:50	06:49	06:33	05:25	04:39	04:41	05:26	06:21	07:15	07:15	08:09
1	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:37	16:27	15:47
6	08:26	07:48	06:47	06:30	05:23	04:38	04:42	05:27	06:23	07:17	07:17	08:10
1	16:01	16:56	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46
7	08:26	07:46	06:44	06:28	05:21	04:37	04:43	05:29	06:25	07:19	07:19	08:12
1	16:02	16:58	17:55	19:53	20:49	21:36	21:41	20:57	19:46	18:32	16:23	15:46
8	08:25	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:26	07:21	07:21	08:13
1	16:03	17:01	17:57	19:55	20:51	21:37	21:40	20:55	19:44	18:29	16:21	15:46
9	08:25	07:42	06:40	06:23	05:17	04:36	04:45	05:33	06:28	07:23	07:23	08:14
1	16:05	17:03	17:59	19:57	20:53	21:38	21:40	20:53	19:41	18:27	16:20	15:45
10	08:24	07:40	06:37	06:21	05:15	04:36	04:47	05:34	06:30	07:25	07:25	08:15
1	16:06	17:05	18:00	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45
11	08:23	07:38	06:35	06:18	05:13	04:35	04:48	05:36	06:32	07:26	07:27	08:17
1	16:08	17:07	18:02	20:01	20:57	21:40	21:38	20:49	19:36	18:22	16:16	15:45
12	08:23	07:36	06:32	06:16	05:11	04:35	04:49	05:39	06:34	07:28	07:29	08:18
1	16:09	17:09	18:04	20:03	20:58	21:40	21:37	20:47	19:34	18:20	16:14	15:44
13	08:22	07:34	06:30	06:14	05:09	04:35	04:50	05:40	06:35	07:30	07:31	08:19
1	16:11	17:11	18:06	20:05	21:00	21:41	21:36	20:45	19:31	18:17	16:13	15:44
14	08:21	07:32	06:27	06:11	05:08	04:34	04:51	05:41	06:37	07:32	07:33	08:20
1	16:13	17:13	18:08	20:07	21:02	21:42	21:35	20:42	19:29	18:15	16:11	15:44
15	08:20	07:30	06:25	06:09	05:06	04:34	04:53	05:43	06:39	07:34	07:34	08:21
1	16:14	17:15	18:10	20:08	21:04	21:42	21:34	20:40	19:26	18:12	16:09	15:44
16	08:19	07:28	06:22	06:06	05:04	04:34	04:54	05:45	06:41	07:36	07:36	08:22
1	16:16	17:17	18:12	20:10	21:05	21:43	21:33	20:38	19:24	18:10	16:08	15:44
17	08:18	07:26	06:20	06:04	05:02	04:34	04:55	05:47	06:43	07:38	07:38	08:22
1	16:18	17:19	18:14	20:12	21:07	21:43	21:31	20:36	19:21	18:08	16:06	15:44
18	08:17	07:24	06:18	06:02	05:01	04:34	04:57	05:49	06:44	07:40	07:40	08:23
1	16:20	17:21	18:16	20:14	21:09	21:44	21:30	20:34	19:19	18:05	16:05	15:45
19	08:16	07:21	06:15	05:59	04:59	04:34	04:58	05:50	06:46	07:42	07:42	08:24
1	16:21	17:23	18:18	20:16	21:10	21:44	21:29	20:31	19:16	18:03	16:03	15:45
20	08:15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:25
1	16:23	17:25	18:20	20:18	21:12	21:45	21:27	20:29	19:14	18:01	16:02	15:45
21	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25
1	16:25	17:27	18:21	20:20	21:13	21:45	21:26	20:27	19:11	17:59	16:01	15:46
22	08:12	07:15	06:08	05:53	04:55	04:34	05:03	05:56	06:52	07:47	07:47	08:26
1	16:27	17:29	18:23	20:22	21:15	21:45	21:25	20:25	19:09	17:56	15:59	15:46
23	08:11	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:49	07:49	08:26
1	16:29	17:31	18:25	20:23	21:17	21:45	21:23	20:22	19:06	17:54	15:58	15:47
24	08:09	07:10	06:03	05:48	04:52	04:35	05:06	05:59	06:55	07:51	07:51	08:27
1	16:31	17:33	18:27	20:25	21:18	21:45	21:22	20:20	19:04	17:52	15:57	15:47
25	08:08	07:08	06:00	05:46	04:51	04:35	05:07	06:01	06:57	06:53	07:53	08:27
1	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48
26	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27
1	16:34	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49
27	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28
1	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:54	15:49
28	08:04	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28
1	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:11	18:54	16:43	15:53	15:50
29	08:02	07:00	05:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28
1	16:40	17:43	18:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51
30	08:00	07:00	05:48	05:35	04:44	04:38	05:15	06:10	07:06	07:03	08:01	08:28
1	16:42	17:45	18:39	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52
31	07:59	07:00	05:45	05:32	04:43	04:38	05:17	06:12	07:08	07:05	08:03	08:28
1	16:44	17:47	18:40	20:38	21:28	21:45	21:10	20:03	18:42	16:37	15:51	15:53
Sonnenscheinstunden 248												
Anzahl Minuten mit Schatten 0 0 0 0 0 0 0 0 0 0 0 0 0												

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 134
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 14 - Ma13

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03	
2	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50	
3	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04	
4	15:56	16:48	17:45	19:44	20:40	21:30	21:44	21:06	19:58	18:44	16:33	15:49	
5	08:27	07:53	06:54	06:38	05:29	04:41	04:40	05:22	06:17	07:12	07:11	08:06	
6	15:57	16:50	17:47	19:46	20:42	21:32	21:43	21:05	19:96	18:41	16:31	15:48	
7	08:27	07:52	06:52	06:35	05:27	04:40	04:41	05:24	06:19	07:13	07:13	08:07	
8	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:46	
9	08:27	07:50	06:49	06:33	05:24	04:39	04:41	05:26	06:21	07:15	07:15	08:09	
10	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:37	16:27	15:47	
11	08:26	07:48	06:47	06:30	05:22	04:38	04:42	05:27	06:23	07:17	07:17	08:10	
12	16:01	16:56	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46	
13	08:26	07:46	06:44	06:28	05:21	04:37	04:43	05:29	06:25	07:19	07:19	08:12	
14	16:02	16:58	17:55	19:53	20:49	21:36	21:41	20:57	19:46	18:32	16:23	15:46	
15	08:25	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:26	07:21	07:21	08:13	
16	16:03	17:01	17:57	19:55	20:51	21:37	21:40	20:55	19:44	18:29	16:21	15:45	
17	08:25	07:42	06:40	06:23	05:17	04:36	04:45	05:33	06:28	07:23	07:23	08:14	
18	16:05	17:03	17:59	19:57	20:53	21:38	21:40	20:53	19:41	18:27	16:20	15:45	
19	08:24	07:40	06:37	06:21	05:15	04:36	04:47	05:34	06:30	07:25	07:25	08:15	
20	16:06	17:05	18:00	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45	
21	08:23	07:38	06:35	06:18	05:13	04:35	04:48	05:36	06:32	07:26	07:27	08:16	
22	16:08	17:07	18:02	20:01	20:57	21:40	21:38	20:49	19:36	18:22	16:16	15:45	
23	08:23	07:36	06:32	06:16	05:11	04:35	04:49	05:39	06:34	07:28	07:29	08:18	
24	16:09	17:09	18:04	20:03	20:58	21:40	21:37	20:47	19:34	18:20	16:14	15:44	
25	08:22	07:34	06:30	06:14	05:09	04:34	04:50	05:40	06:35	07:30	07:31	08:19	
26	16:11	17:11	18:06	20:05	21:00	21:41	21:36	20:45	19:31	18:17	16:13	15:44	
27	08:21	07:32	06:27	06:11	05:07	04:34	04:51	05:41	06:37	07:32	07:32	08:20	
28	16:13	17:13	18:08	20:07	21:02	21:42	21:35	20:42	19:29	18:15	16:11	15:44	
29	08:20	07:30	06:25	06:09	05:06	04:34	04:53	05:43	06:39	07:34	07:34	08:21	
30	16:14	17:15	18:10	20:08	21:04	21:42	21:34	20:40	19:26	18:12	16:09	15:44	
31	08:19	07:28	06:22	06:06	05:04	04:34	04:54	05:45	06:41	07:36	07:36	08:22	
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33	08:18	07:26	06:20	06:04	05:02	04:34	04:55	05:47	06:43	07:38	07:38	08:22	
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35	08:17	07:24	06:18	06:02	05:01	04:34	04:57	05:49	06:44	07:40	07:40	08:23	
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37	08:16	07:21	06:15	05:59	04:59	04:34	04:58	05:50	06:46	07:42	07:42	08:24	
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39	08:15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:25	
40	16:23	17:25	18:20	20:18	21:12	21:45	21:27	20:29	19:14	18:01	16:02	15:45	
41	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25	
42	16:25	17:27	18:21	20:20	21:13	21:45	21:26	20:27	19:11	17:59	16:01	15:46	
43	08:12	07:15	06:08	05:52	04:55	04:34	05:03	05:56	06:52	07:47	07:47	08:26	
44	16:27	17:29	18:23	20:22	21:15	21:45	21:25	20:25	19:09	17:56	15:59	15:46	
45	08:11	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:49	07:49	08:26	
46	16:29	17:31	18:25	20:23	21:17	21:45	21:23	20:22	19:06	17:54	15:58	15:47	
47	08:09	07:10	06:03	05:48	04:52	04:35	05:06	05:59	06:55	07:51	07:51	08:27	
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49	08:08	07:08	06:00	05:46	04:50	04:35	05:07	06:01	06:57	06:53	07:53	08:27	
50	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48	
51	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27	
52	16:34	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49	
53	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28	
54	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:54	15:49	
55	08:03	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28	
56	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:10	18:54	16:43	15:53	15:50	
57	08:02		06:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28	
58	16:40		19:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51	
59	08:00		06:48	05:35	04:44	04:37	05:15	06:10	07:06	07:03	08:01	08:28	
60	16:42		19:38	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52	
61	07:59		06:45		04:43		05:17	06:12		07:05		08:28	
62	16:44		19:40		21:28		21:10	20:03		16:37		15:53	
63	Sonnenscheinstunden	248	272	367	421	495	512	514	461	383	328	258	231
64	Anzahl Minuten mit Schatten	0	0	0	0	0	0	0	0	0	0	0	0

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 135
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 15 - MaR01

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03	
2	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50	
3	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04	
4	15:56	16:48	17:45	19:44	20:40	21:31	21:44	21:07	19:59	18:44	16:33	15:49	
5	08:28	07:54	06:54	06:38	05:29	04:41	04:40	05:22	06:17	07:12	07:11	08:06	
6	15:57	16:50	17:47	19:46	20:42	21:32	21:44	21:05	19:56	18:41	16:31	15:48	
7	08:27	07:52	06:52	06:35	05:27	04:40	04:41	05:24	06:19	07:14	07:13	08:07	
8	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:46	
9	08:27	07:50	06:49	06:33	05:25	04:39	04:41	05:26	06:21	07:15	07:15	08:09	
10	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:37	16:27	15:47	
11	08:27	07:48	06:47	06:31	05:23	04:38	04:42	05:27	06:23	07:17	07:17	08:10	
12	16:01	16:56	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46	
13	08:26	07:46	06:44	06:28	05:21	04:37	04:43	05:29	06:25	07:19	07:19	08:12	
14	16:02	16:59	17:55	19:54	20:49	21:36	21:41	20:57	19:46	18:32	16:23	15:46	
15	08:26	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:26	07:21	07:21	08:13	
16	16:03	17:01	17:57	19:55	20:51	21:37	21:40	20:55	19:44	18:29	16:21	15:46	
17	08:25	07:42	06:40	06:23	05:17	04:36	04:45	05:33	06:28	07:23	07:23	08:14	
18	16:05	17:03	17:59	19:57	20:53	21:38	21:40	20:53	19:41	18:27	16:20	15:45	
19	08:24	07:40	06:37	06:21	05:15	04:36	04:47	05:34	06:30	07:25	07:25	08:15	
20	16:06	17:05	18:00	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45	
21	08:24	07:38	06:35	06:18	05:13	04:35	04:48	05:36	06:32	07:27	07:27	08:17	
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23	08:23	07:36	06:32	06:16	05:11	04:35	04:49	05:39	06:34	07:28	07:29	08:18	
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25	08:22	07:34	06:30	06:14	05:09	04:34	04:50	05:40	06:35	07:30	07:31	08:19	
26	16:11	17:11	18:06	20:05	21:00	21:41	21:36	20:45	19:31	18:17	16:13	15:44	
27	08:21	07:32	06:27	06:11	05:08	04:34	04:51	05:41	06:37	07:32	07:33	08:20	
28	16:13	17:13	18:08	20:07	21:02	21:42	21:35	20:42	19:29	18:15	16:11	15:44	
29	08:20	07:30	06:25	06:09	05:06	04:34	04:53	05:43	06:39	07:34	07:34	08:21	
30	16:14	17:15	18:10	20:09	21:04	21:42	21:34	20:40	19:26	18:12	16:09	15:44	
31	08:19	07:28	06:23	06:06	05:04	04:34	04:54	05:45	06:41	07:36	07:36	08:22	
32	16:16	17:17	18:12	20:10	21:05	21:43	21:33	20:38	19:24	18:10	16:08	15:44	
33	08:18	07:26	06:20	06:04	05:02	04:34	04:55	05:47	06:43	07:38	07:38	08:23	
34	16:18	17:19	18:14	20:12	21:07	21:44	21:31	20:36	19:21	18:08	16:06	15:44	
35	08:17	07:24	06:18	06:02	05:01	04:34	04:57	05:49	06:44	07:40	07:40	08:23	
36	16:20	17:21	18:16	20:14	21:09	21:44	21:30	20:34	19:19	18:05	16:05	15:45	
37	08:16	07:21	06:15	05:59	04:59	04:34	04:58	05:50	06:46	07:42	07:42	08:24	
38	16:21	17:23	18:18	20:16	21:10	21:44	21:29	20:31	19:16	18:03	16:03	15:45	
39	08:15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:25	
40	16:23	17:25	18:20	20:18	21:12	21:45	21:28	20:29	19:14	18:01	16:02	15:45	
41	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25	
42	16:25	17:27	18:22	20:20	21:14	21:45	21:26	20:27	19:11	17:59	16:01	15:46	
43	08:12	07:15	06:08	05:53	04:55	04:34	05:03	05:56	06:52	07:48	07:48	08:26	
44	16:27	17:29	18:23	20:22	21:15	21:45	21:25	20:25	19:09	17:56	15:59	15:46	
45	08:11	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:49	07:49	08:26	
46	16:29	17:31	18:25	20:24	21:17	21:45	21:23	20:22	19:06	17:54	15:58	15:47	
47	08:09	07:10	06:03	05:48	04:52	04:35	05:06	05:59	06:55	07:51	07:51	08:27	
48	16:31	17:33	18:27	20:25	21:18	21:45	21:22	20:20	19:04	17:52	15:57	15:47	
49	08:08	07:08	06:00	05:46	04:50	04:35	05:07	06:01	06:57	06:53	07:53	08:27	
50	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48	
51	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27	
52	16:34	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49	
53	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28	
54	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:54	15:49	
55	08:04	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28	
56	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:11	18:54	16:43	15:53	15:50	
57	08:02		06:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28	
58	16:40		19:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51	
59	08:00		06:48	05:35	04:44	04:37	05:15	06:10	07:06	07:03	08:01	08:28	
60	16:42		19:38	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52	
61	07:59		06:45		04:43		05:17	06:12		07:05		08:28	
62	16:44		19:40		21:28		21:10	20:03		16:37		15:53	
63	Sonnenscheinstunden	248	272	367	421	496	512	514	461	383	328	258	231
64	Anzahl Minuten mit Schatten	0	0	0	0	0	0	0	0	0	0	0	0

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 136
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
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DE-25840 Friedrichstadt
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André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 16 - MaR02

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

Januar Februar März April Mai Juni Juli August September Oktober November Dezember

1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03	
1	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50	
2	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04	
1	15:56	16:48	17:45	19:44	20:40	21:31	21:44	21:07	19:59	18:44	16:33	15:49	
3	08:28	07:54	06:54	06:38	05:29	04:41	04:40	05:22	06:17	07:12	07:11	08:06	
1	15:57	16:50	17:47	19:46	20:42	21:32	21:43	21:05	19:56	18:41	16:31	15:48	
4	08:27	07:52	06:52	06:35	05:27	04:40	04:41	05:24	06:19	07:13	07:13	08:07	
1	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:48	
5	08:27	07:50	06:49	06:33	05:25	04:39	04:41	05:26	06:21	07:15	07:15	08:09	
1	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:37	16:27	15:47	
6	08:26	07:48	06:47	06:31	05:23	04:38	04:42	05:27	06:23	07:17	07:17	08:10	
1	16:01	16:56	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46	
7	08:26	07:46	06:44	06:28	05:21	04:37	04:43	05:29	06:25	07:19	07:19	08:12	
1	16:02	16:59	17:55	19:53	20:49	21:36	21:41	20:57	19:46	18:32	16:23	15:46	
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9	08:25	07:42	06:40	06:23	05:17	04:36	04:45	05:33	06:28	07:23	07:23	08:14	
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1	16:06	17:05	18:00	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45	
11	08:24	07:38	06:35	06:18	05:13	04:35	04:48	05:36	06:32	07:27	07:27	08:17	
1	16:08	17:07	18:02	20:01	20:57	21:40	21:38	20:49	19:36	18:22	16:16	15:45	
12	08:23	07:36	06:32	06:16	05:11	04:35	04:49	05:39	06:34	07:28	07:29	08:18	
1	16:09	17:09	18:04	20:03	20:58	21:40	21:37	20:47	19:34	18:20	16:14	15:44	
13	08:22	07:34	06:30	06:14	05:09	04:35	04:50	05:40	06:35	07:30	07:31	08:19	
1	16:11	17:11	18:06	20:05	21:00	21:41	21:36	20:45	19:31	18:17	16:13	15:44	
14	08:21	07:32	06:27	06:11	05:08	04:34	04:51	05:41	06:37	07:32	07:33	08:20	
1	16:13	17:13	18:08	20:07	21:02	21:42	21:35	20:42	19:29	18:15	16:11	15:44	
15	08:20	07:30	06:25	06:09	05:06	04:34	04:53	05:43	06:39	07:34	07:34	08:21	
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16	08:19	07:28	06:22	06:06	05:04	04:34	04:54	05:45	06:41	07:36	07:36	08:22	
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1	16:21	17:23	18:18	20:16	21:10	21:44	21:29	20:31	19:16	18:03	16:03	15:45	
20	08:15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:25	
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21	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25	
1	16:25	17:27	18:22	20:20	21:13	21:45	21:26	20:27	19:11	17:59	16:01	15:46	
22	08:12	07:15	06:08	05:53	04:55	04:34	05:03	05:56	06:52	07:48	07:48	08:26	
1	16:27	17:29	18:23	20:22	21:15	21:45	21:25	20:25	19:09	17:56	15:59	15:46	
23	08:11	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:49	07:49	08:26	
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25	08:08	07:08	06:00	05:46	04:51	04:35	05:07	06:01	06:57	06:53	07:53	08:27	
1	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48	
26	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27	
1	16:34	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49	
27	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28	
1	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:54	15:49	
28	08:04	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:02	06:59	07:58	08:28	
1	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:11	18:54	16:43	15:53	15:50	
29	08:02		06:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28	
1	16:40		19:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51	
30	08:00		06:48	05:35	04:44	04:38	05:15	06:10	07:06	07:03	08:01	08:28	
1	16:42		19:38	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52	
31	07:59		06:45		04:43		05:17	06:12		07:05		08:28	
1	16:44		19:40		21:28		21:10	20:03		16:37		15:53	
	Sonnenscheinstunden	248	272	367	421	496	512	514	461	383	328	258	231
	Anzahl Minuten mit Schatten	0	0	0	0	0	0	0	0	0	0	0	0

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

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

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Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 137
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
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Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 17 - MaW1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:28	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03	
2	15:54	16:46	17:43	19:42	20:38	21:29	21:44	21:08	20:01	18:46	16:35	15:50	
3	08:28	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:04	
4	15:56	16:48	17:45	19:44	20:40	21:31	21:44	21:07	19:59	18:44	16:33	15:49	
5	08:28	07:54	06:54	06:38	05:29	04:41	04:40	05:22	06:18	07:12	07:11	08:06	
6	15:57	16:50	17:47	19:46	20:42	21:32	21:44	21:05	19:56	18:41	16:31	15:48	
7	08:27	07:52	06:52	06:35	05:27	04:40	04:41	05:24	06:19	07:14	07:13	08:07	
8	15:58	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:46	
9	08:27	07:50	06:49	06:33	05:25	04:39	04:41	05:26	06:21	07:15	07:15	08:09	
10	15:59	16:54	17:51	19:50	20:46	21:34	21:42	21:01	19:51	18:37	16:27	15:47	
11	08:27	07:48	06:47	06:31	05:23	04:38	04:42	05:27	06:23	07:17	07:17	08:10	
12	16:01	16:56	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46	
13	08:26	07:46	06:44	06:28	05:21	04:37	04:43	05:29	06:25	07:19	07:19	08:12	
14	16:02	16:59	17:55	19:54	20:49	21:36	21:41	20:57	19:46	18:32	16:23	15:46	
15	08:26	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:26	07:21	07:21	08:13	
16	16:03	17:01	17:57	19:55	20:51	21:37	21:40	20:55	19:44	18:29	16:21	15:46	
17	08:25	07:42	06:40	06:23	05:17	04:36	04:45	05:33	06:28	07:23	07:23	08:14	
18	16:05	17:03	17:59	19:57	20:53	21:38	21:40	20:53	19:41	18:27	16:20	15:45	
19	08:24	07:40	06:37	06:21	05:15	04:36	04:47	05:34	06:30	07:25	07:25	08:15	
20	16:06	17:05	18:01	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45	
21	08:24	07:38	06:35	06:18	05:13	04:35	04:48	05:36	06:32	07:27	07:27	08:17	
22	16:08	17:07	18:02	20:01	20:57	21:40	21:38	20:49	19:36	18:22	16:16	15:45	
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25	08:22	07:34	06:30	06:14	05:09	04:35	04:50	05:40	06:35	07:30	07:31	08:19	
26	16:11	17:11	18:06	20:05	21:00	21:41	21:36	20:45	19:31	18:17	16:13	15:44	
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28	16:13	17:13	18:08	20:07	21:02	21:42	21:35	20:42	19:29	18:15	16:11	15:44	
29	08:20	07:30	06:25	06:09	05:06	04:34	04:53	05:43	06:39	07:34	07:34	08:21	
30	16:14	17:15	18:10	20:09	21:04	21:42	21:34	20:40	19:26	18:13	16:09	15:44	
31	08:19	07:28	06:23	06:06	05:04	04:34	04:54	05:45	06:41	07:36	07:36	08:22	
32	16:16	17:17	18:12	20:10	21:05	21:43	21:33	20:38	19:24	18:10	16:08	15:44	
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35	08:17	07:24	06:18	06:02	05:01	04:34	04:57	05:49	06:44	07:40	07:40	08:23	
36	16:20	17:21	18:16	20:14	21:09	21:44	21:30	20:34	19:19	18:06	16:05	15:45	
37	08:16	07:21	06:15	05:59	04:59	04:34	04:58	05:50	06:46	07:42	07:42	08:24	
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39	08:15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:25	
40	16:23	17:25	18:20	20:18	21:12	21:45	21:28	20:29	19:14	18:01	16:02	15:45	
41	08:13	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25	
42	16:25	17:27	18:22	20:20	21:14	21:45	21:26	20:27	19:11	17:59	16:01	15:46	
43	08:12	07:15	06:08	05:53	04:55	04:34	05:03	05:56	06:52	07:48	07:48	08:26	
44	16:27	17:29	18:23	20:22	21:15	21:45	21:25	20:25	19:09	17:56	15:59	15:46	
45	08:11	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:49	07:49	08:26	
46	16:29	17:31	18:25	20:24	21:17	21:45	21:23	20:22	19:06	17:54	15:58	15:47	
47	08:09	07:10	06:03	05:48	04:52	04:35	05:06	05:59	06:55	07:51	07:51	08:27	
48	16:31	17:33	18:27	20:25	21:18	21:45	21:22	20:20	19:04	17:52	15:57	15:47	
49	08:08	07:08	06:00	05:46	04:51	04:35	05:07	06:01	06:57	06:53	07:53	08:27	
50	16:33	17:35	18:29	20:27	21:20	21:45	21:20	20:18	19:01	16:50	15:56	15:48	
51	08:07	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	06:55	07:55	08:27	
52	16:35	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49	
53	08:05	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	06:57	07:56	08:28	
54	16:36	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:54	15:49	
55	08:04	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:03	06:59	07:58	08:28	
56	16:38	17:41	18:35	20:33	21:24	21:45	21:15	20:11	18:54	16:43	15:53	15:50	
57	08:02		06:50	05:37	04:46	04:37	05:14	06:08	07:04	07:01	08:00	08:28	
58	16:40		19:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51	
59	08:00		06:48	05:35	04:44	04:38	05:15	06:10	07:06	07:03	08:01	08:28	
60	16:42		19:38	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52	
61	07:59		06:45		04:43		05:17	06:12		07:05		08:28	
62	16:44		19:40		21:28		21:10	20:03		16:37		15:53	
63	Sonnenscheinstunden	248	272	367	421	496	512	514	461	383	328	258	231
64	Anzahl Minuten mit Schatten	0	0	0	0	0	0	0	0	0	0	0	0

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 138
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 18 - N1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28 14:50-15:09/19 15:54	07:57 08:54-08:58/4 16:46 15:25-15:38/13	06:59 17:43	06:43 18:54-19:16/22 19:42	05:33 19:46-20:09/23 20:39	04:42 20:16-20:44/28 21:30 20:38-20:53/15
2	08:28 14:51-15:10/19 15:55	07:55 15:27-15:37/10 16:48 16:09-16:16/7	06:57 17:15-17:17/2 17:45	06:40 18:57-19:00/3 19:44 19:03-19:17/14	05:31 19:47-20:10/23 20:40	04:41 20:18-20:43/25 21:31 20:37-20:54/17
3	08:28 14:50-15:10/20 15:57	07:54 16:07-16:19/12 16:50	06:54 17:13-17:20/7 17:47	06:38 19:03-19:19/16 19:46	05:29 19:47-20:12/25 20:42	04:40 20:19-20:46/27 21:32 20:42-20:55/13
4	08:28 14:51-15:11/20 15:58	07:52 16:06-16:21/15 16:52	06:52 17:12-17:21/9 17:49	06:35 19:02-19:20/18 19:48	05:27 19:48-20:14/26 20:44	04:40 20:20-20:46/26 21:33 20:42-20:55/13
5	08:27 14:51-15:12/21 15:59	07:50 16:05-16:22/17 16:54	06:49 17:12-17:24/12 17:51	06:33 19:03-19:23/20 19:50	05:24 19:49-20:15/26 20:46	04:39 20:21-20:45/24 21:34 20:41-20:55/14
6	08:27 14:52-15:13/21 16:00	07:48 16:05-16:23/18 16:56	06:47 17:11-17:25/14 17:53	06:31 19:03-19:24/21 19:52	05:22 19:51-20:17/26 20:48	04:38 20:23-20:56/33 21:35 20:57-21:00/3
7	08:26 14:52-15:13/21 16:02	07:46 08:14-08:16/2 16:58 16:04-16:23/19	06:45 17:12-17:25/13 17:55	06:28 19:04-19:26/22 19:54	05:21 19:53-20:18/25 20:50	04:37 20:23-20:55/32 21:36 20:56-21:00/4
8	08:26 14:52-15:13/21 16:03	07:44 08:12-08:20/8 17:01 16:03-16:23/20	06:42 17:12-17:24/12 17:57	06:26 19:06-19:28/22 19:56	05:19 19:53-20:20/27 20:51	04:37 20:25-21:02/37 21:37 20:31-20:55/24
9	08:25 14:52-15:14/22 16:05	07:42 08:09-08:20/11 17:03 16:03-16:23/20	06:40 17:13-17:23/10 17:59	06:23 19:08-19:30/22 19:57	05:17 19:54-20:22/28 20:53	04:36 20:25-21:02/37 21:38 20:31-20:54/23
10	08:25 14:52-15:14/22 16:06	07:40 08:07-08:22/15 17:05 16:03-16:23/20	06:37 17:16-17:19/3 18:01	06:21 19:10-19:32/22 19:59	05:15 19:55-20:24/29 20:55	04:36 20:26-21:03/37 21:39 20:32-20:55/23
11	08:24 14:52-15:14/22 16:08	07:38 08:06-08:22/16 17:07 16:04-16:23/19	06:35 17:31-17:36/5 18:02	06:18 19:11-19:33/22 20:01	05:13 19:55-20:23/28 20:57	04:35 20:27-21:04/37 21:40 20:33-20:55/22
12	08:23 14:53-15:15/22 16:09 15:22-15:30/8	07:36 08:06-08:23/17 17:09 16:04-16:23/19	06:32 17:29-17:37/8 18:04	06:16 19:12-19:35/23 20:03	05:11 19:57-20:24/27 20:59	04:35 20:27-21:04/37 21:41 20:33-20:54/21
13	08:22 14:53-15:15/22 16:11 15:21-15:32/11	07:34 08:06-08:23/17 17:11 16:05-16:23/18	06:30 17:29-17:40/11 18:06	06:14 19:15-19:37/22 20:05	05:09 19:59-20:22/23 21:00	04:34 20:28-21:05/37 21:41 20:33-20:48/15
14	08:21 14:54-15:16/22 16:13 15:20-15:33/13	07:32 08:07-08:24/17 17:13 16:06-16:22/16	06:28 17:27-17:41/14 18:08	06:11 19:17-19:38/21 20:07	05:07 20:00-20:29/29 21:02	04:34 20:28-21:06/38 21:42 20:34-20:55/21
15	08:20 14:54-15:16/22 16:14 15:20-15:35/15	07:30 08:06-08:23/17 17:15 16:07-16:20/13	06:25 17:27-17:43/16 18:10	06:09 19:18-19:40/22 20:09	05:06 20:01-20:28/27 21:04	04:34 20:29-21:06/37 21:43 20:35-20:55/20
16	08:19 08:51-08:55/4 15:20-15:36/16 16:16 14:55-15:16/21	07:28 08:07-08:22/15 17:17 16:09-16:18/9	06:23 17:27-17:45/18 18:12	06:06 19:21-19:42/21 20:11	05:04 20:00-20:28/28 21:06	04:34 20:30-21:07/37 21:43 20:35-20:48/13
17	08:18 08:50-08:57/7 15:20-15:37/17 16:18 14:56-15:17/21	07:26 08:08-08:22/14 17:19	06:20 17:28-17:47/19 18:14	06:04 19:25-19:45/20 20:12	05:02 20:01-20:24/23 21:07	04:34 20:31-21:07/36 21:44 20:35-20:48/13
18	08:17 08:48-08:57/9 15:19-15:38/19 16:19 14:56-15:16/20	07:24 08:09-08:20/11 17:21	06:18 17:28-17:49/21 18:16	06:02 19:24-19:44/20 20:14	05:01 20:01-20:36/35 21:09	04:34 20:31-21:08/37 21:44 20:36-20:48/12
19	08:16 08:47-08:59/12 15:19-15:39/20 16:21 14:57-15:16/19	07:22 08:11-08:17/6 17:23	06:15 17:30-17:51/21 18:18	05:59 19:26-19:43/17 20:16	04:59 20:02-20:36/34 21:11	04:34 20:32-21:08/36 21:45 20:36-20:48/12
20	08:15 08:46-09:00/14 15:19-15:40/21 16:23 14:59-15:16/17	07:19 17:25	06:13 17:31-17:53/22 18:20	05:57 19:27-19:43/16 20:18	04:58 20:03-20:36/33 21:12	04:34 20:32-21:08/36 21:45 20:36-20:48/12
21	08:14 08:45-09:01/16 15:19-15:40/21 16:25 14:59-15:15/16	07:17 17:27	06:10 17:34-17:55/21 18:22	05:55 19:29-19:42/13 20:20	04:56 20:03-20:34/31 21:14	04:34 20:32-21:08/36 21:45 20:36-20:56/20
22	08:12 08:45-09:02/17 15:19-15:41/22 16:27 15:01-15:15/14	07:15 17:29	06:08 17:35-17:56/21 18:23	05:53 19:30-19:39/9 20:22	04:55 20:04-20:42/38 21:15	04:34 20:32-21:08/36 21:45 20:36-20:56/20
23	08:11 08:45-09:02/17 15:19-15:41/22 16:29 15:02-15:14/12	07:13 17:31	06:05 17:36-17:59/23 18:25	05:50 19:34-19:35/1 20:24	04:53 20:05-20:44/39 21:17	04:34 20:33-21:09/38 21:46 20:37-20:49/12
24	08:10 08:46-09:03/17 15:19-15:41/22 16:31 15:04-15:11/7	07:10 17:33	06:03 17:39-18:00/21 18:27	05:48 19:50-19:56/6 20:26	04:52 20:05-20:44/39 21:18	04:34 20:32-21:09/37 21:46 20:37-20:49/12
25	08:08 08:46-09:03/17 16:33 15:20-15:42/22	07:08 17:35	06:00 17:41-18:02/21 18:29	05:46 19:49-19:58/9 20:27	04:50 20:07-20:46/39 21:20	04:35 20:32-21:09/37 21:46 20:37-20:49/12
26	08:07 08:46-09:02/16 16:34 15:20-15:42/22	07:06 17:37	05:58 17:41-18:04/23 18:31	05:44 19:48-20:00/12 20:29	04:49 20:09-20:47/38 21:21	04:35 20:32-21:09/37 21:46 20:37-20:50/13
27	08:05 08:47-09:03/16 16:36 15:20-15:41/21	07:04 17:39	05:55 17:43-18:06/23 18:33	05:41 19:47-20:02/15 20:31	04:48 20:13-20:47/34 21:23	04:36 20:31-21:09/38 21:46 20:37-20:50/13
28	08:04 08:47-09:03/16 16:38 15:21-15:42/21	07:01 17:41	05:53 17:45-18:07/22 18:35	05:39 19:47-20:04/17 20:33	04:47 20:14-20:47/33 21:24	04:36 20:32-21:09/37 21:45 20:37-20:58/21
29	08:02 08:48-09:02/14 16:40 15:22-15:41/19	06:59 17:40	06:50 18:47-19:07/20 19:37	05:37 19:46-20:05/19 20:35	04:46 20:14-20:46/32 21:26	04:37 20:31-21:08/37 21:45 20:37-20:58/21
30	08:01 08:49-09:01/12 16:42 15:23-15:41/18	07:01 17:42	06:48 18:50-19:12/22 19:39	05:35 19:46-20:07/21 20:37	04:44 20:15-20:45/30 21:27	04:37 20:31-21:08/37 21:45 20:37-20:52/15
31	07:59 08:50-09:00/10 16:44 15:24-15:40/16	07:04 17:43	06:45 18:53-19:13/20 19:40	05:41 19:47-20:02/15 20:37	04:48 20:13-20:47/34 21:28	04:36 20:31-21:09/38 21:46 20:37-20:50/13
	Sonnenscheinstunden 248	272	367	421	496	512
	Anzahl Minuten mit Schatten 1043	435	474	530	998	1103

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 139
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 18 - N1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:38 20:31-21:08/37	05:19 20:07-20:35/28	06:14 19:11-19:33/22	07:08 18:09-18:18/9	07:07 07:37-07:51/14	08:03 14:34-14:57/23
	21:45 20:37-20:59/22	21:09 20:31-20:37/6	20:01	18:46	16:35 15:33-15:53/20	15:50 15:07-15:08/1
2	04:39 20:30-21:07/37	05:20 20:05-20:34/29	06:16 19:08-19:30/22	07:10 18:10-18:15/5	07:09 07:39-07:50/11	08:05 14:35-14:57/22
	21:44 20:36-20:59/23	21:07 20:31-20:35/4	19:59	18:44	16:33 15:33-15:53/20	15:49
3	04:40 20:30-21:07/37	05:22 20:05-20:33/28	06:18 19:06-19:28/22	07:12 18:11-18:12/1	07:11 07:41-07:48/7	08:06 14:36-14:58/22
	21:44 20:36-21:00/24	21:05 20:32-20:33/1	19:56	18:42	16:31 15:33-15:53/20	15:48
4	04:40 20:30-21:07/37	05:24 20:04-20:31/27	06:19 19:03-19:25/22	07:14 17:51-17:59/8	07:13 15:34-15:53/19	08:08 14:36-14:57/21
	21:43 20:36-21:00/24	21:03	19:54	18:39	16:29	15:48
5	04:41 20:30-21:07/37	05:26 20:03-20:30/27	06:21 19:00-19:22/22	07:15 17:49-18:00/11	07:15 15:34-15:52/18	08:09 14:37-14:58/21
	21:43 20:36-21:00/24	21:01	19:51	18:37	16:27	15:47
6	04:42 20:30-21:02/32	05:27 20:03-20:28/25	06:23 18:59-19:20/21	07:17 17:48-18:01/13	07:17 15:35-15:52/17	08:11 14:37-14:58/21
	21:42 21:03-21:06/3	20:59	19:49	18:34	16:25	15:46
7	04:43 20:30-21:02/32	05:29 20:00-20:26/26	06:25 18:58-19:18/20	07:19 17:47-18:01/14	07:19 15:36-15:50/14	08:12 14:38-14:59/21
	21:41 21:04-21:06/2	20:57	19:46	18:32	16:23	15:46
8	04:44 20:28-20:53/25	05:31 19:58-20:24/26	06:27 18:57-19:16/19	07:21 17:47-18:00/13	07:21 15:37-15:49/12	08:13 14:38-14:58/20
	21:41 20:49-21:02/13	20:55	19:44	18:29	16:21	15:45
9	04:45 20:27-20:54/27	05:33 19:57-20:23/26	06:28 18:56-19:13/17	07:23 17:47-17:58/11	07:23 14:58-15:08/10	08:14 14:39-14:59/20
	21:40 20:50-21:02/12	20:53	19:41	18:27	16:20 15:40-15:46/6	15:45
10	04:46 20:26-20:54/28	05:34 19:55-20:20/25	06:30 18:56-19:10/14	07:25 17:47-17:55/8	07:25 08:25-08:29/4	08:16 14:40-14:59/19
	21:39 20:50-21:02/12	20:51	19:39	18:24	16:18 14:56-15:09/13	15:45
11	04:48 20:25-20:51/26	05:36 19:55-20:18/23	06:32 18:47-19:08/21	07:27 17:48-17:53/5	07:27 08:22-08:32/10	08:17 14:40-14:59/19
	21:38 20:45-21:02/17	20:49	19:36	18:22	16:16 14:55-15:12/17	15:45
12	04:49 20:24-20:53/29	05:38 19:55-20:17/22	06:34 18:45-19:06/21	07:29	07:29 08:21-08:33/12	08:18 14:41-14:59/18
	21:37 20:47-21:01/14	20:47	19:34	18:20	16:14 14:54-15:13/19	15:44
13	04:50 20:24-20:54/30	05:40 19:54-20:14/20	06:35 18:41-19:03/22	07:30	07:31 08:20-08:34/14	08:19 14:41-14:59/18
	21:36 20:48-21:01/13	20:45	19:31	18:17	16:13 14:54-15:13/19	15:44
14	04:51 20:23-20:54/31	05:41 19:54-20:12/18	06:37 18:38-18:58/20	07:32	07:33 08:19-08:35/16	08:20 14:42-15:00/18
	21:35 20:48-21:00/12	20:43	19:29	18:15	16:11 14:53-15:14/21	15:44
15	04:53 20:23-20:55/32	05:43 19:54-20:11/17	06:39 18:36-18:58/22	07:34	07:35 08:19-08:35/16	08:21 14:43-15:00/17
	21:34 20:49-20:59/10	20:40	19:26	18:13	16:09 14:53-15:14/21	15:44
16	04:54 20:23-20:56/33	05:45 19:54-20:08/14	06:41 18:33-18:56/23	07:36	07:37 08:19-08:35/16	08:22 14:43-15:00/17
	21:33 20:50-20:59/9	20:38	19:24	18:10	16:08 14:53-15:15/22	15:44
17	04:55 20:22-20:57/35	05:47 19:54-20:06/12	06:43 18:30-18:53/23	07:38	07:38 08:19-08:36/17	08:23 14:44-15:01/17
	21:32 20:51-20:57/6	20:36	19:21	18:08	16:06 14:53-15:15/22	15:44
18	04:57 20:18-20:56/38	05:49 19:55-20:04/9	06:44 18:29-18:50/21	07:40	07:40 08:20-08:37/17 14:53-15:15/22	08:24 14:45-15:01/16
	21:30 20:51-20:56/5	20:34	19:19	18:05	16:05 14:38-14:45/7	15:45
19	04:58 20:17-20:55/38	05:50 19:56-20:02/6	06:46 18:28-18:48/20	07:42	07:42 08:20-08:37/17 14:54-15:16/22	08:24 14:46-15:02/16
	21:29 20:52-20:55/3	20:32	19:16	18:03	16:03 14:37-14:49/12	15:45
20	05:00 20:15-20:54/39	05:52 19:38-19:42/4	06:48 18:23-18:46/23	07:44	07:44 08:20-08:37/17 14:54-15:16/22	08:25 14:46-15:02/16
	21:28 20:52-20:54/2	20:29 19:59-20:00/1	19:14	18:01	16:02 14:36-14:50/14	15:45
21	05:01 20:14-20:52/38	05:54 19:35-19:45/10	06:50 18:20-18:42/22	07:46	07:46 08:21-08:37/16 14:55-15:16/21	08:26 14:47-15:03/16
	21:26 20:51-20:52/1	20:27	19:11	17:59	16:01 14:35-14:51/16	15:46
22	05:03 20:14-20:42/28	05:56 19:33-19:46/13	06:52 18:19-18:40/21	07:48	07:48 08:22-08:36/14 14:55-15:16/21	08:26 14:47-15:03/16
	21:25 20:36-20:52/16	20:25	19:09	17:56	15:59 14:35-14:52/17	15:46
23	05:04 20:13-20:45/32	05:58 19:31-19:47/16	06:53 18:16-18:38/22	07:50 08:41-08:48/7	07:50 08:24-08:36/12 14:56-15:16/20	08:27 14:48-15:04/16
	21:24 20:38-20:50/12	20:22	19:06	17:54	15:58 14:34-14:53/19	15:47
24	05:06 20:12-20:46/34	05:59 19:29-19:47/18	06:55 18:15-18:35/20	07:52 08:38-08:50/12	07:51 08:26-08:36/10 14:57-15:16/19	08:27 14:48-15:04/16
	21:22 20:39-20:48/9	20:20	19:04	17:52	15:57 14:34-14:54/20	15:47
25	05:07 20:12-20:47/35	06:01 19:28-19:47/19	06:57 18:12-18:33/21	06:54 07:37-07:51/14	07:53 08:28-08:35/7 14:57-15:15/18	08:27 14:48-15:04/16
	21:20 20:40-20:47/7	20:18	19:01	16:50	15:56 14:34-14:55/21	15:48
26	05:09 20:11-20:35/24	06:03 19:27-19:46/19	06:59 18:10-18:30/20	06:55 07:36-07:52/16	07:55 08:30-08:34/4 14:58-15:14/16	08:28 14:48-15:05/17
	21:19 20:32-20:45/13	20:15	18:59	17:48 15:38-15:48/10	15:55 14:33-14:54/21	15:48
27	05:10 20:11-20:38/27	06:05 19:22-19:44/22	07:01 18:09-18:27/18	06:57 07:36-07:53/17	07:57 14:33-14:55/22	08:28 14:49-15:06/17
	21:17 20:34-20:44/10	20:13	18:56	16:45 15:36-15:50/14	15:53 14:59-15:14/15	15:49
28	05:12 20:11-20:39/28	06:07 19:20-19:42/22	07:03 18:08-18:25/17	06:59 07:36-07:53/17	07:58 14:34-14:56/22	08:28 14:49-15:07/18
	21:16 20:35-20:42/7	20:11	18:54	16:43 15:36-15:52/16	15:52 15:00-15:13/13	15:50
29	05:14 20:11-20:39/28	06:09 19:18-19:39/21	07:04 18:08-18:23/15	07:01 07:36-07:53/17	08:00 14:34-14:56/22	08:28 14:50-15:07/17
	21:14 20:36-20:41/5	20:08	18:51	16:41 15:34-15:53/19	15:52 15:02-15:13/11	15:51
30	05:15 20:10-20:32/22	06:10 19:14-19:37/23	07:05 18:08-18:20/12	07:03 07:36-07:53/17	08:02 14:35-14:57/22	08:28 14:49-15:07/18
	21:12 20:27-20:39/12	20:06	18:49	16:39 15:34-15:53/19	15:51 15:04-15:12/8	15:52
31	05:17 20:08-20:33/25	06:12 19:12-19:35/23		07:05 07:36-07:52/16		08:28 14:50-15:08/18
	21:10 20:29-20:38/9	20:04		16:37 15:33-15:53/20		15:53
Sonnenscheinstunden	514	461	383	328	257	231
Anzahl Minuten mit Schatten	1104	622	605	329	1024	568

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 140
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 19 - M13

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1.017 1.220 930 354 7.936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28 15:08-15:16/8 15:54	07:57 15:43-16:03/20 16:46 16:01-16:14/13	06:59 15:51-17:07/76 17:43	06:43 18:11-18:33/22 19:42	05:33 20:39	04:42 05:22-05:45/23 21:29 05:45-05:47/2	
2	08:28 15:09-15:18/9 15:55	07:55 15:43-16:05/22 16:48 16:03-16:15/12	06:56 15:52-17:08/76 17:45	06:40 18:12-18:31/19 19:44	05:31 20:40	04:41 05:23-05:46/23 21:31 05:46-05:48/2	
3	08:28 15:08-15:18/10 15:57	07:54 15:43-16:06/23 16:50 16:05-16:18/13	06:54 15:54-17:10/76 17:47	06:38 18:15-18:28/13 19:46	05:29 20:42	04:40 05:22-05:46/24 21:32 05:46-05:48/2	
4	08:27 15:09-15:20/11 15:58	07:52 15:42-16:10/28 16:52 16:09-16:21/12	06:52 15:57-16:07/10 17:49 18:11-17:10/59	06:35 18:19-18:23/4 19:48	05:27 20:44	04:40 05:22-05:46/24 21:33 05:46-05:48/2	
5	08:27 15:09-15:21/12 15:59	07:50 15:41-16:13/32 16:54 16:12-16:23/11	06:49 16:12-17:14/62 17:51	06:33 19:50	05:24 20:46	04:39 05:23-05:47/24 21:34 05:47-05:49/2	
6	08:27 15:09-15:22/13 16:00	07:48 15:40-16:14/34 16:56 16:11-16:25/14	06:47 16:12-17:24/72 17:53	06:31 19:52	05:22 20:48	04:38 05:22-05:47/25 21:35 05:47-05:48/1	
7	08:26 15:10-15:25/15 16:02	07:46 15:39-16:16/37 16:59 16:14-16:25/11	06:45 16:14-17:26/72 17:55	06:28 19:54	05:21 20:50	04:37 05:13-05:18/5 21:36 05:22-05:48/26	
8	08:26 15:10-15:26/16 16:03	07:44 15:39-16:18/39 17:01 16:16-16:26/10	06:42 16:14-17:29/75 17:57	06:26 19:55	05:19 20:51	04:37 05:12-05:20/8 21:37 05:23-05:49/26	
9	08:25 15:10-15:27/17 16:05	07:42 15:39-16:16/37 17:03 16:11-16:27/16	06:40 16:17-17:32/75 17:59	06:23 19:57	05:17 20:53	04:36 05:12-05:22/10 21:38 05:23-05:50/27	
10	08:24 15:10-15:29/19 16:06	07:40 15:39-16:18/39 17:05 16:14-16:30/16	06:37 16:19-17:33/74 18:01	06:21 19:59	05:15 20:55	04:36 05:11-05:22/11 21:39 05:23-05:49/26	
11	08:24 15:10-15:31/21 16:08	07:38 15:39-16:21/42 17:07 16:16-16:32/16	06:35 16:25-17:36/71 18:02	06:18 20:01	05:13 20:57	04:35 05:11-05:24/13 21:40 05:24-05:50/26	
12	08:23 15:11-15:32/21 16:09	07:36 15:39-16:22/43 17:09 16:17-16:34/17	06:32 16:26-17:37/71 18:04	06:16 20:03	05:11 20:59	04:35 05:11-05:27/16 21:41 05:26-05:50/24	
13	08:22 15:11-15:34/23 16:11	07:34 15:40-16:23/43 17:11 16:19-16:35/16	06:30 16:29-17:40/71 18:06	06:14 20:05	05:09 21:00	04:34 05:10-05:28/16 21:41 05:25-05:50/25	
14	08:21 15:12-15:36/24 16:13	07:32 15:41-16:24/43 17:13 16:20-16:35/15	06:28 16:34-17:40/66 18:08	06:11 20:07	05:07 21:02	04:34 05:10-05:27/17 21:42 05:26-05:50/24	
15	08:20 15:13-15:38/25 16:14	07:30 15:40-16:24/44 17:15 16:20-16:35/15	06:25 16:42-17:41/59 18:10	06:09 20:09	05:06 21:04	04:34 05:10-05:28/18 21:43 05:27-05:50/23	
16	08:19 15:14-15:40/26 16:16	07:28 15:41-16:24/43 17:17 16:21-16:36/15	06:23 16:52-17:41/49 18:12	06:06 20:11	05:04 21:05	04:34 05:10-05:28/18 21:43 05:27-05:51/24	
17	08:18 15:15-15:42/27 16:18	07:26 15:43-16:25/42 17:19 16:22-16:36/14	06:20 16:57-17:41/44 18:14	06:04 20:12	05:02 21:07	04:34 05:10-05:29/19 21:44 05:28-05:51/23	
18	08:17 15:15-15:44/29 16:20	07:24 15:44-16:36/52 16:35-16:38/3 17:21 15:47-16:22/35	06:18 16:57-17:40/43 18:16	06:02 20:14	05:01 21:09	04:34 05:10-05:29/19 21:44 05:28-05:51/23	
19	08:16 15:16-15:46/30 16:21	07:22 15:45-16:38/53 17:23 16:38-16:39/1	06:15 16:59-17:39/40 18:18	05:59 20:16	04:59 21:10	04:34 05:10-05:29/19 21:45 05:28-05:51/23	
20	08:15 15:18-15:48/30 16:23	07:19 15:46-16:40/54 17:25	06:13 17:01-17:37/36 18:20	05:57 20:18	04:58 21:12	04:34 05:10-05:29/19 21:45 05:28-05:51/23	
21	08:14 15:20-15:50/30 16:25	07:17 15:46-16:41/55 17:27	06:10 17:07-17:17/10 17:37-17:38/1 18:22 17:12-17:37/25	05:55 20:20	04:56 21:14	04:34 05:10-05:29/19 21:45 05:27-05:51/24	
22	08:12 15:21-15:53/32 16:27	07:15 15:46-16:43/57 17:29	06:08 17:10-17:38/28 18:23	05:53 20:22	04:55 05:30-05:36/6 21:15 05:36-05:39/3	04:34 05:11-05:30/19 21:45 05:29-05:52/23	
23	08:11 15:22-15:54/32 16:29	07:13 15:46-16:47/61 17:31	06:05 17:10-17:39/29 18:25	05:50 20:24	04:53 05:27-05:39/12 21:17 05:39-05:41/2	04:34 05:11-05:30/19 21:45 05:29-05:52/23	
24	08:10 15:24-15:56/32 16:31	07:10 15:47-16:50/63 17:33	06:03 17:09-17:38/29 18:27	05:48 20:26	04:52 05:26-05:40/14 21:18 05:40-05:42/2	04:34 05:11-05:30/19 21:46 05:29-05:52/23	
25	08:08 15:27-15:59/32 16:33	07:08 15:46-16:53/67 17:35	06:00 17:09-17:39/30 18:29	05:46 20:27	04:50 05:25-05:41/16 21:20 05:41-05:43/2	04:35 05:12-05:31/19 21:46 05:30-05:53/23	
26	08:07 15:29-16:01/32 16:34	07:06 15:47-16:58/71 17:37	05:58 17:08-17:38/30 18:31	05:44 20:29	04:49 05:24-05:42/18 21:21 05:42-05:44/2	04:35 05:12-05:30/18 21:46 05:29-05:53/24	
27	08:05 15:31-16:03/32 16:36	07:04 15:48-17:00/72 17:39	05:55 17:08-17:38/30 18:33	05:41 20:31	04:48 05:23-05:43/20 21:23 05:43-05:44/1	04:36 05:12-05:30/18 21:45 05:29-05:53/24	
28	08:04 15:37-16:06/29 16:38	07:01 15:49-17:03/74 17:41	05:53 17:08-17:37/29 18:35	05:39 20:33	04:47 05:23-05:43/20 21:24 05:43-05:45/2	04:36 05:13-05:30/17 21:45 05:29-05:53/24	
29	08:02 15:38-16:08/30 16:40		06:50 18:09-18:37/28 19:37	05:37 20:35	04:46 05:23-05:44/21 21:26 05:44-05:46/2	04:37 05:14-05:31/17 21:45 05:30-05:54/24	
30	08:01 15:39-15:56/17 16:42 15:54-16:10/16		06:48 18:09-18:36/27 19:39	05:35 20:37	04:44 05:22-05:44/22 21:27 05:44-05:46/2	04:37 05:14-05:30/16 21:45 05:29-05:53/24	
31	07:59 15:41-16:00/19 16:44 15:59-16:12/13		06:45 18:10-18:34/24 19:40		04:43 05:22-05:45/23 21:28 05:45-05:46/1		
	Sonnenscheinstunden Anzahl Minuten mit Schatten	248 730	272 1478	367 1597	421 58	496 191	512 1103

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

Tag im Monat	Sonnenaufgang (SS:MM) Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM) Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten Schattenende/Minuten mit Schatten
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Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 141
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 19 - M13

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September		Oktober		November		Dezember	
1	04:38 05:15-05:30/15	05:19	06:14		07:08 17:07-18:18/71		07:07 15:08-15:47/39	08:03	14:52-15:13/21	
	21:45 05:29-05:54/25	21:09	20:01		18:46		16:35 15:43-15:59/16		15:50	
2	04:39 05:16-05:29/13	05:20	06:16		07:10 17:05-18:16/71		07:09 15:08-15:44/36	08:05	14:53-15:12/19	
	21:44 05:29-05:54/25	21:07	19:59		18:44		16:33 15:40-15:57/17		15:49	
3	04:40 05:16-05:26/10	05:22	06:18		07:12 16:59-18:12/73		07:11 15:09-15:46/37	08:06	14:54-15:12/18	
	21:44 05:28-05:54/26	21:05	19:56		18:42		16:31 15:45-15:56/11		15:48	
4	04:40 05:17-05:26/9	05:24	06:19		07:14 16:55-18:10/75		07:13 15:09-15:46/37	08:08	14:54-15:10/16	
	21:43 05:28-05:54/26	21:03	19:54		18:39		16:29 15:44-15:55/11		15:48	
5	04:41 05:19-05:26/6	05:26	06:21		07:15 16:52-18:07/75		07:15 15:10-15:42/32	08:09	14:55-15:10/15	
	21:43 05:28-05:55/27	21:01	19:51		18:37		16:27 15:40-15:55/15		15:47	
6	04:42 05:29-05:53/24	05:27	06:23		07:17 16:50-18:04/74		07:17 15:11-15:42/31	08:10	14:55-15:09/14	
	21:42 05:53-05:55/2	20:59	19:49		18:34		16:25 15:41-15:53/12		15:46	
7	04:43 05:29-05:53/24	05:29	06:25		07:19 16:49-18:01/72		07:19 15:11-15:40/29	08:12	14:56-15:08/12	
	21:41 05:53-05:55/2	20:57	19:46		18:32		16:23 15:39-15:51/12		15:46	
8	04:44 05:29-05:54/25	05:31	06:27 18:15-18:17/2		07:21 16:48-17:58/70		07:21 15:12-15:37/25	08:13	14:56-15:07/11	
	21:41 05:54-05:55/1	20:55	19:44		18:29		16:21 15:35-15:49/14		15:45	
9	04:45 05:30-05:54/24	05:33	06:28 18:08-18:21/13		07:23 16:47-17:46/59		07:23 15:14-15:35/21	08:14	14:57-15:08/11	
	21:40 05:54-05:55/1	20:53	19:41		18:27		16:20 15:33-15:45/12		15:45	
10	04:46 05:30-05:54/24	05:34	06:30 18:05-18:24/19		07:25 16:30-16:44/14		07:25 15:14-15:34/20	08:16	14:58-15:07/9	
	21:39 05:54-05:55/1	20:51	19:39		18:24 16:46-17:44/58		16:18 15:32-15:44/12		15:45	
11	04:48 05:30-05:53/23	05:36	06:32 18:04-18:25/21		07:27 16:27-17:43/76		07:27 15:13-15:32/19	08:17	14:58-15:06/8	
	21:38 05:53-05:55/2	20:49	19:36		18:22		16:16 15:31-15:43/12		15:45	
12	04:49 05:30-05:53/23	05:38	06:34 18:02-18:26/24		07:29 16:25-17:41/76		07:29 15:11-15:41/30	08:18	14:59-15:06/7	
	21:37 05:53-05:55/2	20:47	19:34		18:20		16:14		15:44	
13	04:50 05:31-05:53/22	05:40	06:35 18:00-18:26/26		07:30 16:23-17:39/76		07:30 15:09-15:39/30	08:19	14:59-15:05/6	
	21:36 05:53-05:55/2	20:45	19:31		18:17		16:13		15:44	
14	04:51 05:31-05:53/22	05:41	06:37 17:59-18:27/28		07:32 16:22-17:35/73		07:33 15:09-15:37/28	08:20	15:00-15:05/5	
	21:35 05:53-05:54/1	20:43	19:29		18:15		16:11		15:44	
15	04:53 05:32-05:53/21	05:43	06:39 17:58-18:27/29		07:34 16:20-17:32/72		07:35 15:04-15:35/31	08:21	15:01-15:05/4	
	21:34 05:53-05:55/2	20:40	19:26		18:13		16:09		15:44	
16	04:54 05:33-05:52/19	05:45	06:41 17:58-18:27/29		07:36 16:19-17:28/69		07:37 15:02-15:34/32	08:22	15:01-15:05/4	
	21:33 05:52-05:54/2	20:38	19:24		18:10		16:08		15:44	
17	04:55 05:33-05:52/19	05:47	06:43 17:56-18:26/30		07:38 16:18-17:24/66		07:38 15:00-15:32/32	08:23	15:02-15:06/4	
	21:32 05:52-05:53/1	20:36	19:21		18:08		16:06		15:44	
18	04:57 05:34-05:51/17	05:49	06:44 17:56-18:26/30		07:40 16:18-17:20/62		07:40 14:58-15:30/32	08:23	15:03-15:06/3	
	21:30 05:51-05:53/2	20:34	19:19		18:06		16:05		15:45	
19	04:58 05:35-05:51/16	05:50	06:46 17:56-18:26/30		07:42 16:17-17:17/60		07:42 14:56-15:28/32	08:24	15:04-15:06/2	
	21:29 05:51-05:52/1	20:32	19:16		18:03		16:03		15:45	
20	05:00 05:36-05:49/13	05:52	06:48 17:56-18:26/30		07:44 16:17-17:12/55		07:44 14:56-15:27/31	08:25	15:04-15:06/2	
	21:28 05:49-05:51/2	20:29	19:14		18:01		16:02		15:45	
21	05:01 05:38-05:47/9	05:54	06:50 17:55-18:24/29		07:46 16:16-17:11/55		07:46 14:56-15:26/30	08:25	15:05-15:07/2	
	21:26 05:47-05:49/2	20:27	19:11		17:59		16:01		15:46	
22	05:03 05:42-05:48/6	05:56	06:52 17:52-18:01/9 18:21-18:23/2		07:48 16:16-17:10/54		07:48 14:54-15:25/31	08:26	15:05-15:07/2	
	21:25	20:25	19:09 17:56-18:21/25		17:56		15:59		15:46	
23	05:04	05:58	06:53 17:46-18:22/36		07:50 16:15-17:07/52		07:50 14:54-15:23/29	08:27	15:06-15:08/2	
	21:23	20:22	19:06 17:49-18:04/15		17:54 17:07-17:09/2		15:58		15:47	
24	05:06	05:59	06:55 17:43-18:23/40		07:52 16:13-17:04/51 17:03-17:07/4		07:51 14:52-15:21/29	08:27	15:06-15:08/2	
	21:22	20:20	19:04		17:52 16:16-16:51/35		15:57		15:47	
25	05:07	06:01	06:57 17:42-18:23/41		06:53 15:12-15:54/42		07:53 14:52-15:20/28	08:27	15:06-15:09/3	
	21:20	20:18	19:01		16:50 15:51-16:06/15		15:56		15:48	
26	05:09	06:03	06:59 17:39-18:23/44		06:55 15:11-15:54/43		07:55 14:52-15:18/26	08:28	15:06-15:09/3	
	21:19	20:15	18:59		16:48 15:50-16:05/15		15:55		15:49	
27	05:10	06:05	07:01 17:38-18:22/44		06:57 15:10-15:53/43		07:57 14:52-15:17/25	08:28	15:07-15:11/4	
	21:17	20:13	18:56		16:45 15:50-16:05/15		15:53		15:49	
28	05:12	06:07 07:03 17:31-18:22/51			06:59 15:10-15:53/43		07:58 14:52-15:16/24	08:28	15:07-15:12/5	
	21:16	20:11 18:54			16:43 15:49-16:04/15		15:52		15:50	
29	05:14	06:09 07:04 17:20-18:22/62			07:01 15:09-15:53/44		08:00 14:52-15:15/23	08:28	15:08-15:13/5	
	21:14	20:08 18:51			16:41 15:48-16:04/16		15:52		15:51	
30	05:15	06:10 07:06 17:11-18:20/69			07:03 15:09-15:52/43		08:01 14:53-15:14/21	08:28	15:07-15:13/6	
	21:12	20:06 18:49			16:39 15:47-16:03/16		15:51		15:52	
31	05:17	06:12			07:05 15:09-15:51/42				08:28	
	21:10	20:03			16:37 15:45-16:01/16				15:53	
	Sonnenscheinstunden	514	383	758	328	1992	257	996	231	232
	Anzahl Minuten mit Schatten	538	0	758						

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 142
Lizenzierter Anwender:
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Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 20 - M14

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28 14:11-14:15/4 15:54 14:52-15:10/18	07:57 16:46	06:59 16:52-17:16/24 17:43	06:43 18:43-19:16/33 19:42	05:33 19:28-20:09/41 20:39	04:42 19:53-20:33/40 21:30 20:27-20:43/16
2	08:28 14:52-15:11/19 15:55 16:48	07:55 16:48	06:57 16:52-17:17/25 17:45	06:40 18:44-19:17/33 19:44	05:31 19:28-20:10/42 20:40	04:41 19:54-20:33/39 21:31 20:27-20:44/17
3	08:28 14:52-15:11/19 15:57 16:50	07:54 16:50	06:54 16:53-17:20/27 17:47	06:38 18:47-19:19/32 19:46	05:29 19:29-20:12/43 20:42 20:11-20:12/1	04:40 19:55-20:31/36 21:32 20:25-20:44/19
4	08:27 14:52-15:12/20 15:58 16:52	07:52 16:52	06:52 16:53-17:21/28 17:49	06:35 18:49-19:20/31 19:48	05:27 19:29-20:13/44 20:44 20:11-20:14/3	04:40 19:56-20:36/40 21:33 20:32-20:44/12
5	08:27 14:52-15:12/20 15:59 16:54	07:50 16:54	06:49 16:55-17:24/29 17:51	06:33 18:51-19:22/31 19:50	05:24 19:30-20:12/42 20:46 20:10-20:15/5	04:39 19:57-20:35/38 21:34 20:31-20:44/13
6	08:27 14:53-15:14/21 16:00 16:56	07:48 16:56	06:47 16:56-17:25/29 17:53	06:31 18:52-19:22/30 19:52	05:22 19:31-20:11/40 20:48 20:09-20:17/8	04:38 19:59-20:35/36 21:35 20:31-20:45/14
7	08:26 14:53-15:14/21 16:02 16:58	07:46 16:58	06:45 16:58-17:28/30 17:55	06:28 18:57-19:22/25 19:54	05:21 19:31-20:11/40 20:50 20:08-20:18/10	04:37 20:00-20:34/34 21:36 20:30-20:45/15
8	08:26 14:53-15:14/21 16:03 17:01	07:44 17:01	06:42 16:59-17:29/30 17:57	06:26 18:58-19:22/24 19:55	05:19 19:31-20:10/39 20:51 20:07-20:18/11	04:37 20:02-20:46/44 21:37 20:54-21:00/6
9	08:25 14:53-15:15/22 16:05 17:03	07:42 17:03	06:40 17:00-17:31/31 17:59	06:23 18:58-19:21/23 19:57	05:17 19:31-20:09/38 20:53 20:05-20:21/16	04:36 20:02-20:45/43 21:38 20:52-21:00/8
10	08:24 14:53-15:15/22 16:06 17:05	07:40 17:05	06:37 17:02-17:33/31 18:01	06:21 18:59-19:21/22 19:59	05:15 19:31-20:08/37 20:55 20:04-20:24/20	04:36 20:03-20:46/43 21:39 20:52-21:02/10
11	08:24 14:54-15:16/22 16:08 17:07	07:38 17:07	06:35 17:06-17:36/30 18:02	06:18 19:00-19:19/19 20:01	05:13 19:31-20:17/46 20:57 20:13-20:25/12	04:35 20:04-20:47/43 21:40 20:52-21:03/11
12	08:23 14:54-15:16/22 16:09 17:09	07:36 17:09	06:32 17:06-17:37/31 18:04	06:16 19:03-19:18/15 20:03	05:11 19:32-20:18/46 20:59 20:13-20:27/14	04:35 20:04-20:46/42 21:41 20:51-21:03/12
13	08:22 14:54-15:16/22 16:11 17:11	07:34 17:11	06:30 17:07-17:39/32 18:06	06:14 19:04-19:17/13 20:05	05:09 19:32-20:15/43 21:00 20:11-20:28/17	04:34 20:05-20:47/42 21:41 20:51-21:04/13
14	08:21 14:55-15:17/22 16:13 17:13	07:32 16:41-16:44/3 17:13	06:28 17:08-17:39/31 18:08	06:11 19:05-19:14/9 20:07 19:30-19:37/7	05:07 19:32-20:14/42 21:02 20:08-20:29/21	04:34 20:05-20:47/42 21:42 20:51-21:05/14
15	08:20 14:55-15:17/22 16:14 17:15	07:30 16:38-16:45/7 17:15	06:25 17:11-17:39/28 18:10	06:09 19:27-19:40/13 20:09	05:06 19:33-20:13/40 21:04 20:08-20:31/23	04:34 20:06-20:48/42 21:43 20:51-21:05/14
16	08:19 14:56-15:18/22 16:16 17:17	07:28 16:37-16:47/10 17:17	06:23 17:13-17:38/25 18:12 17:40-17:45/5	06:06 19:26-19:42/16 20:11	05:04 19:33-20:23/50 21:05 20:17-20:31/14	04:34 20:06-20:48/42 21:43 20:51-21:06/15
17	08:18 14:57-15:18/21 16:18 17:19	07:26 16:37-16:50/13 17:19	06:20 17:16-17:47/31 18:14	06:04 19:24-19:43/19 20:12	05:02 19:34-20:24/50 21:07 20:17-20:32/15	04:34 20:07-20:48/41 21:44 20:51-21:06/15
18	08:17 14:57-15:17/20 16:19 17:21	07:24 16:36-16:52/16 17:21	06:18 17:20-17:49/29 18:16	06:02 19:23-19:43/20 20:14	05:01 19:35-20:22/47 21:09 20:15-20:32/17	04:34 20:07-20:49/42 21:44 20:51-21:06/15
19	08:16 14:58-15:17/19 16:21 17:23	07:22 16:36-16:52/16 17:23	06:15 17:21-17:51/30 18:18	05:59 19:22-19:43/21 20:16	04:59 19:36-20:21/45 21:10 20:14-20:34/20	04:34 20:07-20:49/42 21:45 20:51-21:07/16
20	08:15 15:00-15:18/18 16:23 17:25	07:19 16:36-16:52/16 17:25	06:13 17:22-17:53/31 18:20	05:57 19:22-19:46/24 20:18	04:58 19:37-20:34/57 20:34-20:35/1 21:12 20:32-20:33/1	04:34 20:07-20:49/42 21:45 20:51-21:07/16
21	08:14 15:00-15:17/17 16:25 17:27	07:17 16:37-16:52/15 17:27	06:10 17:26-17:30/4 18:22 17:32-17:55/23	05:55 19:21-19:49/28 20:20	04:56 19:38-20:34/56 21:14 20:31-20:35/4	04:34 20:07-20:49/42 21:45 20:51-21:07/16
22	08:12 15:02-15:17/15 16:27 17:29	07:15 16:37-16:50/13 17:29	06:08 17:31-17:56/25 18:23	05:53 19:20-19:49/29 20:22	04:55 19:40-20:35/55 20:34-20:37/3 21:15 20:32-20:33/1	04:34 20:07-20:49/42 21:45 20:51-21:07/16
23	08:11 15:03-15:15/12 16:29 17:31	07:13 16:38-16:49/11 17:31 16:58-17:03/5	06:05 17:31-17:59/28 18:25	05:50 19:20-19:51/31 20:24	04:53 19:43-20:36/53 21:17 20:32-20:38/6	04:34 20:08-20:50/42 21:46 20:52-21:08/16
24	08:10 15:05-15:13/8 16:31 17:33	07:10 16:40-16:47/7 17:33 16:56-17:05/9	06:03 17:31-18:00/29 18:27	05:48 19:21-19:51/30 20:26	04:52 19:47-20:35/48 21:18 20:31-20:39/8	04:34 20:08-20:50/42 21:46 20:52-21:08/16
25	08:08 16:33 17:35	07:08 16:54-17:07/13 17:35	06:00 17:32-18:01/29 18:29	05:46 19:21-19:52/31 20:27	04:50 19:48-20:35/47 21:20 20:31-20:40/9	04:35 20:08-20:49/41 21:46 20:52-21:07/15
26	08:07 16:34 17:37	07:06 16:53-17:09/16 17:37	05:58 17:32-18:04/32 18:31	05:44 19:22-19:52/30 20:29 19:59-20:00/1	04:49 19:49-20:36/47 21:21 20:31-20:40/9	04:35 20:08-20:50/42 21:46 20:53-21:08/15
27	08:05 16:36 17:39	07:04 16:52-17:11/19 17:39	05:55 17:34-18:06/32 18:33	05:41 19:23-19:53/30 20:31 19:56-20:02/6	04:48 19:49-20:36/47 21:23 20:30-20:41/11	04:36 20:08-20:50/42 21:46 20:53-21:07/14
28	08:04 16:38 17:41	07:01 16:52-17:13/21 17:41	05:53 17:36-18:07/31 18:35	05:39 19:24-20:04/40 20:33	04:47 19:50-20:36/46 21:24 20:30-20:42/12	04:36 20:08-20:50/42 21:45 20:54-21:08/14
29	08:02 16:40 17:43	 17:43	06:50 18:39-19:09/30 19:37	05:37 19:26-20:05/39 20:35	04:46 19:51-20:35/44 21:26 20:29-20:42/13	04:37 20:08-20:50/42 21:45 20:54-21:07/13
30	08:01 16:42 17:45	 17:45	06:48 18:40-19:12/32 19:39	05:35 19:28-20:07/39 20:37	04:44 19:51-20:35/44 21:27 20:29-20:43/14	04:37 20:08-20:51/43 21:45 20:55-21:07/12
31	07:59 16:44 17:48	 17:48	06:45 18:41-19:13/32 19:40	05:41 19:23-19:53/30 20:37	04:43 19:52-20:34/42 21:28 20:28-20:43/15	 21:45 20:55-21:07/12
	Sonnenscheinstunden 248	272	367	421	496	512
	Anzahl Minuten mit Schatten 469	210	914	794	1613	1623

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 143

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

André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 20 - M14

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:38 20:08-20:51/43 21:45 20:56-21:07/11	05:19 19:42-20:27/45 21:09 20:22-20:37/15	06:14 19:00-19:19/19 20:01 18:46	07:08 17:46-18:18/32 18:46	07:07 16:35	08:03 14:36-14:58/22 15:50
2	04:39 20:08-20:50/42 21:44 20:56-21:06/10	05:20 19:41-20:26/45 21:07 20:22-20:35/13	06:16 18:57-19:19/22 19:59	07:10 17:45-18:15/30 18:44	07:09 16:33	08:05 14:36-14:58/22 15:49
3	04:40 20:08-20:51/43 21:44 20:57-21:06/9	05:22 19:41-20:19/38 21:05 20:15-20:33/18	06:18 18:56-19:19/23 19:56	07:12 17:42-18:12/30 18:42	07:11 16:31	08:06 14:37-14:59/22 15:48
4	04:40 20:08-20:51/43 21:43 20:58-21:06/8	05:24 19:41-20:19/38 21:03 20:15-20:29/14	06:19 18:55-19:19/24 19:54	07:14 17:38-18:10/32 18:39	07:13 16:29	08:08 14:37-14:58/21 15:49
5	04:41 20:07-20:51/44 21:43 21:00-21:04/4	05:26 19:41-20:21/40 21:01 20:18-20:28/10	06:21 18:53-19:18/25 19:51	07:15 17:36-18:07/31 18:37	07:15 16:27	08:09 14:38-14:59/21 15:47
6	04:42 20:06-20:41/35 21:42 20:37-20:51/14	05:27 19:41-20:21/40 20:59 20:19-20:28/9	06:23 18:48-19:18/30 19:49	07:17 17:35-18:05/30 18:34	07:17 16:25	08:10 14:38-14:59/21 15:46
7	04:43 20:05-20:42/37 21:41 20:38-20:52/14	05:29 19:40-20:21/41 20:57 20:19-20:26/7	06:25 18:46-19:17/31 19:46	07:19 17:33-18:02/29 18:32	07:19 16:23	08:12 14:39-15:00/21 15:46
8	04:44 20:04-20:43/39 21:41 20:39-20:52/13	05:31 19:39-20:22/43 20:55 20:20-20:24/4	06:27 18:44-19:16/32 19:44	07:21 17:31-18:00/29 18:29	07:21 16:21	08:13 14:40-14:59/19 15:45
9	04:45 20:03-20:44/41 21:40 20:40-20:52/12	05:33 19:38-20:22/44 20:53 20:20-20:23/3	06:28 18:41-19:13/32 19:41	07:23 17:29-17:58/29 18:27	07:23 16:20	08:14 14:41-15:00/19 15:45
10	04:46 20:02-20:40/38 21:39 20:34-20:52/18	05:34 19:37-20:20/43 20:51	06:30 18:37-19:10/33 19:39	07:25 17:27-17:55/28 18:24	07:25 16:19	08:16 14:41-15:00/19 15:45
11	04:48 20:02-20:41/39 21:38 20:35-20:52/17	05:36 19:37-20:18/41 20:49	06:32 18:35-19:08/33 19:36	07:27 17:26-17:51/25 18:22	07:27 16:16	08:17 14:01-14:05/4 15:44
12	04:49 20:01-20:42/41 21:37 20:36-20:51/15	05:38 19:36-20:17/41 20:47	06:34 18:34-19:06/32 19:34	07:29 17:26-17:50/24 18:20	07:29 16:14	08:18 14:42-15:00/18 15:44
13	04:50 20:00-20:43/43 21:36 20:37-20:51/14	05:40 19:35-20:14/39 20:45	06:35 18:31-19:03/32 19:31	07:30 17:25-17:48/23 18:17	07:31 16:13	08:19 14:00-14:08/8 15:44
14	04:51 20:00-20:44/44 21:35 20:38-20:51/13	05:41 19:33-20:12/39 20:43	06:37 18:29-18:59/30 19:29	07:32 17:25-17:45/20 18:15	07:33 16:11	08:20 13:59-14:09/10 15:44
15	04:53 19:59-20:44/45 21:34 20:38-20:50/12	05:43 19:31-20:11/40 20:40 19:58-20:01/3	06:39 18:27-18:58/31 19:26	07:34 17:25-17:43/18 18:13	07:35 16:09	08:21 13:59-14:10/11 15:44
16	04:54 19:59-20:45/46 21:33 20:40-20:51/11	05:45 19:29-19:59/30 20:38 20:03-20:08/5	06:41 18:24-18:56/32 19:24	07:36 17:26-17:41/15 18:10	07:37 16:08	08:22 14:00-14:11/11 15:44
17	04:55 19:59-20:45/46 21:32 20:40-20:50/10	05:47 19:28-19:59/31 20:36	06:43 18:21-18:53/32 19:21	07:38 17:27-17:38/11 18:08	07:38 16:06	08:23 14:00-14:12/12 15:44
18	04:57 19:58-20:45/47 21:30 20:40-20:50/10	05:49 19:28-19:58/30 20:34	06:44 18:19-18:50/31 19:19	07:40 17:11-17:20/9 18:06	07:40 14:39-14:47/8	08:24 14:00-14:13/13 15:45
19	04:58 19:58-20:45/47 21:29 20:41-20:50/9	05:50 19:26-19:57/31 20:32	06:46 18:19-18:48/29 19:16	07:42 17:08-17:21/12 18:03	07:42 14:38-14:50/12	08:24 14:01-14:14/13 15:45
20	05:00 19:54-20:45/51 21:28 20:41-20:49/8	05:52 19:26-19:56/30 20:29	06:48 18:18-18:46/28 19:14	07:44 17:08-17:22/14 18:01	07:44 14:37-14:52/15	08:25 14:01-14:14/13 15:45
21	05:01 19:51-20:45/54 21:26 20:41-20:47/6	05:54 19:26-19:55/29 20:27	06:50 18:17-18:42/25 19:11	07:46 17:07-17:22/15 17:59	07:46 14:36-14:53/17	08:26 14:02-14:15/13 15:46
22	05:03 19:50-20:45/55 21:25 20:42-20:47/5	05:56 19:25-19:52/27 20:25	06:52 18:17-18:40/23 19:09	07:48 17:06-17:22/16 17:56	07:48 14:36-14:54/18	08:26 14:02-14:15/13 15:46
23	05:04 19:48-20:45/57 21:24 20:42-20:43/1	05:58 19:25-19:50/25 20:22	06:53 18:07-18:38/31 19:06	07:50 17:06-17:22/16 17:54	07:50 14:35-14:55/20	08:27 14:03-14:16/13 15:47
24	05:06 19:46-20:29/43 21:22 20:22-20:44/22	05:59 19:26-19:47/21 20:20	06:55 18:05-18:35/30 19:04	07:52 17:06-17:21/15 17:52	07:51 14:35-14:55/20	08:27 14:03-14:16/13 15:47
25	05:07 19:46-20:32/46 21:20 20:25-20:44/19	06:01 19:26-19:46/20 20:18	06:57 18:04-18:33/29 19:01	07:53 16:06-16:19/13 16:50	07:53 14:34-14:55/21	08:27 14:03-14:16/13 15:48
26	05:09 19:44-20:33/49 21:19 20:26-20:42/16	06:03 19:26-19:44/18 20:15	06:59 17:58-18:30/32 18:59	07:55 16:07-16:16/9 16:48	07:55 14:34-14:56/22	08:28 14:04-14:16/12 15:50
27	05:10 19:44-20:34/50 21:17 20:27-20:42/15	06:05 19:28-19:43/15 20:13	07:01 17:56-18:20/24 18:56	07:57 16:08-16:14/6 16:45	07:57 14:35-14:56/21	08:28 14:05-14:17/12 15:49
28	05:12 19:43-20:34/51 21:16 20:28-20:41/13	06:07 19:29-19:41/12 20:11	07:03 17:53-18:20/27 18:54	07:59 16:10-16:12/2 16:43	07:58 14:35-14:57/22	08:28 14:06-14:17/11 15:50
29	05:14 19:43-20:21/38 21:14 20:16-20:41/25	06:08 19:06-19:15/9 20:08 19:32-19:37/5	07:04 17:50-18:20/30 18:51	07:01 16:41 16:41	08:00 14:35-14:57/22	08:28 14:07-14:17/10 15:51
30	05:15 19:42-20:25/43 21:12 20:19-20:39/20	06:10 19:04-19:17/13 20:06	07:06 17:48-18:19/31 18:49	07:03 16:39 16:39	08:01 14:36-14:58/22	08:28 14:07-14:16/9 15:52
31	05:17 19:42-20:27/45 21:10 20:22-20:38/16	06:12 19:02-19:18/16 20:03	07:08 17:42-18:13/30 16:37	07:05 16:37 16:37	08:02 14:36-14:58/22	08:29 14:09-14:16/7 15:53
Sonnenscheinstunden	514	461	383	328	257	231
Anzahl Minuten mit Schatten	1647	1049	869	573	240	776

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

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

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 144
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 21 - M15

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1 08:28	07:57 15:26-15:54/28	06:59 16:49-17:08/19	06:43 19:11-19:16/5	05:33 19:47-20:09/22	04:42 20:43-20:54/11	21:30
15:54	16:46	17:43	19:42	20:39	21:30	21:30
2 08:28	07:55 15:27-15:55/28	06:57 16:47-17:09/22	06:40 19:08-19:17/9	05:31 19:47-20:11/24	04:41 20:44-20:56/12	21:31
15:55	16:48	17:45	19:44	20:40	21:31	21:31
3 08:28	07:54 15:27-15:56/29	06:54 16:46-17:10/24	06:38 19:07-19:19/12	05:29 19:47-20:12/25	04:40 20:43-20:57/14	21:32
15:57	16:50	17:47	19:46	20:42	21:32	21:32
4 08:28	07:52 15:26-15:56/30	06:52 07:16-07:22/6	06:35 19:06-19:21/15	05:26 19:48-20:14/26	04:40 20:43-20:58/15	21:33
15:58	16:52	17:49	19:48	20:44	21:33	21:33
5 08:27	07:50 15:26-15:57/31	06:49 07:14-07:25/11	06:33 19:05-19:23/18	05:24 19:49-20:15/26	04:39 20:43-20:58/15	21:34
15:59	16:54	17:51	19:50	20:46	21:34	21:34
6 08:27	07:48 15:26-15:57/31	06:47 07:11-07:25/14	06:31 19:04-19:24/20	05:22 19:51-20:17/26	04:38 20:43-21:00/17	21:35
16:00	16:56	17:53	19:52	20:48	21:35	21:35
7 08:26	07:46 15:26-15:57/31	06:45 07:10-07:26/16	06:28 19:05-19:26/21	05:20 19:54-20:18/24	04:37 20:43-21:00/17	21:36
16:02	16:58	17:55	19:54	20:50	21:36	21:36
8 08:26	07:44 15:26-15:56/30	06:42 07:10-07:27/17	06:26 19:05-19:28/23	05:19 19:54-20:20/26	04:37 20:44-21:01/17	21:37
16:03	17:01 16:08-16:15/7	17:57 16:44-17:09/25	19:56	20:51	21:37	21:37
9 08:25	07:42 15:26-15:56/30	06:40 07:09-07:26/17	06:23 19:05-19:30/25	05:17 19:57-20:22/25	04:36 20:43-21:01/18	21:38
16:05	17:03 16:04-16:18/14	17:59 16:44-17:09/25	19:57	20:53	21:38	21:38
10 08:25	07:40 15:26-15:56/30	06:37 07:10-07:26/16	06:21 19:06-19:32/26	05:15 19:58-20:24/26	04:36 20:44-21:03/19	21:39
16:06	17:05 16:02-16:21/19	18:01 16:44-17:07/23	19:59	20:55	21:39	21:39
11 08:24	07:38 15:27-15:56/29	06:35 07:09-07:25/16	06:18 19:08-19:33/25	05:13 19:59-20:25/26	04:35 20:44-21:04/20	21:40
16:08	17:07 16:01-16:22/21	18:02 16:46-17:07/21	20:01	20:57	21:40	21:40
12 08:23	07:36 15:28-15:56/28	06:32 07:10-07:24/14	06:16 19:09-19:35/26	05:11 20:01-20:27/26	04:35 20:44-21:04/20	21:41
16:09	17:09 16:00-16:24/24	18:04 16:46-17:05/19	20:03	20:59	21:41	21:41
13 08:22	07:34 15:29-15:55/26	06:30 07:11-07:22/11	06:14 19:11-19:37/26	05:09 20:04-20:28/24	04:34 20:44-21:05/21	21:41
16:11	17:11 15:59-16:25/26	18:06 16:48-17:03/15	20:05	21:00	21:41	21:41
14 08:21	07:32 07:59-08:07/8 15:59-16:26/27	06:28 07:14-07:20/6	06:11 19:13-19:38/25	05:07 20:05-20:30/25	04:34 20:45-21:06/21	21:42
16:13	17:13 15:30-15:54/24	18:08 16:50-16:59/9	20:07	21:02	21:42	21:42
15 08:20	07:30 07:56-08:08/12 15:57-16:26/29	06:25	06:09 19:15-19:40/25	05:06 20:07-20:32/25	04:34 20:45-21:06/21	21:43
16:14	17:15 15:31-15:52/21	18:10	20:09	21:04	21:43	21:43
16 08:19	07:28 07:55-08:10/15 15:57-16:27/30	06:23	06:06 19:16-19:42/26	05:04 20:08-20:33/25	04:34 20:45-21:07/22	21:43
16:16	17:17 15:33-15:51/18	18:12	20:11	21:06	21:43	21:43
17 08:18	07:26 07:54-08:10/16 15:57-16:27/30	06:20	06:04 19:16-19:44/28	05:02 20:13-20:33/20	04:34 20:46-21:07/21	21:44
16:18	17:19 15:36-15:48/12	18:14	20:12	21:07	21:44	21:44
18 08:17	07:24 07:54-08:11/17	06:18	06:02 19:21-19:22/1	05:01 20:12-20:33/21	04:34 20:46-21:08/22	21:44
16:19	17:21 15:37-16:27/30	18:16	20:14 19:23-19:46/23	21:09	21:44	21:44
19 08:16	07:22 07:53-08:11/18	06:15	05:59 19:23-19:48/25	04:59 20:14-20:33/19	04:34 20:46-21:08/22	21:45
16:21	17:23 15:56-16:27/31	18:18	20:16	21:11	21:45	21:45
20 08:15	07:19 07:53-08:11/18	06:13 17:51-17:53/2	05:57 19:24-19:50/26	04:58 20:14-20:32/18	04:34 20:46-21:08/22	21:45
16:23	17:25 15:57-16:27/30	18:20	20:18	21:12	21:45	21:45
21 08:14	07:17 07:54-08:11/17	06:10 17:49-17:55/6	05:55 19:24-19:51/27	04:56 20:15-20:32/17	04:34 20:46-21:08/22	21:45
16:25	17:27 15:57-16:27/30	18:22	20:20	21:14	21:45	21:45
22 08:12	07:15 07:54-08:09/15	06:08 17:46-17:56/10	05:53 19:25-19:50/25	04:55 20:17-20:32/15	04:34 20:46-21:08/22	21:45
16:27	17:29 15:57-16:26/29	18:23	20:22	21:15	21:45	21:45
23 08:11	07:13 07:55-08:09/14	06:05 17:46-17:59/13	05:50 19:27-19:50/23	04:53 20:19-20:31/12	04:34 20:47-21:09/22	21:46
16:29	17:31 15:58-16:25/27	18:25	20:24 19:53-19:54/1	21:17	21:46	21:46
24 08:10	07:10 07:57-08:07/10	06:03 17:45-18:00/15	05:48 19:30-19:49/19	04:52 20:19-20:30/11	04:34 20:47-21:09/22	21:46
16:31	17:33 15:59-16:25/26	18:27	20:26 19:51-19:56/5	21:18	21:46	21:46
25 08:08	15:36-15:42/6	07:08 07:59-08:04/5	06:00 17:45-18:01/16	05:46 19:32-19:48/16	04:50 20:21-20:29/8	04:35 20:47-21:09/22
16:32	17:35 15:59-16:23/24	18:29	20:27 19:49-19:58/9	21:20	21:46	21:46
26 08:07	15:33-15:45/12	07:06 16:01-16:22/21	05:58 17:44-18:00/16	05:44 19:35-19:47/12	04:49 20:23-20:27/4	04:35 20:47-21:09/22
16:34	17:37 16:58-17:00/2	18:31	20:29 19:48-20:00/12	21:21	21:46	21:46
27 08:05	15:31-15:47/16	07:04 16:02-16:19/17	05:55 17:45-17:59/14	05:41 19:37-19:45/8	04:48 20:46-20:48/2	04:36 20:47-21:09/22
16:36	17:39 16:52-17:04/12	18:33	20:31 19:47-20:02/15	21:23	21:46	21:46
28 08:04	15:30-15:50/20	07:01 16:05-16:17/12	05:53 17:45-17:57/12	05:39 19:47-20:04/17	04:47 20:45-20:50/5	04:36 20:48-21:09/21
16:38	17:41 16:50-17:07/17	18:35	20:33	21:24	21:45	21:45
29 08:02	15:29-15:51/22	06:50 18:47-18:56/9	05:37 19:47-20:05/18	04:45 20:44-20:51/7	04:37 20:47-21:08/21	21:45
16:40		19:37	20:35	21:26	21:45	21:45
30 08:01	15:28-15:52/24	06:48	05:35 19:47-20:07/20	04:44 20:44-20:52/8	04:37 20:48-21:08/20	21:45
16:42		19:39	20:37	21:27	21:45	21:45
31 07:59	15:27-15:53/26	06:45		04:43 20:43-20:53/10		
16:44		19:40		21:28		
Sonnenscheinstunden	248	272	367	421	496	512
Anzahl Minuten mit Schatten	126	1156	561	657	578	583

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 145
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 21 - M15

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember	
1	04:38 20:48-21:09/21	05:19 20:11-20:37/26	06:14 19:08-19:33/25	07:08 07:50-08:03/13	07:07 14:56-15:26/30	08:03	
	21:45	21:09	20:01	18:46 17:27-17:44/17	16:35 15:32-15:50/18	15:50	
2	04:39 20:48-21:07/19	05:20 20:09-20:35/26	06:16 19:04-19:30/26	07:10 07:49-08:04/15	07:09 14:55-15:26/31	08:05	
	21:44	21:07	19:59	18:44 17:25-17:45/20	16:33 15:35-15:48/13	15:49	
3	04:40 20:48-21:06/18	05:22 20:08-20:33/25	06:18 19:03-19:28/25	07:12 07:48-08:04/16	07:11 14:55-15:26/31	08:06	
	21:44	21:05	19:56	18:42 17:23-17:45/22	16:31 15:39-15:43/4	15:48	
4	04:40 20:49-21:07/18	05:24 20:05-20:31/26	06:19 19:02-19:25/23	07:14 07:46-08:03/17	07:13 14:56-15:27/31	08:08	
	21:43	21:03	19:54	18:39 17:22-17:46/24	16:29	15:48	
5	04:41 20:49-21:07/18	05:26 20:04-20:30/26	06:21 19:01-19:22/21	07:15 07:46-08:03/17	07:15 14:56-15:27/31	08:09	
	21:43	21:01	19:51	18:37 17:21-17:46/25	16:27	15:47	
6	04:42 20:50-21:06/16	05:27 20:04-20:28/24	06:23 19:00-19:20/20	07:17 07:46-08:02/16	07:17 14:56-15:26/30	08:11	
	21:42	20:59	19:49	18:34 17:20-17:46/26	16:25	15:46	
7	04:43 20:50-21:06/16	05:29 20:00-20:26/26	06:25 19:00-19:18/18	07:19 07:46-08:02/16	07:19 14:56-15:26/30	08:12	
	21:41	20:57	19:46	18:32 17:20-17:46/26	16:23	15:46	
8	04:44 20:50-21:05/15	05:31 19:58-20:24/26	06:27 19:01-19:16/15	07:21 07:48-08:00/12	07:21 14:56-15:26/30	08:13	
	21:41	20:55	19:44	18:29 17:20-17:46/26	16:21	15:45	
9	04:45 20:51-21:05/14	05:33 19:57-20:23/26	06:28 19:00-19:13/13	07:23 07:50-07:59/9	07:23 14:57-15:25/28	08:14	
	21:40	20:53	19:41	18:27 17:20-17:45/25	16:20	15:45	
10	04:46 20:51-21:04/13	05:34 19:56-20:20/24	06:30 19:01-19:10/9	07:25 07:52-07:55/3	07:25 14:57-15:24/27	08:16	
	21:39	20:51	19:39	18:24 17:20-17:44/24	16:18	15:45	
11	04:48 20:51-21:03/12	05:36 19:55-20:18/23	06:32 19:03-19:08/5	07:27 17:21-17:44/23	07:27 14:59-15:25/26	08:17	
	21:38	20:49	19:36	18:22	16:16	15:44	
12	04:49 20:52-21:02/10	05:38 19:55-20:17/22	06:34	07:29 17:21-17:42/21	07:29 15:00-15:24/24	08:18	
	21:37	20:47	19:34	18:20	16:14	15:44	
13	04:50 20:52-21:01/9	05:40 19:54-20:14/20	06:35	07:30 16:41-16:47/6	07:31 15:01-15:23/22	08:19	
	21:36	20:45	19:31	18:17 17:22-17:41/19	16:13	15:44	
14	04:51 20:53-21:00/7	05:41 19:54-20:12/18	06:37 18:38-18:46/8	07:32 16:37-16:51/14	07:33 15:02-15:22/20	08:20	
	21:35	20:43	19:29	18:15 17:24-17:39/15	16:11	15:44	
15	04:53 20:53-20:59/6	05:43 19:47-19:50/3	06:39 18:36-18:48/12	07:34 16:34-16:53/19	07:35 15:04-15:20/16	08:21	
	21:34	20:40	19:26	18:13 17:26-17:36/10	16:09	15:44	
16	04:54 20:55-20:59/4	05:45 19:43-19:52/9	06:41 18:34-18:49/15	07:36 16:32-16:55/23	07:37 15:06-15:18/12	08:22	
	21:33	20:38	19:24	18:10	16:08	15:44	
17	04:55 20:56-20:57/1	05:47 19:41-19:54/13	06:43 18:33-18:48/15	07:38 08:29-08:37/8	07:38 15:09-15:15/6	08:23	
	21:32	20:36	19:21	18:08 16:31-16:56/25	16:06	15:44	
18	04:57 20:31-20:38/7	05:49 19:38-19:55/17	06:44 18:32-18:48/16	07:40 08:27-08:39/12	07:40	08:24	
	21:30	20:34	19:19	18:06 16:30-16:56/26	16:05	15:45	
19	04:58 20:29-20:39/10	05:50 19:35-19:55/20	06:46 18:32-18:48/16	07:42 08:26-08:40/14	07:42	08:24	
	21:29	20:32	19:16	18:03 16:29-16:57/28	16:03	15:45	
20	05:00 20:29-20:41/12	05:52 19:32-19:55/23	06:48 18:32-18:46/14	07:44 08:25-08:41/16	07:44	08:25	
	21:28	20:29	19:14	18:01 16:28-16:57/29	16:02	15:45	
21	05:01 20:28-20:41/13	05:54 19:30-19:56/26	06:50 18:32-18:42/10	07:46 08:24-08:41/17	07:46	08:26	
	21:26	20:27	19:11	17:59 16:27-16:57/30	16:01	15:46	
22	05:02 20:26-20:42/16	05:56 19:28-19:55/27	06:52 18:33-18:40/7	07:48 08:23-08:41/18	07:48	08:26	
	21:25	20:25	19:09	17:56 16:27-16:57/30	15:59	15:46	
23	05:04 20:25-20:43/18	05:58 19:27-19:53/26	06:53 18:35-18:38/3	07:50 08:23-08:41/18	07:50	08:27	
	21:24	20:22	19:06	17:54 16:27-16:57/30	15:58	15:47	
24	05:06 20:24-20:43/19	05:59 19:27-19:51/24	06:55	07:52 08:23-08:40/17 16:27-16:57/30	07:51	08:27	
	21:22	20:20	19:04	17:52 16:08-16:15/7	15:57	15:47	
25	05:07 20:24-20:43/19	06:01 19:23-19:49/26	06:57	06:54 07:24-07:40/16 15:27-15:56/29	07:53	08:27	
	21:20	20:18	19:01	16:50 15:04-15:19/15	15:56	15:48	
26	05:09 20:23-20:43/20	06:03 19:19-19:46/27	06:59	06:55 07:24-07:39/15 15:27-15:56/29	07:55	08:28	
	21:19	20:15	18:59	16:48 15:02-15:21/19	15:55	15:48	
27	05:10 20:23-20:44/21	06:05 19:17-19:44/27	07:01	06:57 07:27-07:38/11 15:27-15:55/28	07:57	08:28	
	21:17	20:13	18:56	16:45 15:00-15:22/22	15:53	15:49	
28	05:12 20:17-20:42/25	06:07 19:16-19:42/26	07:03	06:59 07:29-07:36/7 15:28-15:55/27	07:58	08:28	
	21:16	20:11	18:54	16:43 14:59-15:24/25	15:52	15:50	
29	05:14 20:16-20:41/25	06:08 19:14-19:39/25	07:04 17:33-17:38/5	07:01 14:58-15:25/27	08:00	08:28	
	21:14	20:08	18:51	16:41 15:29-15:54/25	15:51	15:51	
30	05:15 20:15-20:39/24	06:10 19:11-19:37/26	07:06 07:52-08:01/9	07:03 14:57-15:25/28	08:02	08:28	
	21:12	20:06	18:49	16:39 15:30-15:53/23	15:51	15:52	
31	05:17 20:12-20:38/26	06:12 19:09-19:35/26		07:05 14:57-15:26/29		08:28	
	21:10	20:04		16:37 15:31-15:52/21		15:53	
	Sonnenscheinstunden	514	461	383	328	257	231
	Anzahl Minuten mit Schatten	472	763	343	1270	460	0

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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Lizenzierter Anwender:
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Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 22 - M16

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28 12:02-13:04/62 15:54 14:02-14:30/28	07:57 14:06-14:46/40 16:46	06:59 17:43	06:43 18:23-19:04/41 19:42	05:33 19:01-19:39/38 20:39 19:43-19:59/16	04:42 19:50-20:46/56 21:30
2	08:28 12:03-13:05/62 15:55 14:02-14:31/29	07:55 14:07-14:45/38 16:48	06:56 17:45	06:40 18:22-19:05/43 19:44	05:31 19:04-19:39/35 20:40 19:41-20:00/19	04:41 19:51-20:48/57 21:31
3	08:28 12:04-13:04/60 15:57 14:02-14:32/30	07:54 14:09-14:46/37 16:50	06:54 17:47	06:38 18:23-19:06/43 19:46	05:29 19:05-19:38/32 20:42 19:39-20:01/22	04:40 19:52-20:48/56 21:32
4	08:27 12:05-13:05/60 15:58 14:02-14:33/31	07:52 14:10-14:45/35 16:52	06:52 17:07-17:13/6 17:49	06:35 18:23-19:06/43 19:48	05:26 19:09-19:37/28 20:44 19:38-20:02/24	04:40 19:52-20:50/58 21:33
5	08:27 12:06-13:05/59 15:59 14:02-14:33/31	07:50 14:11-14:44/33 16:54	06:49 17:03-17:17/14 17:51	06:33 18:24-19:07/43 19:50	05:24 19:14-19:36/22 20:46 19:37-20:03/26	04:39 19:53-20:51/58 21:34
6	08:27 12:08-13:06/58 16:00 14:02-14:35/33	07:48 14:12-14:43/31 16:56	06:47 17:00-17:18/18 17:53	06:31 18:25-19:07/42 19:52	05:22 19:15-19:34/19 20:48 19:36-20:07/31	04:38 19:54-20:52/58 21:35
7	08:26 12:09-12:26/17 14:02-14:36/34 16:02 12:28-13:06/38	07:46 14:14-14:42/28 16:58	06:45 16:59-17:19/20 17:55	06:28 18:27-19:07/40 19:54	05:20 19:16-19:32/16 20:50 19:35-20:09/34	04:37 19:54-20:53/59 21:36
8	08:26 12:10-12:25/15 14:02-14:36/34 16:03 12:28-13:06/38	07:44 14:15-14:39/24 17:00	06:42 16:58-17:20/22 17:57	06:26 18:29-19:14/45 19:55	05:19 19:18-19:30/12 20:51 19:34-20:10/36	04:37 19:56-20:54/58 21:37
9	08:25 12:12-12:24/12 14:01-14:37/36 16:05 12:29-13:05/36	07:42 14:18-14:37/19 17:03	06:40 16:57-17:21/24 17:59	06:23 18:29-19:17/48 19:57	05:17 19:22-19:27/5 20:53 19:35-20:12/37	04:36 19:56-20:54/58 21:38
10	08:24 12:15-12:22/7 14:01-14:38/37 16:06 12:30-13:05/35	07:40 14:21-14:34/13 17:05	06:37 16:56-17:20/24 18:01	06:21 18:31-19:19/48 19:59	05:15 19:34-20:13/39 20:55	04:36 19:57-20:55/58 21:39
11	08:24 12:30-13:05/35 16:08 14:01-14:38/37	07:38 12:30-13:05/35 17:07	06:35 16:56-17:21/25 18:02	06:18 18:32-19:21/49 20:01	05:13 19:34-20:15/41 20:57	04:35 19:58-20:56/58 21:40
12	08:23 12:31-13:05/34 16:09 14:01-14:39/38	07:36 12:31-13:05/34 17:09	06:32 16:55-17:20/25 18:04	06:16 18:34-19:23/49 20:03	05:11 19:34-20:17/43 20:59	04:35 19:59-20:56/57 21:41
13	08:22 12:32-13:05/33 16:11 14:01-14:40/39	07:34 12:32-13:05/33 17:11	06:30 16:55-17:20/25 18:06	06:14 18:36-19:26/50 20:05	05:09 19:34-20:19/45 21:00	04:34 20:00-20:57/57 21:41
14	08:21 12:33-13:05/32 16:13 14:01-14:41/40	07:32 12:33-13:05/32 17:13	06:27 16:55-17:19/24 18:08	06:11 18:35-19:27/52 20:07	05:07 19:34-20:19/45 21:02	04:34 20:00-20:57/57 21:42
15	08:20 12:35-13:05/30 16:14 14:01-14:42/41	07:30 12:35-13:05/30 17:15	06:25 16:56-17:19/23 18:10	06:09 18:36-19:28/52 20:09	05:06 19:34-20:21/47 21:04	04:34 20:01-20:58/57 21:43
16	08:19 12:36-13:04/28 16:16 14:02-14:42/40	07:28 12:36-13:04/28 17:17	06:23 16:56-17:17/21 18:12	06:06 18:37-19:30/53 20:11	05:04 19:34-20:23/49 21:05	04:34 20:01-20:58/57 21:43
17	08:18 12:38-13:04/26 16:18 14:02-14:43/41	07:26 12:38-13:04/26 17:19	06:20 16:57-17:16/19 18:14	06:04 18:38-19:34/56 20:12	05:02 19:35-20:26/51 21:07	04:34 20:01-20:59/58 21:44
18	08:17 12:39-13:02/23 16:19 14:01-14:43/42	07:24 12:39-13:02/23 17:21	06:18 16:58-17:14/16 18:16	06:02 18:40-19:36/56 20:14	05:01 19:35-20:27/52 21:09	04:33 20:02-20:59/57 21:44
19	08:16 12:41-13:02/21 16:21 14:02-14:44/42	07:22 12:41-13:02/21 17:23	06:15 17:01-17:12/11 18:18	05:59 18:42-19:38/56 20:16	04:59 19:36-20:29/53 21:10	04:33 20:02-20:59/57 21:45
20	08:15 12:43-13:00/17 16:23 14:02-14:45/43	07:19 12:43-13:00/17 17:25	06:13 17:19-17:30/10 18:20	05:57 18:47-19:39/52 20:18	04:58 19:35-20:30/55 21:12	04:34 20:02-20:59/57 21:45
21	08:14 12:46-12:58/12 16:25 14:02-14:45/43	07:17 12:46-12:58/12 17:27	06:10 17:39-17:41/2 18:22	05:55 18:50-19:40/50 20:20	04:56 19:36-20:31/55 21:14	04:34 20:02-20:59/57 21:45
22	08:12 14:03-14:46/43 16:27 14:02-14:46/44	07:15 14:03-14:46/43 17:29	06:08 17:32-17:46/14 18:23	05:52 18:49-19:40/51 20:22	04:55 19:37-20:32/55 21:15	04:34 20:02-20:59/57 21:45
23	08:11 14:02-14:46/44 16:29 14:03-14:46/43	07:13 14:02-14:46/44 17:31	06:05 17:30-17:48/18 18:25	05:50 18:50-19:40/50 20:24	04:53 19:38-20:33/55 21:17	04:34 20:03-21:00/57 21:46
24	08:10 14:02-14:46/44 16:31 14:03-14:46/43	07:10 14:02-14:46/44 17:33	06:03 17:28-17:47/19 18:27 17:47-17:49/2	05:48 18:50-19:40/50 20:26	04:52 19:38-20:33/55 21:18	04:34 20:03-21:00/57 21:46
25	08:08 14:03-14:47/44 16:32 14:03-14:47/44	07:08 14:03-14:47/44 17:35	06:00 17:27-17:51/24 18:29	05:46 18:51-19:41/50 20:27	04:50 19:39-20:33/54 21:20	04:35 20:03-21:00/57 21:46
26	08:07 14:03-14:47/44 16:34 14:03-14:46/43	07:06 14:03-14:47/44 17:37	05:58 17:25-17:53/28 18:31	05:44 18:52-19:41/49 20:29	04:49 19:40-20:34/54 21:21	04:35 20:03-21:00/57 21:46
27	08:05 14:03-14:46/43 16:36 14:04-14:47/43	07:04 14:03-14:46/43 17:39	05:55 17:24-17:55/31 18:33	05:41 18:53-19:41/48 20:31	04:48 19:42-20:39/57 21:23	04:36 20:03-21:00/57 21:46
28	08:04 14:04-14:47/43 16:38 14:05-14:47/42	07:01 14:04-14:47/43 17:41	05:53 17:23-17:56/33 18:35	05:39 18:54-19:41/47 20:33	04:47 19:43-20:41/58 21:24	04:36 20:03-21:00/57 21:45
29	08:02 14:05-14:47/42 16:40 14:05-14:47/42	06:59 14:05-14:47/42 17:42	06:50 18:23-18:58/35 19:37	05:37 18:56-19:40/44 20:35	04:45 19:44-20:43/59 21:26	04:37 20:03-21:00/57 21:45
30	08:01 14:05-14:47/42 16:42 14:06-14:46/40	06:58 14:05-14:47/42 17:42	06:48 18:22-18:58/36 19:39	05:35 18:58-19:40/42 20:37	04:44 19:46-20:44/58 21:27	04:37 20:03-21:00/57 21:45
31	07:59 14:06-14:46/40 16:44	06:57 14:06-14:46/40 17:42	06:45 18:22-19:01/39 19:40	05:34 19:46-19:56/10 20:37	04:43 19:49-20:45/56 21:28	04:37 20:03-21:00/57 21:45
Sonnenscheinstunden	248	272	367	421	496	512
Anzahl Minuten mit Schatten	2048	298	598	1452	1588	1718

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

Tag im Monat	Sonnenaufgang (SS:MM) Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:53 / 147

Lizenzierter Anwender:
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André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 22 - M16

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:38 20:03-21:00/57	05:19 19:45-20:27/42	06:14 18:32-19:21/49	07:08 17:35-18:00/25	07:07 13:50-14:05/15	08:03 12:12-12:47/35
	21:45	21:09	20:01	18:46	16:35	15:50
2	04:39 20:02-21:00/58	05:20 19:44-20:24/40	06:16 18:29-19:17/48	07:10 17:35-18:00/25	07:09 13:47-14:07/20	08:05 11:58-12:05/77
	21:44	21:07	19:59	18:44	16:33	15:49
3	04:40 20:01-21:00/59	05:22 19:45-20:23/38	06:17 18:27-19:15/48	07:12 17:34-17:59/25	07:11 13:44-14:09/25	08:06 11:56-12:08/12
	21:44	21:05	19:56	18:41	16:31	15:48
4	04:40 20:01-21:00/59	05:24 19:30-19:38/8	06:19 18:26-19:11/45	07:14 17:34-17:58/24	07:13 13:43-14:12/29	08:08 11:54-12:09/15
	21:43	21:03	19:54	18:39	16:29	15:48
5	04:41 20:01-20:59/58	05:26 19:27-19:41/14	06:21 18:23-19:03/40	07:15 17:34-17:57/23	07:15 13:42-14:13/31	08:09 11:54-12:11/17
	21:43	21:01	19:51	18:37	16:27	15:47
6	04:42 20:01-20:59/58	05:27 19:26-19:43/17	06:23 18:21-19:03/42	07:17 17:35-17:56/21	07:17 13:40-14:14/34	08:10 11:53-12:12/19
	21:42	20:59	19:49	18:34	16:25	15:46
7	04:43 20:00-20:58/58	05:29 19:24-19:44/20	06:25 18:19-19:02/43	07:19 17:36-17:55/19	07:19 13:39-14:15/36	08:12 11:52-12:52/59
	21:41	20:57	19:46	18:32	16:23	15:46
8	04:44 20:00-20:58/58	05:31 19:22-19:45/23	06:26 18:18-19:01/43	07:21 17:37-17:53/16	07:21 13:38-14:16/38	08:13 11:52-12:52/60
	21:41	20:55	19:44	18:29	16:21	15:45
9	04:45 19:59-20:56/57	05:33 19:17-19:46/29	06:28 18:16-18:59/43	07:23 17:40-17:50/10	07:23 13:38-14:16/38	08:14 11:53-12:54/61
	21:40	20:53	19:41	18:27	16:20	15:45
10	04:46 19:59-20:55/56	05:34 19:14-19:46/32	06:30 18:16-18:58/42	07:25	07:25 13:37-14:17/40	08:16 11:52-12:54/62
	21:39	20:51	19:39	18:24	16:18	15:45
11	04:48 19:59-20:55/56	05:36 19:12-19:47/35	06:32 18:15-18:56/41	07:27	07:27 13:37-14:18/41	08:17 11:52-12:54/62
	21:38	20:49	19:36	18:22	16:16	15:44
12	04:49 19:58-20:54/56	05:38 19:09-19:48/39	06:34 18:15-18:54/39	07:29	07:29 13:37-14:19/42	08:18 11:52-12:54/62
	21:37	20:47	19:34	18:20	16:14	15:44
13	04:50 19:56-20:53/57	05:40 19:05-19:47/42	06:35 18:13-18:50/37	07:30	07:31 13:37-14:19/42	08:19 11:52-12:55/63
	21:36	20:45	19:31	18:17	16:13	15:44
14	04:51 19:54-20:52/58	05:41 19:03-19:48/45	06:37 18:13-18:48/35	07:32	07:33 13:36-14:19/43	08:20 11:52-12:55/63
	21:35	20:43	19:29	18:15	16:11	15:44
15	04:53 19:52-20:51/59	05:43 19:02-19:48/46	06:39 18:13-18:47/34	07:34	07:35 13:36-14:19/43	08:21 11:53-12:55/63
	21:34	20:40	19:26	18:12	16:09	15:44
16	04:54 19:52-20:50/58	05:45 18:59-19:47/48	06:41 18:14-18:45/31	07:36	07:37 13:36-14:20/44	08:22 11:53-12:57/64
	21:33	20:38	19:24	18:10	16:08	15:44
17	04:55 19:50-20:44/54	05:47 18:58-19:47/49	06:43 18:13-18:42/29	07:38	07:38 13:36-14:20/44	08:23 11:53-12:57/64
	21:32	20:36	19:21	18:08	16:06	15:44
18	04:57 19:49-20:43/54	05:49 18:58-19:47/49	06:44 18:14-18:38/24	07:40	07:40 13:36-14:20/44	08:24 11:54-12:58/64
	21:30	20:34	19:19	18:05	16:05	15:45
19	04:58 19:48-20:42/54	05:50 18:56-19:46/50	06:46 18:15-18:37/22	07:42	07:42 13:37-14:21/44	08:24 11:55-12:59/64
	21:29	20:32	19:16	18:03	16:03	15:45
20	04:59 19:48-20:43/55	05:52 18:55-19:46/51	06:48 18:16-18:35/19	07:44	07:44 13:38-14:21/43	08:25 11:54-12:59/65
	21:28	20:29	19:14	18:01	16:02	15:45
21	05:01 19:47-20:42/55	05:54 18:55-19:45/50	06:50 18:17-18:32/15	07:46	07:46 12:22-12:34/12	08:26 11:55-12:59/64
	21:26	20:27	19:11	17:59	16:01	15:46
22	05:02 19:47-20:42/55	05:56 18:54-19:43/49	06:52 18:21-18:28/7	07:48	07:48 12:19-12:36/17	08:26 11:55-12:59/64
	21:25	20:25	19:09	17:56	15:59	15:46
23	05:04 19:46-20:41/55	05:58 18:50-19:42/52	06:53	07:50	07:50 12:18-12:39/21	08:27 11:56-13:01/65
	21:23	20:22	19:06	17:54	15:58	15:46
24	05:06 19:46-20:40/54	05:59 18:46-19:41/55	06:55 17:46-17:54/8	07:52	07:51 12:17-12:40/23	08:27 11:56-13:01/65
	21:22	20:20	19:04	17:52	15:57	15:47
25	05:07 19:46-20:39/53	06:01 18:43-19:40/57	06:57 17:43-17:57/14	06:53	07:53 12:15-12:41/26	08:27 11:57-13:01/64
	21:20	20:18	19:01	16:50	15:56	15:48
26	05:09 19:45-20:37/52	06:03 18:40-19:36/56	06:59 17:40-17:58/18	06:55	07:55 12:14-12:42/28	08:28 11:57-13:01/64
	21:19	20:15	18:59	16:48	15:54	15:48
27	05:10 19:45-20:36/51	06:05 18:39-19:31/52	07:01 17:38-17:59/21	06:57	07:57 12:14-12:44/30	08:28 11:59-13:02/63
	21:17	20:13	18:56	16:45	15:53	15:49
28	05:12 19:44-20:31/47	06:07 18:38-19:30/52	07:03 17:37-17:59/22	06:59	07:58 12:13-12:45/32	08:28 11:59-13:03/64
	21:16	20:11	18:54	16:43	15:52	15:50
29	05:14 19:45-20:31/46	06:08 18:36-19:28/52	07:04 17:36-18:00/24	07:01	08:00 12:13-12:46/33	08:28 12:00-13:03/63
	21:14	20:08	18:51	16:41	15:51	15:51
30	05:15 19:44-20:29/45	06:10 18:35-19:26/51	07:05 17:35-18:00/25	07:03	08:01 12:13-12:47/34	08:28 12:00-13:03/63
	21:12	20:06	18:49	16:39	15:51	15:52
31	05:17 19:44-20:28/44	06:12 18:34-19:23/49		07:05		08:28 12:01-13:03/62
	21:10	20:03		16:37		15:53
Sonnenscheinstunden	514	461	383	328	257	231
Anzahl Minuten mit Schatten	1696	1538	910	188	1402	2727

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 148
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 23 - M17

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28 13:51-14:06/15 15:54 14:07-15:10/63	07:57 15:15-16:14/59 16:46	06:59 17:43	06:43 07:11-07:18/7 19:42 07:18-07:28/10	05:33 20:39	04:42 21:29	
2	08:28 13:53-14:07/14 15:55 14:09-15:12/63	07:55 15:15-16:16/61 16:48	06:56 17:45	06:40 07:07-07:20/13 19:44 07:20-07:28/8	05:31 20:40	04:41 21:31	
3	08:28 13:53-14:06/13 15:57 14:09-15:14/65	07:54 15:15-16:18/63 16:50	06:54 17:47	06:38 07:05-07:22/17 19:46 07:22-07:29/7	05:29 20:42	04:40 21:32	
4	08:27 13:55-14:06/11 15:58 14:11-15:16/65	07:52 15:17-16:20/63 16:52	06:52 17:49	06:35 07:03-07:23/20 19:48 07:23-07:29/6	05:27 20:44	04:40 21:33	
5	08:27 13:56-14:04/8 15:59 14:12-15:16/64	07:50 15:18-16:22/64 16:54	06:49 17:51	06:33 07:02-07:23/21 19:50 07:23-07:29/6	05:25 20:46	04:39 21:34	
6	08:27 13:59-14:02/3 16:01 14:13-15:17/64	07:48 15:19-16:25/66 16:56	06:47 17:53	06:31 07:01-07:23/22 19:52 07:23-07:28/5	05:23 20:48	04:38 21:35	
7	08:26 14:14-15:19/65 16:02	07:46 15:19-16:27/68 16:59	06:45 17:55	06:28 07:01-07:24/23 19:54 07:24-07:28/4	05:21 20:50	04:37 21:36	
8	08:26 14:14-15:20/66 16:03	07:44 15:20-15:39/19 17:01 15:46-16:29/43	06:42 17:57	06:26 06:54-07:05/11 19:55 07:04-07:28/24	05:19 20:51	04:37 21:37	
9	08:25 14:15-15:21/66 16:05	07:42 15:22-15:37/15 17:03 15:52-16:32/40	06:40 17:59	06:23 06:51-07:08/17 19:57 07:06-07:26/20	05:17 20:53	04:36 21:38	
10	08:24 14:16-15:21/65 16:06	07:40 15:26-15:35/9 17:05 15:58-16:33/35	06:37 18:01	06:21 06:49-07:10/21 19:59 07:08-07:26/18	05:15 20:55	04:36 21:39	
11	08:24 14:17-15:22/65 16:08	07:38 16:02-16:34/32 17:07	06:35 18:02	06:18 06:45-06:56/11 20:01 06:56-07:25/29	05:13 20:57	04:35 21:40	
12	08:23 14:18-15:23/65 16:09	07:36 16:04-16:34/30 17:09	06:32 18:04	06:16 06:42-06:59/17 20:03 06:58-07:25/27	05:11 20:59	04:35 21:41	
13	08:22 14:19-15:29/70 16:11	07:34 16:08-16:34/26 17:11	06:30 18:06	06:14 06:41-07:00/19 20:05 06:59-07:25/26	05:09 21:00	04:34 21:41	
14	08:21 14:20-15:31/71 16:13	07:32 16:10-16:33/23 17:13	06:27 18:08	06:11 06:40-07:01/21 20:07 07:00-07:24/24	05:07 21:02	04:34 21:42	
15	08:20 14:22-15:33/71 16:14	07:30 16:13-16:32/19 17:15	06:25 18:10	06:09 06:38-07:01/23 20:09 07:00-07:23/23	05:06 21:04	04:34 21:43	
16	08:19 14:25-15:35/70 16:16	07:28 16:17-16:32/15 17:17	06:23 18:12	06:06 06:38-07:01/23 20:11 07:00-07:23/23	05:04 21:05	04:34 21:43	
17	08:18 14:32-15:31/59 16:18	07:26 16:20-16:30/10 15:31-15:36/5	06:20 18:14	06:04 06:38-07:02/24 20:12 07:01-07:23/22	05:02 21:07	04:34 21:44	
18	08:17 14:33-15:39/66 16:20	07:24 16:22-16:27/5 15:19-15:32/13	06:18 18:16	06:02 06:37-07:01/24 20:14 07:00-07:21/21	05:01 21:09	04:34 21:44	
19	08:16 14:34-15:42/68 16:21	07:22 17:23	06:15 18:18	05:59 06:37-07:00/23 20:16 06:59-07:20/21	04:59 21:10	04:34 21:44	
20	08:15 14:36-15:43/67 16:23	07:19 17:25	06:13 18:20	05:57 06:37-07:00/23 20:18 06:59-07:19/20	04:59 21:12	04:34 21:45	
21	08:14 14:39-14:46/7 16:25	07:17 14:47-15:45/58	06:10 18:22	05:55 06:38-06:58/20 20:20 06:58-07:17/19	04:56 21:14	04:34 21:45	
22	08:12 14:48-15:51/63 16:27	07:15 17:29	06:08 18:23	05:53 06:38-06:57/19 07:02-07:13/11 20:22 06:57-07:00/3	04:55 21:15	04:34 21:45	
23	08:11 14:49-15:53/64 16:29	07:13 17:31	06:05 18:25	05:50 06:39-06:55/16 20:24 06:55-06:57/2	04:53 21:17	04:34 21:45	
24	08:10 14:51-15:56/65 16:31	07:10 17:33	06:03 18:27	05:48 06:40-06:53/13 20:26	04:52 21:18	04:34 21:46	
25	08:08 14:55-15:59/64 16:33	07:08 17:35	06:00 18:29	05:46 06:43-06:50/7 20:27	04:50 21:20	04:35 21:46	
26	08:07 14:59-16:01/62 16:34	07:06 17:37	05:58 18:31	05:44 20:29	04:49 21:21	04:35 21:46	
27	08:05 15:03-16:03/60 16:36	07:03 17:39	05:55 18:33	05:41 20:31	04:48 21:23	04:36 21:45	
28	08:04 15:10-16:06/56 16:38	07:01 17:41	05:53 18:35	05:39 20:33	04:47 21:24	04:36 21:45	
29	08:02 15:12-16:08/56 16:40		06:50 19:37	05:37 20:35	04:46 21:26	04:37 21:45	
30	08:00 15:14-16:10/56 16:42		06:48 07:16-07:24/8 19:39	05:35 20:37	04:44 21:27	04:37 21:45	
31	07:59 15:14-16:12/58 16:44		06:45 07:12-07:26/14 19:40		04:43 21:28		
Sonnenscheinstunden		248	272	367	421	496	512
Anzahl Minuten mit Schatten		2056	765	22	820	0	0

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

Tag im Monat	Sonnenaufgang (SS:MM) Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten Zeitpunkt (SS:MM)
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Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 150

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

Berechnet:
André Gefke / andre.gefke@i17-wind.de
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 24 - M18

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:28	09:03-09:20/17	07:57	06:59	06:43	05:33	04:42	04:38	05:19	06:14	07:08	07:07	08:03	08:46-09:08/22
	15:54	09:19-09:39/20	16:46	17:43	19:42	20:39	21:29	21:44	21:08	20:01	18:46	16:35	15:50	08:07-09:18/11
2	08:28	09:03-09:21/18	07:55	06:56	06:40	05:31	04:41	04:39	05:20	06:16	07:10	07:09	08:05	08:46-09:08/22
	15:56	09:20-09:40/20	16:48	17:45	19:44	20:40	21:31	21:44	21:07	19:59	18:44	16:33	15:49	09:07-09:19/12
3	08:28	09:02-09:21/19	07:54	06:54	06:38	05:29	04:41	04:40	05:22	06:18	07:12	07:11	08:06	08:47-09:09/22
	15:57	09:20-09:39/19	16:50	17:47	19:46	20:42	21:32	21:44	21:05	19:56	18:42	16:31	15:48	09:08-09:20/12
4	08:27	09:02-09:22/20	07:52	06:52	06:35	05:27	04:40	04:41	05:24	06:19	07:14	07:13	08:08	08:47-09:08/21
	15:58	09:21-09:40/19	16:52	17:49	19:48	20:44	21:33	21:43	21:03	19:54	18:39	16:29	15:48	09:07-09:22/15
5	08:27	09:02-09:23/21	07:50	06:49	06:33	05:25	04:39	04:41	05:26	06:21	07:15	07:15	08:09	08:48-09:09/21
	15:59	09:22-09:39/17	16:54	17:51	19:50	20:46	21:34	21:43	21:01	19:51	18:37	16:27	15:47	09:08-09:24/16
6	08:27	09:02-09:23/21	07:48	06:47	06:31	05:23	04:38	04:42	05:27	06:23	07:17	07:17	08:10	08:48-09:09/21
	16:01	09:22-09:39/17	16:57	17:53	19:52	20:48	21:35	21:42	20:59	19:49	18:34	16:25	15:46	09:08-09:25/17
7	08:26	09:03-09:24/21	07:46	06:45	06:28	05:21	04:37	04:43	05:29	06:25	07:19	07:19	08:12	08:49-09:10/21
	16:02	09:23-09:39/16	16:59	17:55	19:54	20:50	21:36	21:41	20:57	19:46	18:32	16:23	15:46	09:09-09:26/17
8	08:26	09:03-09:24/21	07:44	06:42	06:26	05:19	04:37	04:44	05:31	06:27	07:21	07:21	08:13	08:49-09:09/20
	16:03	09:23-09:38/15	17:01	17:57	19:55	20:51	21:37	21:41	20:55	19:44	18:29	16:21	15:46	09:08-09:27/19
9	08:25	09:03-09:25/22	07:42	06:40	06:23	05:17	04:36	04:45	05:33	06:28	07:23	07:23	08:14	08:51-09:10/19
	16:05	09:24-09:36/12	17:03	17:59	19:57	20:53	21:38	21:40	20:53	19:41	18:27	16:20	15:45	09:09-09:28/19
10	08:24	09:03-09:25/22	07:40	06:37	06:21	05:15	04:36	04:47	05:34	06:30	07:25	07:25	08:16	08:52-09:10/18
	16:06	09:24-09:36/12	17:05	18:01	19:59	20:55	21:39	21:39	20:51	19:39	18:24	16:18	15:45	09:09-09:29/20
11	08:24	09:04-09:25/21	07:38	06:35	06:18	05:13	04:35	04:48	05:36	06:32	07:27	07:27	08:17	08:53-09:10/17
	16:08	09:24-09:36/12	17:07	18:02	20:01	20:57	21:40	21:38	20:49	19:36	18:22	16:16	15:45	09:09-09:29/20
12	08:23	09:04-09:26/22	07:36	06:32	06:16	05:11	04:35	04:49	05:38	06:34	07:28	07:29	08:18	08:54-09:10/16
	16:09	09:25-09:35/10	17:09	18:04	20:03	20:58	21:41	21:37	20:47	19:34	18:20	16:14	15:44	09:09-09:30/21
13	08:22	09:04-09:26/22	07:34	06:30	06:14	05:09	04:35	04:50	05:40	06:35	07:30	07:31	08:19	08:55-09:10/15
	16:11	09:25-09:35/10	17:11	18:06	20:05	21:00	21:41	21:36	20:45	19:31	18:17	16:13	15:44	09:09-09:30/21
14	08:21	09:05-09:26/21	07:32	06:28	06:11	05:08	04:34	04:51	05:42	06:37	07:32	07:33	08:20	08:56-09:10/14
	16:13	09:26-09:35/9	17:13	18:08	20:07	21:02	21:42	21:35	20:43	19:29	18:15	16:11	15:44	09:09-09:31/22
15	08:20	09:06-09:26/20	07:30	06:25	06:09	05:06	04:34	04:53	05:43	06:39	07:34	07:35	08:21	08:57-09:11/14
	16:14	09:26-09:34/8	17:15	18:10	20:09	21:04	21:43	21:34	20:40	19:26	18:13	16:09	15:44	09:10-09:32/22
16	08:19	09:06-09:25/19	07:28	06:23	06:07	05:04	04:34	04:54	05:45	06:41	07:36	07:36	08:22	08:58-09:11/13
	16:16	09:26-09:33/7	17:17	18:12	20:10	21:05	21:43	21:33	20:38	19:24	18:10	16:08	15:44	09:10-09:32/22
17	08:18	09:07-09:25/18	07:26	06:20	06:04	05:02	04:34	04:55	05:47	06:43	07:38	07:38	08:23	08:59-09:12/13
	16:18	09:27-09:35/10	17:19	18:14	20:12	21:07	21:44	21:32	20:36	19:21	18:08	16:06	15:44	09:11-09:33/22
18	08:17	09:08-09:25/17	07:24	06:18	06:02	05:01	04:34	04:57	05:49	06:44	07:40	07:40	08:23	09:00-09:12/12
	16:20	09:28-09:35/10	17:21	18:16	20:14	21:09	21:44	21:30	20:34	19:19	18:06	16:05	15:45	09:11-09:34/23
19	08:16	09:09-09:25/16	07:22	06:15	05:59	04:59	04:34	04:58	05:51	06:46	07:42	07:42	08:24	08:50-08:54/4
	16:21	09:29-09:35/10	17:23	18:18	20:16	21:10	21:44	21:29	20:32	19:16	18:03	16:03	15:45	09:12-09:34/22
20	08:15	09:10-09:25/15	07:19	06:13	05:57	04:58	04:34	05:00	05:52	06:48	07:44	07:44	08:24	08:48-08:58/10
	16:23	09:30-09:35/10	17:25	18:20	20:18	21:12	21:45	21:28	20:29	19:14	18:01	16:02	15:45	09:11-09:34/23
21	08:14	09:11-09:23/12	07:17	06:10	05:55	04:56	04:34	05:01	05:54	06:50	07:46	07:46	08:25	09:02-09:13/11
	16:25	09:31-09:35/10	17:27	18:22	20:20	21:14	21:45	21:26	20:27	19:11	17:59	16:01	15:46	09:12-09:35/23
22	08:12	09:13-09:23/10	07:15	06:08	05:53	04:55	04:34	05:03	05:56	06:52	07:48	07:48	08:26	09:02-09:13/11
	16:27	09:32-09:35/10	17:29	18:23	20:22	21:15	21:45	21:25	20:25	19:09	17:56	15:59	15:46	09:12-09:35/23
23	08:11	09:16-09:20/4	07:13	06:05	05:50	04:53	04:34	05:04	05:58	06:53	07:50	07:49	08:26	09:03-09:14/11
	16:29	09:33-09:35/10	17:31	18:25	20:24	21:17	21:45	21:23	20:22	19:06	17:54	15:58	15:47	09:13-09:36/23
24	08:10	09:17-09:23/12	07:10	06:03	05:48	04:52	04:35	05:06	06:00	06:55	07:51	07:51	08:27	09:03-09:15/12
	16:31	09:34-09:35/10	17:33	18:27	20:26	21:18	21:45	21:22	20:20	19:04	17:52	15:57	15:47	09:14-09:36/22
25	08:08	09:18-09:23/12	07:08	06:00	05:46	04:51	04:35	05:07	06:01	06:57	07:53	07:53	08:27	09:03-09:15/12
	16:33	09:35-09:35/10	17:35	18:29	20:27	21:20	21:46	21:20	20:18	19:01	16:50	15:56	15:48	09:14-09:37/23
26	08:07	09:19-09:23/12	07:06	05:58	05:44	04:49	04:35	05:09	06:03	06:59	07:55	07:55	08:25	09:03-09:15/12
	16:35	09:36-09:35/10	17:37	18:31	20:29	21:21	21:45	21:19	20:15	18:59	16:48	15:55	15:49	09:14-09:37/23
27	08:05	09:19-09:23/12	07:03	05:55	05:41	04:48	04:36	05:10	06:05	07:01	07:57	07:57	08:28	09:04-09:17/13
	16:36	09:37-09:35/10	17:39	18:33	20:31	21:23	21:45	21:17	20:13	18:56	16:45	15:54	15:49	09:16-09:38/22
28	08:04	09:19-09:23/12	07:01	05:53	05:39	04:47	04:36	05:12	06:07	07:03	07:59	07:59	08:28	09:04-09:17/13
	16:38	09:38-09:35/10	17:41	18:35	20:33	21:24	21:45	21:15	20:11	18:54	16:43	15:53	15:50	09:16-09:38/22
29	08:02	09:19-09:23/12	07:00	05:50	05:37	04:46	04:37	05:14	06:09	07:04	07:01	08:00	08:28	09:04-09:18/14
	16:40	09:39-09:35/10	17:43	18:37	20:35	21:25	21:45	21:14	20:08	18:51	16:41	15:52	15:51	09:17-09:39/22
30	08:00	09:19-09:23/12	06:58	05:55	05:41	04:48	04:38	05:15	06:10	07:06	07:03	08:01	08:28	09:03-09:18/15
	16:42	09:40-09:35/10	17:45	18:39	20:37	21:27	21:45	21:12	20:06	18:49	16:39	15:51	15:52	09:17-09:38/21
31	07:59	09:19-09:23/12	06:55	05:52	05:38	04:43	04:34	05:17	06:12	07:07	07:05	08:02	08:28	09:03-09:19/16
	16:44	09:41-09:35/10	17:47	18:41	20:39	21:28	21:45	21:10	20:03	18:46	16:37	15:53	15:53	09:18-09:39/21
Sonnenscheinstunden	248		272	367	421	496	512	514	461	383	328	258	237	1075
Anzahl Minuten mit Schatten		629	0	0	0	0	0	0	0	0	0	0	0	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 151
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 25 - M19

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28	07:57	06:59	06:43	07:19-07:36/17	18:49-19:10/21
	15:54	16:46	17:43	19:42	18:13-18:41/28	20:39
2	08:28	07:55	06:57	06:40	07:19-07:34/15	18:48-19:10/22
	15:55	16:48	17:45	19:44	18:13-18:40/27	20:41
3	08:28	07:54	06:54	06:38	07:20-07:33/13	18:47-19:11/24
	15:57	16:50	17:47	19:46	18:14-18:39/25	20:42
4	08:28	07:52	06:52	06:35	07:21-07:31/10	18:46-19:10/24
	15:58	16:52	17:49	19:48	18:15-18:36/21	20:44
5	08:27	07:50	06:49	06:33	18:17-18:35/18	20:34
	15:59	16:54	17:51	19:50	18:46-19:11/25	20:46
6	08:27	07:48	06:47	06:31	18:19-18:31/12	20:32
	16:00	16:56	17:53	19:52	18:45-19:10/25	20:48
7	08:26	07:46	06:45	06:28	18:45-19:10/25	20:48
	16:02	16:58	17:55	19:54	18:45-19:10/25	20:50
8	08:26	07:44	06:42	06:26	18:45-19:10/25	20:50
	16:03	17:01	17:57	19:56	19:25-19:28/3	20:51
9	08:25	07:42	06:40	06:23	18:45-19:08/23	20:51
	16:05	17:03	17:59	19:57	19:23-19:30/7	20:53
10	08:25	07:41	06:37	06:21	18:46-19:08/22	20:53
	16:06	17:05	18:01	19:59	19:22-19:32/10	20:55
11	08:24	07:39	06:35	06:18	18:46-19:06/20	20:55
	16:08	17:07	18:02	20:01	19:20-19:33/13	20:57
12	08:23	07:36	06:32	06:16	18:47-19:05/18	20:57
	16:09	17:09	18:04	20:03	19:20-19:35/15	20:59
13	08:22	07:34	06:30	06:14	18:50-19:03/13	20:59
	16:11	17:11	18:06	20:05	19:21-19:36/15	21:00
14	08:21	07:32	06:28	06:11	18:52-18:59/7	21:00
	16:13	17:13	18:08	20:07	19:20-19:34/14	21:02
15	08:20	07:30	06:25	06:09	19:21-19:34/13	21:02
	16:14	17:15	18:10	20:09	19:21-19:34/13	21:04
16	08:19	07:28	06:23	06:06	19:22-19:32/10	21:04
	16:16	17:17	18:12	20:11	19:22-19:32/10	21:06
17	08:18	07:26	06:20	06:04	19:23-19:29/6	21:06
	16:18	17:19	18:14	20:12	19:23-19:29/6	21:08
18	08:17	07:24	06:18	06:02	19:23-19:29/6	21:08
	16:19	17:21	18:16	20:14	19:23-19:29/6	21:10
19	08:16	07:22	06:15	05:59	19:23-19:29/6	21:10
	16:21	17:23	18:18	20:16	19:23-19:29/6	21:11
20	08:15	07:19	06:13	05:57	19:48-19:50/2	21:11
	16:23	17:25	18:20	20:18	19:48-19:50/2	21:12
21	08:14	07:17	06:10	05:55	19:46-19:52/6	21:12
	16:25	17:27	18:22	20:20	19:46-19:52/6	21:14
22	08:12	07:15	06:08	05:53	19:44-19:52/8	21:14
	16:27	17:29	18:23	20:22	19:44-19:52/8	21:15
23	08:11	07:13	06:05	05:50	19:43-19:54/11	21:15
	16:29	17:31	18:25	20:24	19:43-19:54/11	21:17
24	08:10	07:10	06:03	05:48	19:43-19:56/13	21:17
	16:31	17:33	18:27	20:26	19:43-19:56/13	21:18
25	08:08	07:08	06:00	05:46	19:42-19:58/16	21:18
	16:32	17:35	18:29	20:27	19:42-19:58/16	21:20
26	08:07	07:06	05:58	05:44	19:42-20:00/18	21:20
	16:34	17:37	18:31	20:29	19:42-20:00/18	21:21
27	08:05	07:04	05:55	05:41	19:43-20:02/19	21:21
	16:36	17:39	18:33	20:31	19:43-20:02/19	21:23
28	08:04	07:01	05:53	05:39	19:43-20:04/21	21:23
	16:38	17:41	18:35	20:33	19:43-20:04/21	21:24
29	08:02		05:50	05:37	19:44-20:05/21	21:24
	16:40		19:37	20:35	19:44-20:05/21	21:26
30	08:01		05:48	05:35	19:45-20:07/22	21:26
	16:42		19:39	20:37	19:45-20:07/22	21:27
31	07:59		05:45			21:28
	16:44		19:40			21:28
Sonnenscheinstunden 248 272 367 421 496 513						
Anzahl Minuten mit Schatten 0 0 1285 743 633 604						

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:53 / 152
Lizenzierter Anwender:
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-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 25 - M19

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:38 20:49-21:09/20	05:19 20:15-20:37/22	06:14 18:46-19:06/20		07:08 07:46-08:06/20	07:07 08:03	
	21:45	21:09	20:01 19:20-19:33/13		18:46 17:28-17:58/30	16:35 15:50	
2	04:39 20:48-21:07/19	05:20 20:13-20:35/22	06:16 18:44-19:06/22		07:10 07:46-08:06/20	07:09 08:05	
	21:44	21:07	19:59 19:20-19:30/10		18:44 17:29-17:57/28	16:33 15:49	
3	04:40 20:47-21:07/20	05:22 20:13-20:33/20	06:18 18:43-19:06/23		07:12 07:46-08:06/20	07:11 08:06	
	21:44	21:05	19:56 19:21-19:28/7		18:42 17:28-17:55/27	16:31 15:48	
4	04:40 20:46-21:07/21	05:24 20:09-20:31/22	06:19 18:42-19:07/25		07:14 07:45-08:04/19	07:13 08:08	
	21:43	21:03	19:54 19:22-19:25/3		18:39 17:30-17:54/24	16:29 15:48	
5	04:41 20:46-21:07/21	05:26 20:07-20:30/23	06:21 18:41-19:06/25		07:15 07:46-08:03/17	07:15 08:09	
	21:43	21:01	19:51		18:37 17:31-17:52/21	16:27 15:47	
6	04:42 20:45-21:06/21	05:27 20:05-20:28/23	06:23 18:15-18:27/12		07:17 07:47-08:02/15	07:17 08:11	
	21:42	20:59	19:49 18:41-19:06/25		18:34 17:33-17:49/16	16:25 15:46	
7	04:43 20:45-21:06/21	05:29 20:04-20:26/22	06:25 18:12-18:30/18		07:19 07:48-08:00/12	07:19 08:12	
	21:41	20:57	19:46 18:41-19:06/25		18:32 17:38-17:44/6	16:23 15:46	
8	04:44 20:45-21:05/20	05:31 20:03-20:24/21	06:27 07:16-07:26/10 18:41-19:06/25		07:21 07:51-07:57/6	07:21 08:13	
	21:41	20:55	19:44 18:10-18:31/21		18:29	16:21 15:45	
9	04:45 20:45-21:05/20	05:33 20:01-20:23/22	06:28 07:13-07:27/14 18:40-19:04/24		07:23	07:23 08:14	
	21:40	20:53	19:41 18:08-18:32/24		18:27	16:20 15:45	
10	04:46 20:43-21:04/21	05:34 19:58-20:20/22	06:30 07:12-07:28/16 18:41-19:03/22		07:25	07:25 08:16	
	21:39	20:51	19:39 18:06-18:33/27		18:24	16:18 15:45	
11	04:48 20:42-21:03/21	05:36 19:56-20:18/22	06:32 07:11-07:28/17 18:42-19:02/20		07:27	07:27 08:17	
	21:38	20:49	19:36 18:05-18:33/28		18:22	16:16 15:44	
12	04:49 20:42-21:02/20	05:38 19:55-20:17/22	06:34 07:10-07:29/19 18:43-19:01/18		07:29	07:29 08:18	
	21:37	20:47	19:34 18:04-18:34/30		18:20	16:14 15:44	
13	04:50 20:41-21:01/20	05:40 19:52-20:14/22	06:35 07:09-07:28/19 18:43-18:58/15		07:30	07:31 08:19	
	21:36	20:45	19:31 18:03-18:33/30		18:17	16:13 15:44	
14	04:51 20:40-21:00/20	05:41 19:51-20:12/21	06:37 07:09-07:28/19 18:46-18:55/9		07:32	07:33 08:20	
	21:35	20:43	19:29 18:02-18:33/31		18:15	16:11 15:44	
15	04:53 20:38-20:59/21	05:43 19:50-20:11/21	06:39 07:09-07:27/18		07:34	07:35 08:21	
	21:34	20:40	19:26 18:02-18:33/31		18:13	16:09 15:44	
16	04:54 20:37-20:59/22	05:45 19:49-20:08/19	06:41 07:10-07:26/16 18:02-18:33/31		07:36	07:37 08:22	
	21:33	20:38	19:24 17:45-17:54/9		18:10	16:08 15:44	
17	04:55 20:36-20:57/21	05:47 19:49-20:06/17	06:43 07:10-07:24/14 18:01-18:32/31		07:38	07:39 08:23	
	21:32	20:36	19:21 17:40-17:56/16		18:08	16:06 15:44	
18	04:57 20:35-20:56/21	05:49 19:49-20:04/15	06:44 07:11-07:23/12 18:01-18:32/31		07:40	07:40 08:24	
	21:30	20:34	19:19 17:37-17:58/21		18:06	16:05 15:45	
19	04:58 20:35-20:54/19	05:50 19:48-20:02/14	06:46 07:14-07:19/5 18:01-18:31/30		07:42	07:42 08:24	
	21:29	20:32	19:16 17:35-18:00/25		18:03	16:03 15:45	
20	04:59 20:35-20:54/19	05:52 19:49-20:00/11	06:48 17:34-18:01/27		07:44	07:44 08:25	
	21:28	20:29	19:14 18:02-18:30/28		18:01	16:02 15:45	
21	05:01 20:34-20:52/18	05:54 19:49-19:58/9	06:50 17:32-18:28/56		07:46	07:46 08:26	
	21:26	20:27	19:11		17:59	16:01 15:46	
22	05:02 20:35-20:52/17	05:56 19:50-19:55/5	06:52 17:31-18:01/30		07:48	07:48 08:26	
	21:25	20:25	19:09 18:02-18:27/25		17:56	15:59 15:46	
23	05:04 20:34-20:50/16	05:58 19:52-19:53/1	06:53 17:30-18:02/32		07:50	07:50 08:27	
	21:24	20:22	19:06 18:04-18:25/21		17:54	15:58 15:47	
24	05:06 20:34-20:48/14	05:59	06:55 17:29-18:02/33		07:52	07:51 08:27	
	21:22	20:20	19:04 18:05-18:23/18		17:52	15:57 15:47	
25	05:07 20:34-20:47/13	06:01	06:57 17:29-18:02/33		06:54	07:53 08:27	
	21:20	20:18	19:01 18:08-18:20/12		16:50	15:56 15:48	
26	05:09 20:25-20:32/7	06:03 19:26-19:32/6	06:59 07:54-08:02/8		06:55	07:55 08:28	
	21:19	20:34-20:45/11	20:15		18:48	15:55 15:48	
27	05:10 20:24-20:34/10	06:05 19:24-19:34/10	07:01 07:50-08:04/14		06:57	07:57 08:28	
	21:17	20:35-20:44/9	20:13		18:56	15:53 15:49	
28	05:12 20:20-20:34/14	06:07 19:23-19:35/12	07:03 07:49-08:05/16		06:59	07:58 08:28	
	21:16	20:35-20:42/7	20:11		18:54	15:52 15:50	
29	05:14 20:18-20:35/17	06:08 18:53-19:00/7	07:04 07:48-08:06/18		07:01	08:00 08:28	
	21:14	20:36-20:41/5	20:08 19:21-19:35/14		18:51	15:51 15:51	
30	05:15 20:16-20:35/19	06:10 18:49-19:03/14	07:06 07:47-08:06/19		07:03	08:02 08:28	
	21:12	20:36-20:39/3	20:06 19:20-19:36/16		18:49	15:51 15:52	
31	05:17 20:15-20:36/21	06:12 18:47-19:05/18			07:05	08:28	
	21:10	20:04 19:20-19:35/15			16:37	15:53	
	Sonnenscheinstunden	515	461	383	328	257	231
	Anzahl Minuten mit Schatten	609	530	1513	281	0	0

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

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

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 153
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 26 - M9

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1.017 1.220 930 354 7.936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember											
1	08:28 15:54 16:48 17:43	07:57 16:48 17:43	06:59 17:43	06:43 18:52-19:08/16 19:42	05:33 20:39 21:45	04:42 21:30 21:59	04:38 21:45 21:59	05:19 21:59 21:59	06:14 20:01 20:01	07:08 18:47 17:51-18:18/27	07:07 16:35 16:35	08:03 16:35 16:35											
2	08:28 15:56 16:48 17:45	07:55 16:48 17:45	06:57 17:45	06:40 18:52-19:06/14 19:44	05:31 20:40 21:31	04:41 21:31 21:44	04:39 21:44 21:07	05:20 21:07 19:59	06:16 18:44 18:44	07:10 17:50-18:15/25	07:09 16:33 16:33	08:05 16:33 16:49											
3	08:28 15:57 16:50 17:47	07:54 16:50 17:47	06:54 17:16-17:20/4 17:47	06:38 18:54-19:05/11 19:46	05:29 20:42 21:32	04:41 21:32 21:44	04:40 21:05 19:56	05:22 21:05 19:56	06:18 18:42 18:42	07:12 17:48-18:12/24	07:11 16:31 16:48	08:06 16:31 16:48											
4	08:28 15:58 16:52 17:49	07:52 16:52 17:49	06:52 17:13-17:21/8 17:49	06:36 18:57-19:00/3 19:48	05:27 20:44 21:33	04:41 21:43 21:43	05:24 21:03 19:54	06:19 21:03 19:54	06:19 18:39 18:39	07:14 17:47-18:10/23	07:13 16:25 16:25	08:08 16:25 16:49											
5	08:27 15:59 16:54 17:51	07:50 16:54 17:51	06:49 17:12-17:24/12 17:51	06:33 19:50 19:50	05:25 20:46 21:34	04:41 21:43 21:01	05:26 21:01 19:51	06:21 21:01 19:51	06:21 18:37 18:37	07:15 17:46-18:07/21	07:15 16:27 16:47	08:09 16:27 16:47											
6	08:27 16:01 16:57 17:53	07:48 16:57 17:53	06:47 17:10-17:25/15 17:53	06:31 19:52 19:52	05:23 20:48 21:35	04:42 21:42 20:59	05:27 20:59 19:48	06:23 19:48 19:48	06:23 18:34 18:34	07:17 17:46-18:05/19	07:17 16:25 16:46	08:10 16:25 16:46											
7	08:26 16:02 16:59 17:55	07:46 16:59 17:55	06:45 17:10-17:28/18 17:55	06:28 19:54 19:54	05:21 20:50 21:36	04:43 21:41 21:41	05:29 20:57 19:46	06:25 19:46 19:46	06:25 18:32 18:32	07:19 17:46-18:02/16	07:19 16:23 16:46	08:12 16:23 16:46											
8	08:26 16:03 17:01 17:57	07:44 17:01 17:57	06:42 17:09-17:29/20 17:57	06:26 19:54 19:56	05:19 20:51 21:37	04:37 21:41 21:41	05:31 20:55 19:44	06:27 19:44 19:44	06:27 18:29 18:29	07:21 17:47-18:00/13	07:21 16:21 16:46	08:13 16:21 16:46											
9	08:25 16:05 17:03 17:59	07:42 17:03 17:59	06:40 17:10-17:32/22 17:59	06:23 19:57 19:57	05:17 20:53 21:38	04:36 21:40 20:53	05:33 21:41 19:41	06:28 19:41 19:41	06:28 18:48-18:58/10	07:23 17:47-17:58/11	07:23 16:20 16:46	08:14 16:20 16:46											
10	08:24 16:06 17:05 18:01	07:41 17:05 18:01	06:37 17:09-17:33/24 18:01	06:21 19:59 19:59	05:15 20:55 21:39	04:47 21:39 20:51	05:34 20:51 19:39	06:30 19:39 19:39	06:30 18:46-18:59/13	07:25 17:49-17:55/6	07:25 16:18 16:46	08:16 16:18 16:46											
11	08:24 16:08 17:07 18:03	07:39 17:07 18:03	06:35 17:10-17:36/26 18:03	06:18 20:01 20:01	05:13 20:57 21:40	04:48 21:38 20:49	05:36 20:49 19:37	06:32 19:37 19:37	06:32 18:45-19:00/15	07:27 17:51-17:53/2	07:27 16:16 16:46	08:17 16:16 16:46											
12	08:23 16:09 17:09 18:04	07:36 17:09 18:04	06:32 17:11-17:37/26 18:04	06:16 20:03 20:03	05:11 20:59 21:41	04:49 21:37 20:47	05:38 20:47 19:34	06:34 19:34 19:34	06:34 18:44-19:01/17	07:29 18:20 18:20	07:29 16:14 16:46	08:18 16:14 16:46											
13	08:22 16:11 17:11 18:06	07:34 17:11 18:06	06:30 17:13-17:40/27 18:06	06:14 20:05 20:05	05:09 21:00 21:41	04:34 21:36 20:45	05:40 20:45 19:32	06:36 19:32 19:32	06:36 18:42-19:00/18	07:30 18:17 18:17	07:30 16:13 16:46	08:19 16:13 16:46											
14	08:21 16:13 17:13 18:08	07:32 17:13 18:08	06:28 17:15-17:41/26 18:08	06:11 20:07 20:07	05:08 21:02 21:42	04:34 21:35 20:43	05:42 20:43 19:29	06:37 19:29 19:29	06:37 18:42-19:00/18	07:32 18:15 18:15	07:32 16:11 16:46	08:20 16:11 16:46											
15	08:20 16:14 17:15 18:10	07:30 17:15 18:10	06:25 17:17-17:43/26 18:10	06:09 20:09 20:09	05:06 21:04 21:43	04:34 21:34 20:40	05:43 20:40 19:27	06:39 19:27 19:27	06:39 18:42-18:58/16	07:34 18:13 18:13	07:34 16:09 16:46	08:21 16:09 16:46											
16	08:19 16:16 17:17 18:12	07:28 17:17 18:12	06:23 17:18-17:45/27 18:12	06:07 20:11 20:11	05:04 21:06 21:43	04:34 21:33 20:38	05:45 20:38 19:24	06:41 19:24 18:45-18:56/11	06:41 18:35-18:45/10	07:36 18:10 18:10	07:36 16:08 16:46	08:22 16:08 16:46											
17	08:18 16:18 17:19 18:14	07:26 17:19 18:14	06:20 17:20-17:47/27 18:14	06:04 20:12 20:12	05:02 21:07 21:44	04:34 21:32 20:36	05:47 20:36 19:22	06:43 19:22 18:46-18:53/7	06:43 18:42-19:00/17	07:38 18:08 18:08	07:38 16:06 16:46	08:23 16:06 16:46											
18	08:17 16:20 17:21 18:16	07:24 17:21 18:16	06:18 17:20-17:49/29 18:16	06:02 20:14 20:14	05:01 21:09 21:44	04:34 21:30 20:34	05:49 20:34 19:19	06:45 19:19 18:42-18:50/8	06:45 18:42-18:50/8	07:40 18:06 18:06	07:40 16:05 16:46	08:24 16:05 16:46											
19	08:16 16:25 17:27 18:22	07:22 17:27 18:22	06:15 17:21-17:51/30 18:22	05:59 20:16 20:16	04:59 21:11 21:45	04:34 21:29 20:32	05:51 20:32 19:16	06:46 19:16 18:43-18:48/5	06:46 18:21-18:44/23	07:42 18:03 18:03	07:42 16:03 16:46	08:24 16:03 16:46											
20	08:15 16:23 17:25 18:20	07:19 17:25 18:20	06:13 17:22-17:53/31 18:20	05:57 20:18 20:18	04:58 21:12 21:45	04:34 21:28 20:29	05:50 20:29 19:14	06:48 20:29 18:44-18:46/2	06:48 18:18-18:45/27	07:44 18:01 18:01	07:44 16:02 16:46	08:25 16:02 16:46											
21	08:14 16:25 17:27 18:22	07:17 17:27 18:22	06:10 17:24-17:55/31 18:22	05:55 20:20 20:20	04:56 21:14 21:45	04:34 21:26 20:27	05:54 20:27 19:11	06:50 19:11 18:15-18:42/27	06:50 18:15-18:42/27	07:46 17:59 17:59	07:46 16:01 16:46	08:26 16:01 16:46											
22	08:12 16:27 17:29 18:24	07:15 17:29 18:24	06:08 17:29-17:56/27 18:24	05:53 20:22 20:22	04:55 21:15 21:45	04:34 21:25 20:25	05:03 20:25 19:09	06:52 19:09 18:07-18:40/30	06:52 18:10-18:40/30	07:48 17:56 17:56	07:48 16:01 16:46	08:28 16:01 16:46											
23	08:11 16:29 17:31 18:25	07:13 17:31 18:25	06:05 17:31-17:58/27 18:25	05:50 20:24 20:24	04:53 21:17 21:46	04:34 21:24 20:22	05:04 20:22 19:06	06:54 19:06 18:05-18:35/30	06:54 18:07-18:38/31	07:50 17:54 17:54	07:50 16:01 16:46	08:27 16:01 16:46											
24	08:10 16:31 17:33 18:27	07:10 17:33 18:27	06:03 17:33-17:57/24 18:27	05:48 20:26 20:26	04:52 21:18 21:46	04:35 21:22 20:20	05:06 20:20 19:04	06:55 19:04 18:00-18:27/27	06:55 18:00-18:27/27	07:52 17:52 17:52	07:52 16:01 16:46	08:27 16:01 16:46											
25	08:08 16:33 17:35 18:29	07:08 17:35 18:29	06:00 17:36-17:56/20 18:29	05:46 20:27 20:27	04:51 21:20 21:46	04:35 21:20 20:18	05:07 20:18 19:01	06:57 19:01 18:04-18:33/29	06:57 18:04-18:33/29	07:54 16:50 16:50	07:54 16:01 16:46	08:28 16:01 16:46											
26	08:07 16:35 17:37 18:31	07:06 17:37 18:31	05:58 17:42-17:51/9 18:31	05:44 20:29 20:29	04:49 21:21 21:46	04:35 21:19 20:15	05:09 20:15 18:59	06:59 18:59 18:00-18:27/27	06:59 18:00-18:27/27	07:55 16:48 16:48	07:55 16:01 16:46	08:28 16:01 16:46											
27	08:05 16:36 17:39 18:33	07:04 17:39 18:33	05:55 17:45-17:56/11 18:33	05:41 20:31 20:31	04:48 21:23 21:46	04:36 21:17 20:13	05:10 20:13 18:56	07:01 18:56 17:59-18:25/26	07:01 18:56 17:59-18:25/26	07:57 16:45 16:45	07:57 16:01 16:46	08:28 16:01 16:46											
28	08:04 16:38 17:41 18:35	07:01 17:41 18:35	05:53 17:52-18:07/15 18:35	05:39 20:33 20:33	04:47 21:24 21:45	04:36 21:16 20:11	05:12 20:11 18:54	07:03 18:54 17:57-18:23/26	07:03 18:54 17:57-18:23/26	07:58 16:43 16:43	07:58 16:01 16:46	08:28 16:01 16:46											
29	08:02 16:40 17:43 18:37	07:00 17:43 18:37	06:50 18:52-19:10/18 18:37	05:37 20:35 20:35	04:46 21:26 21:45	04:37 21:14 20:08	05:14 20:08 18:51	07:04 18:51 17:53-18:20/27	07:04 18:51 17:53-18:20/27	07:59 16:41 16:41	07:59 16:01 16:46	08:28 16:01 16:46											
30	08:01 16:42 17:46 18:40	07:00 17:46 18:40	06:48 18:52-19:10/18 18:40	05:35 20:37 20:37	04:44 21:27 21:45	04:37 21:12 20:06	05:15 20:06 18:49	07:06 18:49 17:53-18:20/27	07:06 18:49 17:53-18:20/27	07:03 16:39 16:39	07:03 16:01 16:46	08:28 16:01 16:46											
31	07:59 16:44 17:49 18:43	07:00 17:49 18:43	06:45 18:51-19:09/18 18:43	05:31 20:38 20:38	04:43 21:28 21:45	04:37 21:10 20:04	05:17 20:04 18:49	07:07 18:49 17:53-18:20/27	07:07 18:49 17:53-18:20/27	07:05 16:37 16:37	07:05 16:01 16:46	08:28 16:01 16:46											
Sonnenscheinstunden																							
Anzahl Minuten mit Schatten																							
	248	0	0	367	650	421	44	496	0	512	0	514	0	461	0	383	511	328	187	257	0	231	0

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 154
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 27 - M11

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni		
1	08:28 14:36-15:16/40	07:57 08:38-08:56/18	06:59 07:52-08:31/39	06:43	05:33	04:42		
	15:54	16:46 09:01-09:44/43	17:43 08:31-08:47/16	19:42	20:39	21:29		
2	08:28 14:36-15:17/41	07:55 08:36-08:58/22	06:56 07:51-08:30/39	06:40	05:31	04:41		
	15:56	16:48 09:01-09:44/43	17:45 08:30-08:45/15	19:44	20:40	21:31		
3	08:28 14:38-15:19/41	07:54 08:36-09:46/70	06:54 07:52-08:30/38	06:38	05:29	04:41		
	15:57	16:50	17:47 08:30-08:44/14	19:46	20:42	21:32		
4	08:27 14:39-15:20/41	07:52 08:35-08:40/5	06:52 07:51-08:29/38	06:35	05:27	04:40		
	15:58	16:52 08:40-09:46/66	17:49 08:29-08:42/13	19:48	20:44	21:33		
5	08:27 14:40-15:21/41	07:50 08:31-08:45/14	06:49 07:52-08:29/37	06:33	05:25	04:39		
	15:59	16:54 08:45-09:46/61	17:51 08:29-08:40/11	19:50	20:46	21:34		
6	08:27 14:41-15:22/41	07:48 08:28-08:48/20	06:47 07:52-08:27/35	06:31	05:23	04:38		
	16:01	16:57 08:48-09:47/59	17:53 08:27-08:37/10	19:52	20:48	21:35		
7	08:26 14:47-15:25/38	07:46 08:26-08:50/24	06:45 07:53-08:27/34	06:28	05:21	04:37		
	16:02	16:59 08:50-09:47/57	17:55 08:27-08:33/6	19:54	20:50	21:36		
8	08:26 14:48-15:26/38	07:44 08:24-08:51/27	06:42 07:53-08:24/31	06:26	05:19	04:37		
	16:03	17:01 08:51-09:46/55	17:57	19:55	20:51	21:37		
9	08:25 14:49-15:27/38	07:42 08:23-08:36/13	06:40 07:54-08:23/29	06:23	05:17	04:36		
	16:05	17:03 08:35-09:46/71	17:59	19:57	20:53	21:38		
10	08:24 14:51-15:29/38	07:40 08:22-08:41/19	06:37 07:56-08:22/26	06:21	05:15	04:36		
	16:06	17:05 08:40-09:46/66	18:01	19:59	20:55	21:39		
11	08:24 14:53-15:31/38	07:38 08:21-08:43/22	06:35 07:57-08:19/22	06:18	05:13	04:35		
	16:08	17:07 08:42-09:46/64	18:02	20:01	20:57	21:40		
12	08:23 14:56-15:32/36	07:36 08:19-08:46/27	06:32 08:00-08:16/16	06:16	05:11	04:35		
	16:09	17:09 08:45-09:46/61	18:04	20:03	20:59	21:41		
13	08:22 14:58-15:34/36	07:34 08:18-08:47/29	06:30 08:03-08:11/8	06:14	05:09	04:34		
	16:11	17:11 08:46-09:45/59	18:06	20:05	21:00	21:41		
14	08:21 15:02-15:36/34	07:32 08:17-08:49/32	06:28	06:11	05:08	04:34		
	16:13	17:13 08:48-09:45/57	18:08	20:07	21:02	21:42		
15	08:20 15:04-15:38/34	07:30 08:15-08:49/34	06:25	06:09	05:06	04:34		
	16:14	17:15 08:48-09:44/56	18:10	20:09	21:04	21:43		
16	08:19 15:05-15:40/35	07:28 08:14-08:50/36	06:23	06:07	05:04	04:34		
	16:16	17:17 08:49-09:43/54	18:12	20:11	21:05	21:43		
17	08:18 15:06-15:43/37	07:26 08:08-08:17/9	06:20	06:04	05:02	04:34		
	16:18	17:19 08:17-09:42/85	18:14	20:12	21:07	21:44		
18	08:17 15:06-15:44/38	07:24 08:04-08:23/19	06:18	06:02	05:01	04:34		
	16:20	17:21 08:22-09:41/79	18:16	20:14	21:09	21:44		
19	08:16 09:14-09:25/11	07:22 08:01-08:24/23	06:15	06:00	05:00	04:34		
	16:21	17:23 08:23-08:04/41	18:18	20:16	21:10	21:44		
20	08:15 09:12-09:29/17	07:19 07:59-08:26/27	06:13	06:00	05:00	04:34		
	16:23	17:25 08:25-09:04/39	18:20	20:18	21:12	21:45		
21	08:14 09:09-09:31/22	07:17 07:58-08:28/30	06:10	06:00	05:00	04:34		
	16:25	17:27 08:27-09:03/36	18:22	20:20	21:14	21:45		
22	08:12 09:09-09:33/24	07:15 07:56-08:29/33	06:08	06:00	05:00	04:34		
	16:27	17:29 08:28-09:01/33	18:23	20:22	21:15	21:45		
23	08:11 09:07-09:34/27	07:13 07:55-08:30/35	06:05	06:00	05:00	04:34		
	16:29	17:31 08:29-08:59/30	18:25	20:24	21:17	21:45		
24	08:10 09:06-09:35/29	07:10 07:55-08:31/36	06:03	06:00	05:00	04:35		
	16:31	17:33 08:30-08:57/27	18:27	20:26	21:18	21:46		
25	08:08 09:05-09:37/32	07:08 07:53-08:31/38	06:00	06:00	05:00	04:35		
	16:33	17:35 08:30-08:53/23	18:29	20:27	21:20	21:46		
26	08:07 09:04-09:38/34	07:06 07:53-08:31/38	05:58	06:00	05:00	04:35		
	16:35	17:37 08:30-08:49/19	18:31	20:29	21:21	21:46		
27	08:05 09:03-09:39/36	07:04 07:52-08:31/39	05:55	06:00	05:00	04:36		
	16:36	17:39 08:30-08:48/18	18:33	20:31	21:23	21:45		
28	08:04 09:03-09:41/38	07:01 07:52-08:31/39	05:53	06:00	05:00	04:36		
	16:38	17:41 08:30-08:48/18	18:35	20:33	21:24	21:45		
29	08:02 09:03-09:42/39		06:50	06:00	05:00	04:37		
	16:40		19:37	20:35	21:26	21:45		
30	08:00 08:45-08:49/4		06:48	06:00	05:00	04:38		
	16:42		19:39	20:37	21:27	21:45		
31	07:59 08:41-08:54/13		06:45		04:43			
	16:44		19:40		21:28			
	Sonnenscheinstunden	248	272	367	421	496	512	0
	Anzahl Minuten mit Schatten	1381	2202	477	0	0	0	0

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 155
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 27 - M11

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober		November		Dezember	
1	04:38	05:19	06:14	07:08	08:40-08:54/14	07:07	07:52-08:10/18	08:03	14:36-15:13/37
	21:44	21:09	20:01	18:46		16:35	08:09-09:16/67	15:50	
2	04:39	05:20	06:16	07:10	08:37-08:57/20	07:09	07:53-08:03/10	08:05	14:34-15:12/38
	21:44	21:07	19:59	18:44		16:33	08:02-09:16/74	15:49	
3	04:40	05:22	06:18	07:12	08:34-08:58/24	07:11	07:54-08:20/26	08:06	14:33-15:12/39
	21:44	21:05	19:56	18:42		16:31	08:20-09:16/56	15:48	
4	04:41	05:24	06:19	07:14	08:32-08:59/27	07:13	07:56-08:19/23	08:08	14:32-15:10/38
	21:43	21:03	19:54	18:39		16:29	08:19-09:16/57	15:48	
5	04:41	05:26	06:21	07:15	08:30-09:01/31	07:15	07:58-08:17/19	08:09	14:32-15:10/38
	21:43	21:01	19:51	18:37		16:27	08:17-09:16/59	15:47	
6	04:42	05:27	06:23	07:17	08:29-09:01/32	07:17	08:01-08:15/14	08:10	14:28-15:09/41
	21:42	20:59	19:49	18:34		16:25	08:15-09:16/61	15:46	
7	04:43	05:29	06:25	07:19	08:28-09:03/35	07:19	08:05-09:16/71	08:12	14:27-15:09/42
	21:41	20:57	19:46	18:32	09:03-09:11/8	16:23		15:46	
8	04:44	05:31	06:27	07:21	08:27-09:04/37	07:21	08:06-08:30/24	08:13	14:26-15:08/42
	21:41	20:55	19:44	18:29	09:04-09:14/10	16:21	08:31-09:15/44	15:46	
9	04:45	05:33	06:28	07:23	08:27-09:04/37	07:23	08:07-08:29/22	08:14	14:27-15:08/41
	21:40	20:53	19:41	18:27	09:04-09:16/12	16:20	08:31-09:15/44	15:45	
10	04:47	05:34	06:30	07:25	08:26-09:04/38	07:25	08:09-08:27/18	08:16	14:26-15:07/41
	21:39	20:51	19:39	18:24	09:04-09:18/14	16:18	08:32-09:14/42	15:45	
11	04:48	05:36	06:32	07:27	08:26-09:04/38	07:27	08:13-08:25/12	08:17	14:26-15:06/40
	21:38	20:49	19:36	18:22	09:04-09:19/15	16:16	08:33-09:15/42	15:45	
12	04:49	05:38	06:34	07:29	08:25-09:04/39	07:29	08:18-08:20/2	08:18	14:24-15:06/42
	21:37	20:47	19:34	18:20	09:04-09:20/16	16:14	08:34-09:14/40	15:44	
13	04:50	05:40	06:35	07:30	08:25-09:05/40	07:31	08:35-09:14/39	08:19	14:23-15:06/43
	21:36	20:45	19:31	18:17	09:04-09:21/17	16:13	15:16-15:22/6	15:44	
14	04:51	05:42	06:37	07:32	08:25-09:04/39	07:33	08:35-09:13/38	08:20	14:23-15:05/42
	21:35	20:43	19:29	18:15	09:03-09:21/18	16:11	15:14-15:24/10	15:44	
15	04:53	05:43	06:39	07:34	08:25-09:04/39	07:35	08:36-09:12/36	08:21	14:23-15:05/42
	21:34	20:40	19:26	18:13	09:03-09:21/18	16:09	15:11-15:25/14	15:44	
16	04:54	05:45	06:41	07:36	08:25-09:03/38	07:37	08:37-09:11/34	08:22	14:23-15:05/42
	21:33	20:38	19:24	18:10	09:02-09:22/20	16:08	15:08-15:26/18	15:44	
17	04:55	05:47	06:43	07:38	08:26-09:03/37	07:38	08:38-09:10/32	08:23	14:23-15:06/43
	21:32	20:36	19:21	18:08	09:02-09:27/25	16:06	15:05-15:27/22	15:44	
18	04:57	05:49	06:44	07:40	08:26-09:02/36	07:40	08:40-09:09/29	08:23	14:24-15:06/42
	21:30	20:34	19:19	18:06	09:01-09:29/28	16:05	15:02-15:27/25	15:45	
19	04:58	05:51	06:46	07:42	08:27-09:01/34 09:46-10:01/15	07:42	08:41-09:08/27 14:57-15:28/31	08:24	14:24-15:07/43
	21:29	20:32	19:16	18:03	09:00-09:31/31	16:03	14:48-14:53/5	15:45	
20	05:00	05:52	06:48	07:44	08:28-08:59/31 09:42-10:05/23	07:44	08:44-09:08/24	08:25	14:24-15:06/42
	21:28	20:29	19:14	18:01	08:58-09:32/34	16:02	14:46-15:27/41	15:45	
21	05:01	05:54	06:50	07:46	08:29-08:58/29 09:40-10:07/27	07:46	08:45-09:07/22	08:25	14:25-15:07/42
	21:26	20:27	19:11	17:59	08:57-09:33/36	16:01	14:46-15:25/39	15:46	
22	05:03	05:56	06:52	07:48	08:30-08:56/26 09:38-10:09/31	07:48	08:48-09:05/17	08:26	14:25-15:07/42
	21:25	20:25	19:09	17:56	08:55-09:34/39	15:59	14:45-15:24/39	15:46	
23	05:04	05:58	06:53	07:50	08:32-08:54/22 09:36-10:10/34	07:49	08:51-09:02/11	08:26	14:26-15:08/42
	21:23	20:22	19:06	17:54	08:53-09:35/42	15:58	14:44-15:22/38	15:47	
24	05:06	06:00	06:55	07:52	08:34-08:51/17	07:51	14:43-15:21/38	08:27	14:26-15:08/42
	21:22	20:20	19:04	17:52	08:50-10:11/81	15:57		15:47	
25	05:07	06:01	06:57	06:53	07:40-07:44/4	07:53	14:43-15:20/37	08:27	14:26-15:09/43
	21:20	20:18	19:01	16:50	07:44-09:12/88	15:56		15:48	
26	05:09	06:03	06:59	06:55	07:44-08:20/36	07:55	14:43-15:18/35	08:28	14:27-15:09/42
	21:19	20:15	18:59	16:48	08:19-09:13/54	15:55		15:49	
27	05:10	06:05	07:01	06:57	07:44-08:18/34	07:56	14:43-15:17/34	08:28	14:28-15:10/42
	21:17	20:13	18:56	16:45	08:17-09:13/56	15:54		15:49	
28	05:12	06:07	07:03	06:59	07:46-08:18/32	07:58	14:43-15:16/33	08:28	14:29-15:11/42
	21:16	20:11	18:54	16:43	08:17-09:15/58	15:53		15:50	
29	05:14	06:09	07:04	07:01	07:47-08:17/30	08:00	14:40-15:15/35	08:28	14:29-15:12/43
	21:14	20:08	18:51	16:41	08:16-09:15/59	15:52		15:51	
30	05:15	06:10	07:06	07:03	07:49-08:15/26	08:01	14:38-15:15/37	08:28	14:30-15:13/43
	21:12	20:06	18:49	16:39	08:14-09:15/61	15:51		15:52	
31	05:17	06:12		07:05	07:51-08:13/22			08:28	14:32-15:14/42
	21:10	20:03		16:37	08:12-09:16/64			15:53	
	Sonnenscheinstunden	514	461	383	328	258	1690	1283	
	Anzahl Minuten mit Schatten	0	0	0	1960				

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

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12/10/2015 15:53 / 156

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

André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 28 - M12

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28 11:41-12:20/39 13:22-15:04/102	07:57 06:59		06:43 07:07-07:17/10	05:33 04:42		
	15:54 12:55-13:07/12	16:46 17:43		19:42 07:15-07:24/9	20:39 21:29		
2	08:28 11:41-12:19/38 13:23-15:04/101	07:55 06:56		06:40 07:04-07:12/8	05:31 04:41		
	15:55 12:56-13:05/9	16:48 17:45		19:44 07:09-07:23/14	20:40 21:31		
3	08:28 11:42-12:19/37 13:25-15:05/100	07:54 06:54		06:38 07:02-07:11/9	05:29 04:40		
	15:57 13:01-13:03/2	16:50 17:47		19:46 07:09-07:23/14	20:42 21:32		
4	08:27 11:43-12:20/37 13:38-15:06/88	07:52 06:52		06:35 06:59-07:11/12	05:26 04:40		
	15:58 13:27-13:37/10	16:52 17:49		19:48 07:09-07:21/12	20:44 21:33		
5	08:27 11:44-12:19/35 13:39-15:06/87	07:50 06:49		06:33 06:57-07:10/13	05:24 04:39		
	15:59 13:30-13:34/4	16:54 17:51		19:50 07:09-07:20/11	20:46 21:34		
6	08:27 11:45-12:19/34	07:48 06:47		06:31 06:54-07:09/15	05:22 04:38		
	16:00 13:41-15:06/85	16:56 17:53		19:52 07:08-07:17/9	20:48 21:35		
7	08:26 11:46-12:19/33	07:46 06:45		06:28 06:52-07:08/16	05:20 04:37		
	16:02 13:43-15:07/84	16:58 17:55		19:54 07:08-07:10/2	20:50 21:36		
8	08:26 11:47-12:19/32 13:57-15:07/70	07:44 06:42		06:26 06:52-07:07/15	05:19 04:37		
	16:03 13:46-13:56/10	17:01 17:57		19:55 07:07-07:08/1	20:51 21:37		
9	08:25 11:48-12:18/30	07:42 06:40		06:23 06:52-07:04/12	05:17 04:36		
	16:05 13:58-15:07/69	17:03 17:59		19:57	20:53 21:38		
10	08:24 11:49-12:17/28	07:40 06:37		06:21 06:55-07:02/7	05:15 04:36		
	16:06 14:00-15:08/68	17:05 18:00		19:59	20:55 21:39		
11	08:24 11:51-12:17/26	07:38 06:35		06:18	05:13 04:35		
	16:08 14:02-15:08/66	17:07 18:02		20:01	20:57 21:40		
12	08:23 11:53-12:16/23	07:36 06:32		06:16	05:11 04:35		
	16:09 14:09-15:08/59	17:09 18:04		20:03	20:58 21:41		
13	08:22 11:55-12:14/19	07:34 06:30		06:14	05:09 04:34		
	16:11 14:10-15:08/58	17:11 18:06		20:05	21:00 21:41		
14	08:21 11:57-12:13/16	07:32 06:27		06:11	05:07 04:34		
	16:13 14:12-15:09/57	17:13 18:08		20:07	21:02 21:42		
15	08:20 12:02-12:10/8	07:30 06:25		06:09	05:06 04:34		
	16:14 14:14-15:09/55	17:15 18:10		20:09	21:04 21:43		
16	08:19 14:17-15:09/52	07:28 06:23		06:06	05:04 04:34		
	16:16	17:17 18:12		20:10	21:05 21:43		
17	08:18 14:24-15:09/45	07:26 06:20		06:04	05:02 04:34		
	16:18	17:19 18:14		20:12	21:07 21:44		
18	08:17 14:25-15:09/44	07:24 06:18		06:02	05:01 04:34		
	16:19	17:21 18:16		20:14	21:09 21:44		
19	08:16 14:28-15:09/41	07:22 06:15		05:59	04:59 04:34		
	16:21	17:23 18:18		20:16	21:10 21:44		
20	08:15 14:31-15:08/37	07:19 06:13		05:57	04:58 04:34		
	16:23	17:25 18:20		20:18	21:12 21:45		
21	08:14 14:33-15:08/35	07:17 06:10		05:55	04:56 04:34		
	16:25	17:27 18:22		20:20	21:14 21:45		
22	08:12 14:36-15:07/31	07:15 06:08		05:53	04:55 04:34		
	16:27	17:29 18:23		20:22	21:15 21:45		
23	08:11 14:43-15:07/24	07:13 06:05		05:50	04:53 04:34		
	16:29	17:31 18:25		20:24	21:17 21:45		
24	08:10 14:45-15:05/20	07:10 06:03		05:48	04:52 04:34		
	16:31	17:33 18:27		20:25	21:18 21:45		
25	08:08 14:48-15:04/16	07:08 06:00 06:24-06:26/2		05:46	04:50 04:35		
	16:33	17:35 18:29		20:27	21:20 21:46		
26	08:07 14:50-15:02/12	07:06 05:58 06:22-06:27/5		05:44	04:49 04:35		
	16:34	17:37 18:31		20:29	21:21 21:45		
27	08:05	07:03 05:55 06:19-06:24/5		05:41	04:48 04:36		
	16:36	17:39 18:33 06:24-06:27/3		20:31	21:23 21:45		
28	08:04	07:01 05:53 06:17-06:25/8		05:39	04:47 04:36		
	16:38	17:41 18:35 06:25-06:27/2		20:33	21:24 21:45		
29	08:02		06:50 07:14-07:25/11	05:37	04:46 04:37		
	16:40		19:37 07:25-07:27/2	20:35	21:25 21:45		
30	08:00		06:48 07:12-07:16/4	05:35	04:44 04:37		
	16:42		19:39 07:14-07:26/12	20:37	21:27 21:45		
31	07:59		06:45 07:09-07:16/7		04:43		
	16:44		19:40 07:14-07:25/11		21:28		
	Sonnenscheinstunden 248	272	367	421	496	512	
	Anzahl Minuten mit Schatten 1988	0	70	178	0	0	

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 157
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 28 - M12

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember
1	04:38	05:19	06:14	07:08	07:07	08:03
2	04:39	05:20	06:16	07:10	07:09	08:05
3	04:40	05:22	06:17	07:12	07:11	08:06
4	04:41	05:23	06:18	07:14	07:13	08:08
5	04:42	05:24	06:19	07:16	07:15	08:10
6	04:43	05:25	06:20	07:18	07:17	08:12
7	04:44	05:26	06:21	07:20	07:19	08:14
8	04:45	05:27	06:22	07:22	07:21	08:16
9	04:46	05:28	06:23	07:24	07:23	08:18
10	04:47	05:29	06:24	07:26	07:25	08:20
11	04:48	05:30	06:25	07:28	07:27	08:22
12	04:49	05:31	06:26	07:30	07:29	08:24
13	04:50	05:32	06:27	07:32	07:31	08:26
14	04:51	05:33	06:28	07:34	07:33	08:28
15	04:52	05:34	06:29	07:36	07:35	08:30
16	04:53	05:35	06:30	07:38	07:37	08:32
17	04:54	05:36	06:31	07:40	07:39	08:34
18	04:55	05:37	06:32	07:42	07:41	08:36
19	04:56	05:38	06:33	07:44	07:43	08:38
20	04:57	05:39	06:34	07:46	07:45	08:40
21	04:58	05:40	06:35	07:48	07:47	08:42
22	04:59	05:41	06:36	07:50	07:49	08:44
23	05:00	05:42	06:37	07:52	07:51	08:46
24	05:01	05:43	06:38	07:54	07:53	08:48
25	05:02	05:44	06:39	07:56	07:55	08:50
26	05:03	05:45	06:40	07:58	07:57	08:52
27	05:04	05:46	06:41	08:00	07:59	08:54
28	05:05	05:47	06:42	08:02	08:01	08:56
29	05:06	05:48	06:43	08:04	08:03	08:58
30	05:07	05:49	06:44	08:06	08:05	09:00
31	05:08	05:50	06:45	08:08	08:07	09:02
Sonnenscheinstunden	514	0	383	328	257	231
Anzahl Minuten mit Schatten	0	0	256	0	650	4749

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

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

WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 158
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 29 - W1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:28 13:50-15:11/81 15:54	07:57 15:30-15:55/25 16:46	06:59 17:43	06:43 07:44-08:04/20 19:42	05:33 20:39	04:42 21:29	
2	08:28 13:53-15:12/79 15:56	07:55 15:32-15:55/23 16:48	06:56 17:45	06:40 07:45-08:02/17 19:44	05:31 20:40	04:41 21:31	
3	08:28 13:56-15:14/78 15:57	07:54 15:35-15:54/19 16:50	06:54 17:47	06:38 07:48-07:59/11 19:46	05:29 20:42	04:41 21:32	
4	08:27 13:57-15:15/78 15:58	07:52 15:39-15:53/14 16:52	06:52 17:49	06:35 19:48	05:27 20:44	04:40 21:33	
5	08:27 13:58-15:16/78 15:59	07:50 15:41-15:52/11 16:54	06:49 17:51	06:33 19:50	05:25 20:46	04:39 21:34	
6	08:27 13:59-15:18/79 16:01	07:48 15:45-15:49/4 16:56	06:47 07:25-07:44/19 17:53	06:31 19:52	05:23 20:48	04:38 21:35	
7	08:26 14:02-15:21/79 16:02	07:46 16:59	06:45 07:22-07:47/25 17:55	06:28 19:54	05:21 20:50	04:37 21:36	
8	08:26 14:09-15:22/73 16:03	07:44 17:01	06:42 07:19-07:48/29 17:57	06:26 19:55	05:19 20:51	04:37 21:37	
9	08:25 14:11-15:23/72 16:05	07:42 17:03	06:40 07:16-07:28/12 17:59	06:23 19:57	05:17 20:53	04:36 21:38	
10	08:24 14:12-15:24/72 16:06	07:40 17:05	06:37 07:14-07:31/17 18:01	06:21 19:59	05:15 20:55	04:36 21:39	
11	08:24 14:14-15:27/73 16:08	07:38 17:07	06:35 07:11-07:32/21 18:02	06:18 20:01	05:13 20:57	04:35 21:40	
12	08:23 14:17-15:29/72 16:09	07:36 17:09	06:32 07:10-07:34/24 18:04	06:16 20:03	05:11 20:59	04:35 21:41	
13	08:22 14:21-15:31/70 16:11	07:34 17:11	06:30 07:08-07:34/26 18:06	06:14 20:05	05:09 21:00	04:34 21:41	
14	08:21 14:25-15:33/68 16:13	07:32 17:13	06:27 07:07-07:17/10 18:08	06:11 20:07	05:08 21:02	04:34 21:42	
15	08:20 14:27-15:36/69 16:14	07:30 17:15	06:25 07:03-07:21/18 18:10	06:09 20:09	05:06 21:04	04:34 21:43	
16	08:19 14:27-15:38/71 16:16	07:28 17:17	06:23 07:01-07:23/22 18:12	06:06 20:10	05:04 21:05	04:34 21:43	
17	08:18 14:28-15:40/72 16:18	07:26 17:19	06:20 06:58-07:24/26 18:14	06:04 20:12	05:02 21:07	04:34 21:44	
18	08:17 14:28-15:42/74 16:20	07:24 17:21	06:18 06:55-07:04/9 18:16	06:02 20:14	05:01 21:09	04:34 21:44	
19	08:16 14:29-15:44/75 16:21	07:22 17:23	06:15 06:51-07:07/16 18:18	05:59 20:16	04:59 21:10	04:34 21:44	
20	08:15 14:30-15:46/76 16:23	07:19 17:25	06:13 06:49-07:10/21 18:20	05:57 20:18	04:58 21:12	04:34 21:45	
21	08:14 14:31-15:49/78 16:25	07:17 17:27	06:10 06:47-07:10/23 18:22	05:55 20:20	04:56 21:14	04:34 21:45	
22	08:12 14:33-15:50/77 16:27	07:15 17:29	06:08 06:46-07:12/26 18:23	05:53 20:22	04:55 21:15	04:34 21:45	
23	08:11 14:34-15:52/78 16:29	07:13 17:31	06:05 06:44-07:11/27 18:25	05:50 20:24	04:53 21:17	04:34 21:45	
24	08:10 14:35-14:50/15 16:31	07:10 17:33	06:03 06:44-07:12/28 18:27	05:48 20:26	04:52 21:18	04:35 21:46	
25	08:08 14:38-14:49/11 15:04-15:54/50 16:33	07:08 17:35	06:00 06:43-07:11/28 07:24-07:41/17 18:29	05:46 20:27	04:50 21:20	04:35 21:46	
26	08:07 14:41-14:46/5 16:34	07:06 17:37	05:58 06:43-07:11/28 07:28-07:37/9 18:31	05:44 20:29	04:49 21:21	04:35 21:46	
27	08:05 15:06-15:54/48 16:36	07:03 17:39	05:55 06:42-07:10/28 18:33	05:41 20:31	04:48 21:23	04:36 21:45	
28	08:04 15:15-15:56/41 16:38	07:01 17:41	05:53 06:43-07:10/27 18:35	05:39 20:33	04:47 21:24	04:36 21:45	
29	08:02 15:20-15:56/36 16:40		06:50 07:42-08:09/27 19:37	05:37 20:35	04:46 21:26	04:37 21:45	
30	08:00 15:24-15:56/32 16:42		06:48 07:43-08:08/25 19:39	05:35 20:37	04:44 21:27	04:37 21:45	
31	07:59 15:26-15:56/30 16:44		06:45 07:43-08:06/23 19:40		04:43 21:28		
Sonnenscheinstunden		248	272	367	421	496	512
Anzahl Minuten mit Schatten		2096	96	1162	48	0	0

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

Tag im Monat	Sonnenaufgang (SS:MM) Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten Zeitpunkt (SS:MM)
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 159
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersieglug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 29 - W1

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Juli	August	September	Oktober	November	Dezember
1	04:38	05:19	06:14	07:08	07:48-08:13/25	07:07
	21:44	21:09	20:01	18:46	08:12-08:32/20	16:35
2	04:39	05:20	06:16	07:10	07:49-08:12/23	07:09
	21:44	21:07	19:59	18:44	08:11-08:31/20	16:33
3	04:40	05:22	06:18	07:12	07:50-08:09/19	07:11
	21:44	21:05	19:56	18:42	08:08-08:29/21	16:31
4	04:41	05:24	06:19	07:14	07:52-08:07/15	07:13
	21:43	21:03	19:54	18:39	08:06-08:29/22	16:29
5	04:41	05:26	06:21	07:15	07:55-08:01/6	07:15
	21:43	21:01	19:51	18:37	08:01-08:26/25	16:27
6	04:42	05:27	06:23	07:17	07:57-08:24/27	07:17
	21:42	20:59	19:49	18:34		16:25
7	04:43	05:29	06:25	07:19	07:59-08:21/22	07:19
	21:41	20:57	19:46	18:32		16:23
8	04:44	05:31	06:27	07:21	08:11-08:17/6	07:21
	21:41	20:55	19:44	18:29		16:21
9	04:45	05:33	06:28	07:23	15:03-15:26/23	07:23
	21:40	20:53	19:41	18:27		16:20
10	04:47	05:34	06:30	07:25	15:00-15:26/26	07:25
	21:39	20:51	19:39	18:24		16:18
11	04:48	05:36	06:32	07:27	14:57-15:27/30	07:27
	21:38	20:49	19:36	18:22		16:16
12	04:49	05:38	06:34	07:28	14:56-15:28/32	07:28
	21:37	20:47	19:34	18:20		16:14
13	04:50	05:40	06:35	07:30	14:52-15:28/36	07:30
	21:36	20:45	19:31	18:17		16:13
14	04:51	05:42	06:37	07:32	14:47-15:28/41	07:32
	21:35	20:43	19:29	18:15		16:11
15	04:53	05:43	06:39	07:34	14:44-15:27/43	07:34
	21:34	20:40	19:26	18:13		16:09
16	04:54	05:45	06:41	07:36	14:14-14:19/5	07:37
	21:33	20:38	19:24	18:10	14:09-14:24/15	16:08
17	04:55	05:47	06:43	07:38	14:11-14:22/11	07:38
	21:32	20:36	19:21	18:08	14:08-15:27/50	16:06
18	04:57	05:49	06:44	07:40	14:09-14:24/15	07:40
	21:30	20:34	19:19	18:06	14:07-15:26/59	16:05
19	04:58	05:50	06:46	07:42	14:08-15:26/78	07:42
	21:29	20:32	19:16	18:03		16:03
20	05:00	05:52	06:48	07:44	14:07-15:25/78	07:44
	21:28	20:29	19:14	18:01		16:02
21	05:01	05:54	06:50	07:46	14:07-15:24/77	07:46
	21:26	20:27	19:11	17:59		16:01
22	05:03	05:56	06:52	07:48	14:07-15:22/75	07:48
	21:25	20:25	19:09	17:56		15:59
23	05:04	05:58	06:53	07:50	14:06-15:20/74	07:50
	21:23	20:22	19:06	17:54		15:58
24	05:06	05:59	06:55	07:51	14:05-15:19/74	07:51
	21:22	20:20	19:04	17:52		15:57
25	05:07	06:01	06:57	07:53	14:05-15:17/72	07:53
	21:20	20:18	19:01	16:50		15:56
26	05:09	06:03	06:59	07:55	14:05-15:16/71	07:55
	21:19	20:15	18:59	16:48		15:55
27	05:10	06:05	07:01	07:56	14:06-15:15/69	07:56
	21:17	20:13	18:56	16:45		15:54
28	05:12	06:07	07:03	07:58	14:05-15:13/68	07:58
	21:16	20:11	18:54	16:43		15:53
29	05:14	06:09	07:04	07:01	14:02-15:12/70	08:00
	21:14	20:08	18:51	16:41		15:52
30	05:15	06:10	07:06	07:03	14:00-15:11/71	08:01
	21:12	20:06	18:49	16:39		15:51
31	05:17	06:12		07:05		
	21:10	20:03		16:37		
Sonnenscheinstunden 514 461 383 328 247 1350 231 2442						
Anzahl Minuten mit Schatten 0 0 978 247 1350 2442						

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Projekt:
151008_Miltzow_III-VII

Ausdruck/Seite
12/10/2015 15:53 / 160
Lizenzierter Anwender:
I17-Wind GmbH & Co. KG
Am Westersielzug 11
DE-25840 Friedrichstadt
-
André Gefke / andre.gefke@i17-wind.de
Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 30 - W6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:28 15:54	07:57 16:48	06:59 17:43	06:43 17:21	05:33 19:19	04:42 19:56
2	08:28 15:55	07:55 16:48	06:57 17:45	06:40 17:21	05:31 19:19	04:41 19:59
3	08:28 15:57	07:54 16:50	06:54 17:47	06:38 17:23	05:29 19:20	04:40 20:01
4	08:28 15:58	07:53 16:52	06:52 17:49	06:35 17:25	05:26 19:21	04:40 20:02
5	08:27 15:59	07:50 16:54	06:49 17:51	06:33 17:27	05:24 19:23	04:39 20:03
6	08:27 16:00	07:48 16:56	06:47 17:53	06:31 17:30	05:22 19:24	04:38 20:06
7	08:26 16:02	07:46 16:58	06:45 17:55	06:28 17:33	05:20 19:25	04:37 20:07
8	08:26 16:03	07:44 17:01	06:42 17:57	06:26 17:35	05:19 19:26	04:37 20:09
9	08:25 16:05	07:42 17:03	06:40 17:59	06:23 17:37	05:17 19:29	04:36 20:09
10	08:25 16:06	07:40 17:05	06:37 18:01	06:21 17:39	05:15 19:30	04:36 20:11
11	08:24 16:08	14:19-14:24/5 07:38 17:07	14:52-14:53/5 06:35 18:02	14:47-14:48/5 06:18 18:49	18:22/3 05:13 19:32	20:54/8 04:35 20:12
12	08:23 16:09	14:15-14:29/14 07:36 17:09	14:54-14:55/10 06:32 18:04	14:44-14:45/10 06:16 18:50	19:22/12 05:11 19:34	20:17/7 04:35 20:13
13	08:22 16:11	14:13-14:32/19 07:34 17:11	14:55-14:56/15 06:30 18:06	14:42-14:43/15 06:14 18:51	19:20/20 05:09 19:34	20:14/4 04:34 20:21
14	08:21 16:13	14:11-14:35/24 07:32 17:13	14:56-14:57/20 06:28 18:08	14:43-14:44/20 06:11 18:52	19:18/16 05:07 19:34	20:11/4 04:34 20:21
15	08:20 16:14	14:10-14:37/27 07:30 17:15	14:57-14:58/25 06:25 18:10	14:44-14:45/25 06:09 18:54	19:16/12 05:06 19:36	20:10/4 04:34 20:22
16	08:19 16:16	14:09-14:39/30 07:28 17:17	14:58-14:59/30 06:23 18:12	14:45-14:46/30 06:06 18:58	19:15/9 05:04 19:36	20:09/4 04:34 20:22
17	08:18 16:18	14:08-14:41/33 07:26 17:19	14:59-15:00/33 06:20 18:14	14:46-14:47/33 06:04 19:25	19:14/5 05:02 19:38	20:08/4 04:34 20:22
18	08:17 16:19	14:07-14:42/35 07:24 17:21	15:01-15:02/35 06:18 18:16	14:47-14:48/35 06:02 19:23	19:12/9 05:01 19:39	20:07/4 04:33 20:23
19	08:16 16:21	14:06-14:44/38 07:22 17:23	15:02-15:03/38 06:16 18:18	14:48-14:49/38 06:00 19:22	19:11/22 04:59 19:42	20:06/4 04:33 20:23
20	08:15 16:23	14:06-14:46/40 07:19 17:25	15:03-15:04/40 06:13 18:20	14:49-14:50/40 05:57 19:21	19:10/25 04:58 19:46	20:05/4 04:34 20:23
21	08:14 16:25	14:04-14:47/43 07:17 17:27	15:04-15:05/43 06:10 18:22	14:50-14:51/43 05:55 19:20	19:08/28 04:56 19:47	20:04/4 04:34 20:23
22	08:12 16:27	14:04-14:49/45 07:15 17:29	15:05-15:06/45 06:08 18:23	14:51-14:52/45 05:53 19:18	19:06/31 04:55 19:47	20:03/4 04:34 20:23
23	08:11 16:29	14:03-14:50/47 07:13 17:31	15:06-15:07/47 06:05 18:25	14:52-14:53/47 05:50 19:18	19:05/32 04:53 19:48	20:02/4 04:34 20:24
24	08:10 16:31	14:02-14:50/48 07:10 17:33	15:07-15:08/48 06:03 18:27	14:53-14:54/48 05:48 19:17	19:04/22 04:52 19:48	20:01/4 04:34 20:24
25	08:08 16:32	14:02-14:52/50 07:08 17:35	15:08-15:09/50 06:00 18:29	14:54-14:55/50 05:46 19:17	19:03/37 04:50 19:49	20:00/4 04:35 20:23
26	08:07 16:34	14:01-14:53/52 07:06 17:37	15:09-15:10/52 05:58 18:31	14:55-14:56/52 05:44 19:17	19:02/40 04:49 19:50	20:00/4 04:35 20:24
27	08:05 16:36	14:00-14:53/53 07:04 17:39	15:10-15:11/53 05:55 18:33	14:56-14:57/53 05:41 19:17	19:01/41 04:48 19:51	20:00/4 04:36 20:24
28	08:04 16:38	14:00-14:55/55 07:01 17:41	15:11-15:12/55 05:53 18:35	14:57-14:58/55 05:39 19:17	19:00/42 04:47 19:52	20:00/4 04:36 20:25
29	08:02 16:40	14:00-14:56/56 07:00 17:43	15:12-15:13/56 05:50 18:37	14:58-14:59/56 05:37 19:18	19:00/42 04:45 19:53	20:00/4 04:37 20:24
30	08:01 16:42	13:59-14:56/57 07:00 17:44	15:13-15:14/57 05:48 19:39	14:59-15:00/57 05:35 19:20	19:00/43 04:44 19:54	20:00/4 04:37 20:25
31	07:59 16:44	13:59-14:57/58 07:00 17:44	15:14-15:15/58 05:46 19:40	15:00-15:01/58 05:33 19:21	19:00/43 04:43 19:55	20:00/4 04:38 20:25
	Sonnenscheinstunden 248					
	Anzahl Minuten mit Schatten	829	272	2734	2471	974
						496
						1612
						513
						1440

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Lizenzierter Anwender:
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Berechnet:
12/10/2015 15:41/2.9.285

SHADOW - Kalender pro WEA

Berechnung: GesamtbelastungWEA: 30 - W6

Voraussetzungen für Berechnung des Schattenwurfs

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [HEILIGENDAMM]
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez
1.39 2.32 3.70 5.75 8.12 7.70 7.33 7.20 5.12 3.48 1.79 1.03

Betriebsdauer je Sektor
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe
344 328 399 568 526 526 738 987 1,017 1,220 930 354 7,936
: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember	
1	04:38 20:17-20:23/6 21:45 20:25-21:39/44	05:19 19:44-20:34/50	06:14 18:49-19:12/23	07:08 15:33-16:23/50	07:07 13:27-15:11/104	08:03 14:01-14:07/6	
2	04:39 20:15-20:23/8 21:44 20:25-21:08/43	05:20 19:42-20:33/51	06:16 18:47-19:12/25	18:46 17:02-17:46/44	07:09 13:27-14:30/63	08:05	
3	04:40 20:15-21:07/52 21:44 04:40 20:14-21:07/53	05:22 19:40-20:32/52	06:17 18:47-19:12/25	18:44 17:03-17:45/42	07:11 13:27-14:30/63	08:06	
4	21:43 04:41 20:14-21:07/53	05:24 19:38-20:30/52	06:19 18:46-19:12/26	18:42 15:29-16:24/55	07:13 13:28-14:31/63	08:08	
5	21:43 04:42 20:13-21:06/53	05:26 19:36-20:28/52	06:21 18:45-19:11/26	18:39 15:28-16:24/56	07:15 13:28-14:30/62	08:09	
6	21:42 04:43 20:11-21:06/55	05:27 19:35-20:26/51	06:23 17:27-17:42/15	18:37 15:26-16:25/59	07:17 13:28-14:30/62	08:10	
7	21:41 04:44 20:10-21:05/55	05:29 19:33-20:23/50	06:25 17:23-17:46/23	18:34 15:25-16:25/60	07:19 13:28-14:30/62	08:12	
8	21:41 04:45 20:09-21:05/56	05:31 19:32-20:21/49	06:26 17:20-17:48/28	18:32 15:24-16:25/61	07:21 13:28-14:29/61	08:13	
9	21:40 10:04 20:07-21:03/56	05:33 19:30-20:20/50	06:28 17:17-17:49/32	18:29 15:23-16:26/63	07:23 13:29-14:29/60	08:14	
10	21:39 11:04 20:05-21:03/58	05:34 19:28-20:16/48	06:30 17:15-17:51/36	18:27 15:23-16:26/63	07:25 13:29-14:28/59	08:16	
11	21:38 12:04 20:04-21:02/58	05:36 19:28-20:13/45	06:32 17:13-17:52/39	18:24 15:22-16:26/64	07:27 13:31-14:29/58	08:17	
12	21:37 13:04 20:03-21:01/58	05:38 19:27-20:09/42	06:34 17:11-17:53/42	18:22 15:02-15:07/5	07:29 13:31-14:28/57	08:18	
13	21:36 14:04 20:02-21:00/58	05:40 19:25-20:08/43	06:35 17:09-17:53/44	18:20 14:54-15:14/20	07:31 13:32-14:28/56	08:19	
14	21:35 15:04 20:01-20:58/57	05:41 19:25-20:07/42	06:37 17:08-17:53/45	18:17 14:49-15:18/29	07:33 13:32-14:27/55	08:20	
15	21:34 16:04 20:01-20:58/57	05:43 19:25-20:06/41	06:39 17:07-17:54/47	18:15 14:46-16:26/100	07:35 13:33-14:26/53	08:21	
16	21:33 17:04 20:00-20:57/57	05:45 19:24-20:04/40	06:41 17:06-17:55/49	18:12 14:46-16:26/100	07:37 13:34-14:26/52	08:22	
17	21:32 18:04 20:00-20:56/57	05:47 19:24-20:03/39	06:43 17:04-17:54/50	18:10 14:46-16:26/100	07:39 13:35-14:25/50	08:23	
18	21:30 19:04 20:00-20:56/57	05:49 19:24-20:00/36	06:44 17:04-17:54/50	18:08 14:46-16:26/100	07:40 13:36-14:24/48	08:24	
19	21:29 20:04 20:00-20:56/57	05:50 19:23-19:56/33	06:46 17:03-17:54/51	18:05 14:46-16:26/100	07:42 13:38-14:25/47	08:24	
20	21:28 21:05 19:57-20:51/54	05:52 19:23-19:56/33	06:48 17:03-17:54/51	18:03 14:46-16:26/100	07:44 13:39-14:24/45	08:25	
21	21:28 22:05 20:02-20:51/53	05:54 19:24-19:54/30	06:50 17:03-17:54/51	18:01 14:46-16:26/100	07:46 13:40-14:23/43	08:26	
22	21:25 23:05 20:00-20:51/53	05:56 19:24-19:52/28	06:52 17:02-17:42/15	18:00 14:46-16:26/100	07:48 13:42-14:22/40	08:26	
23	21:24 04:51 19:57-20:49/52	05:58 19:24-19:50/26	06:53 17:02-17:42/16	17:58 14:46-16:26/100	07:50 13:43-14:21/38	08:27	
24	21:22 05:06 19:53-20:47/54	05:59 19:25-19:47/22	06:55 17:01-17:53/52	17:54 14:46-16:26/100	07:52 13:45-14:20/35	08:27	
25	21:20 05:07 19:51-20:36/45	06:01 19:27-19:46/19	06:57 17:01-17:52/51	17:52 14:46-16:26/100	07:54 13:46-14:20/34	08:27	
26	21:19 05:09 19:49-20:36/47	06:03 19:28-19:43/15	06:59 17:01-17:53/52	17:50 14:46-16:26/100	07:56 13:47-14:17/30	08:28	
27	21:17 05:10 19:48-20:36/48	06:05 18:59-19:05/6	07:01 17:01-17:53/52	17:48 14:46-16:26/100	07:58 13:49-14:16/27	08:28	
28	21:16 05:12 19:46-20:35/49	06:07 18:55-19:08/13	07:03 17:01-17:53/52	17:46 14:46-16:26/100	07:59 13:51-14:15/24	08:28	
29	21:14 05:14 19:46-20:36/50	06:08 18:52-19:09/17	07:04 17:01-17:53/52	17:43 14:46-16:26/100	08:00 13:54-14:14/20	08:28	
30	21:12 05:15 19:44-20:35/51	06:10 18:51-19:11/20	07:06 15:35-16:22/47	17:41 14:46-16:26/100	08:02 13:57-14:12/15	08:28	
31	21:10 05:17 19:44-20:34/50	06:12 18:50-19:12/22	07:08 15:35-16:22/47	17:39 14:46-16:26/100	08:04 13:57-14:12/15	08:28	
	Sonnenscheinstunden Anzahl Minuten mit Schatten	515 1664	461 1126	383 1739	328 3185	257 1623	231 6

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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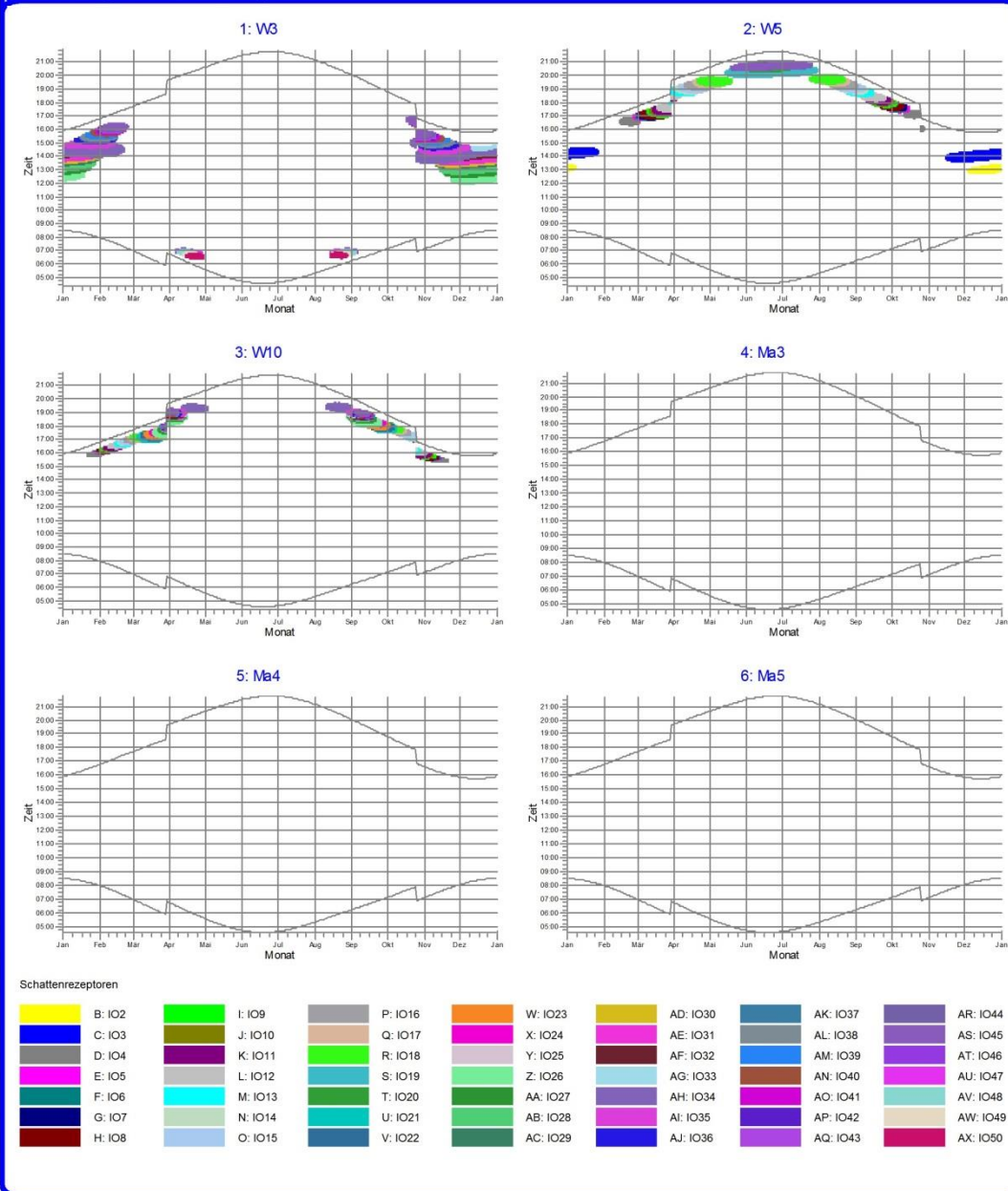
WindPRO, entwickelt von EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø, Tel. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

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SHADOW - Grafischer Kalender pro WEA

Berechnung: Gesamtbelastung



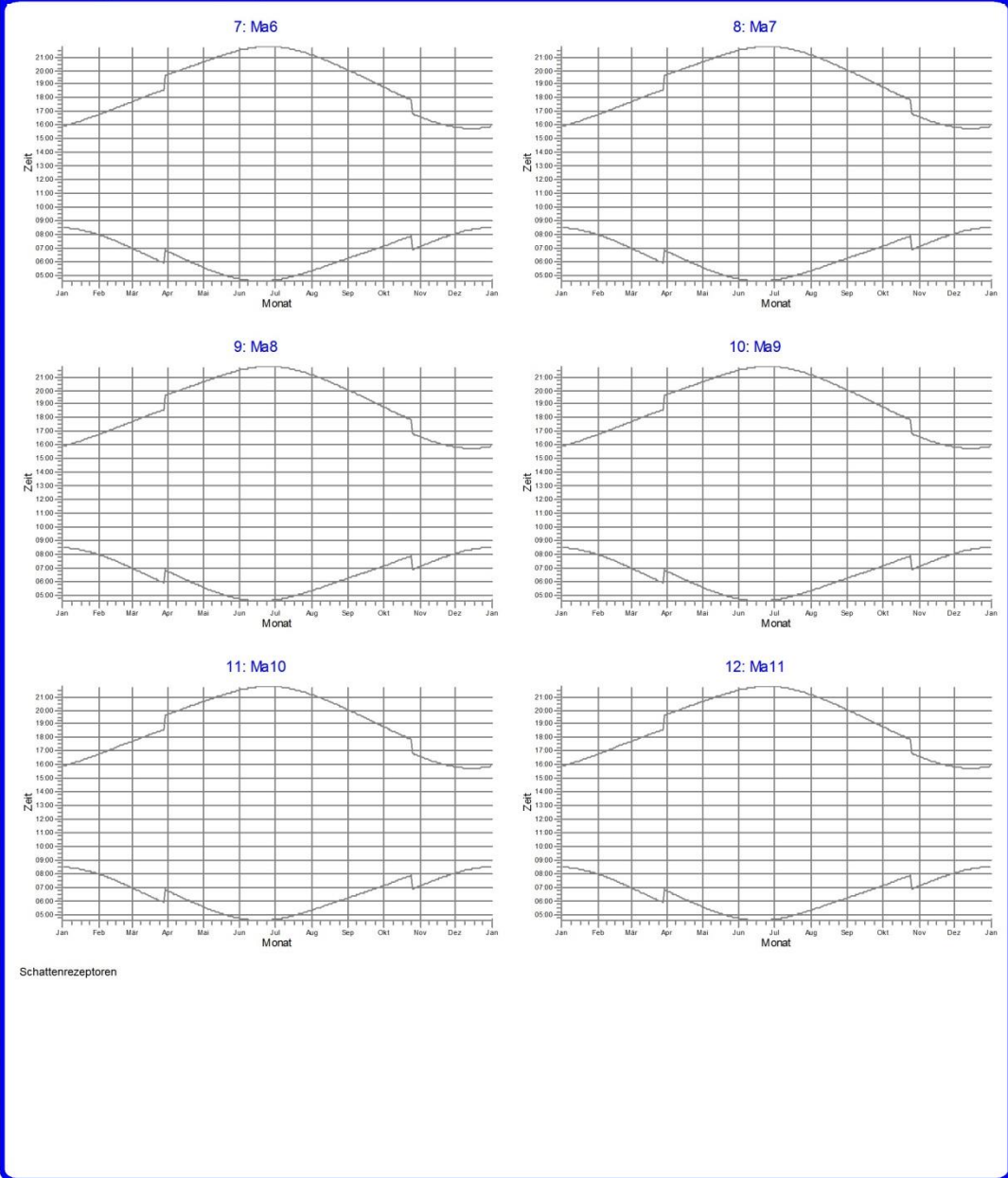
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SHADOW - Grafischer Kalender pro WEA

Berechnung: Gesamtbelastung



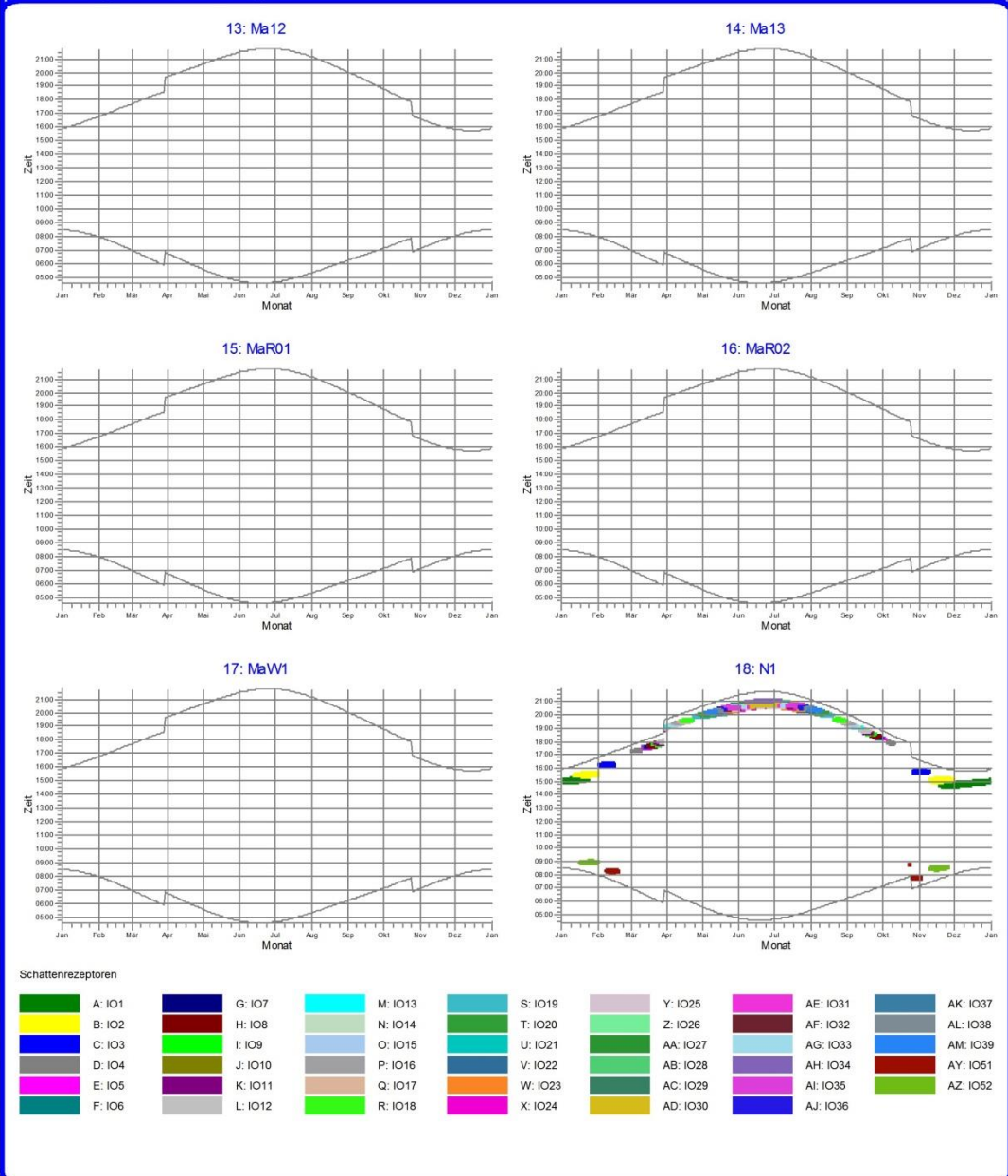
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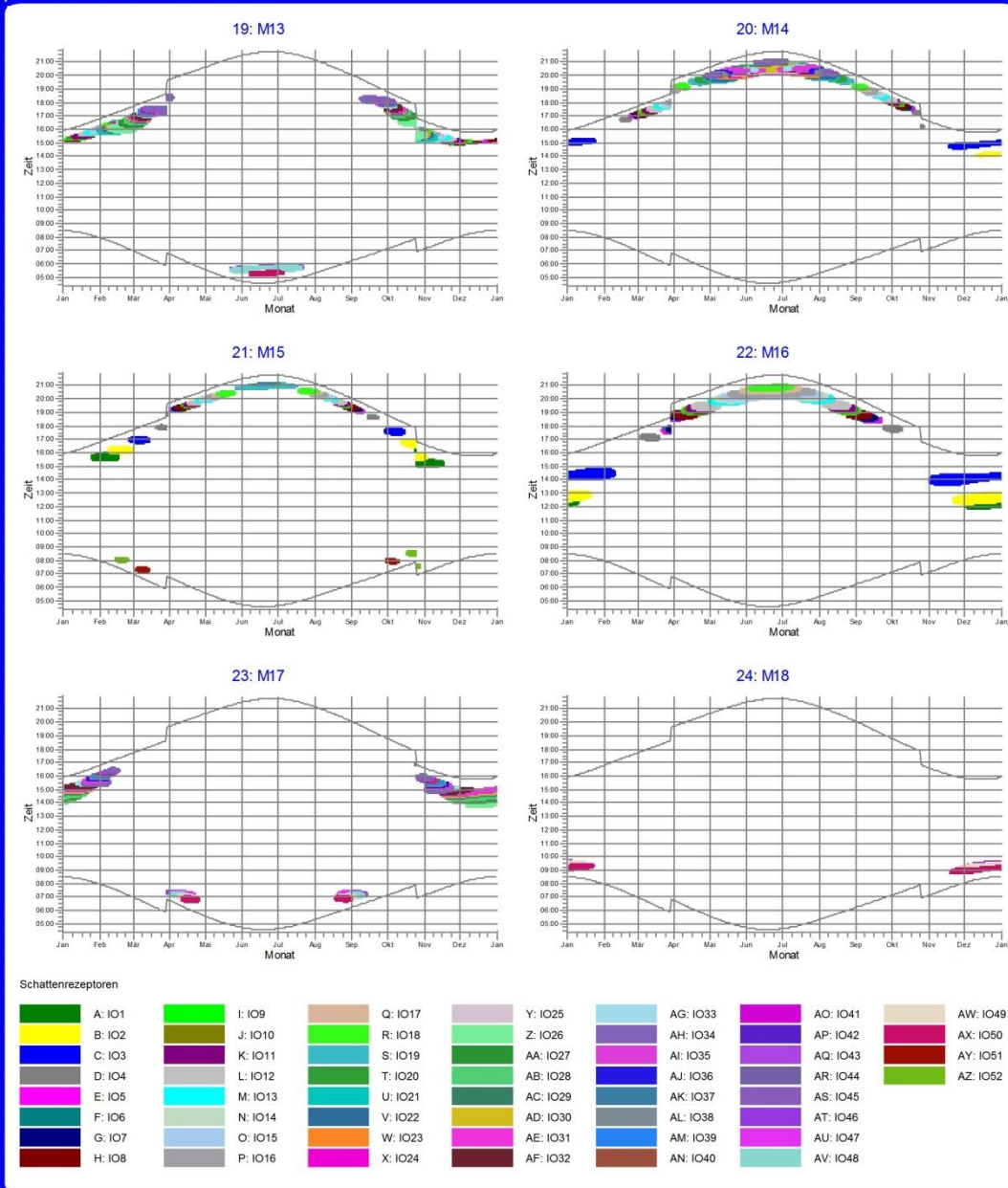
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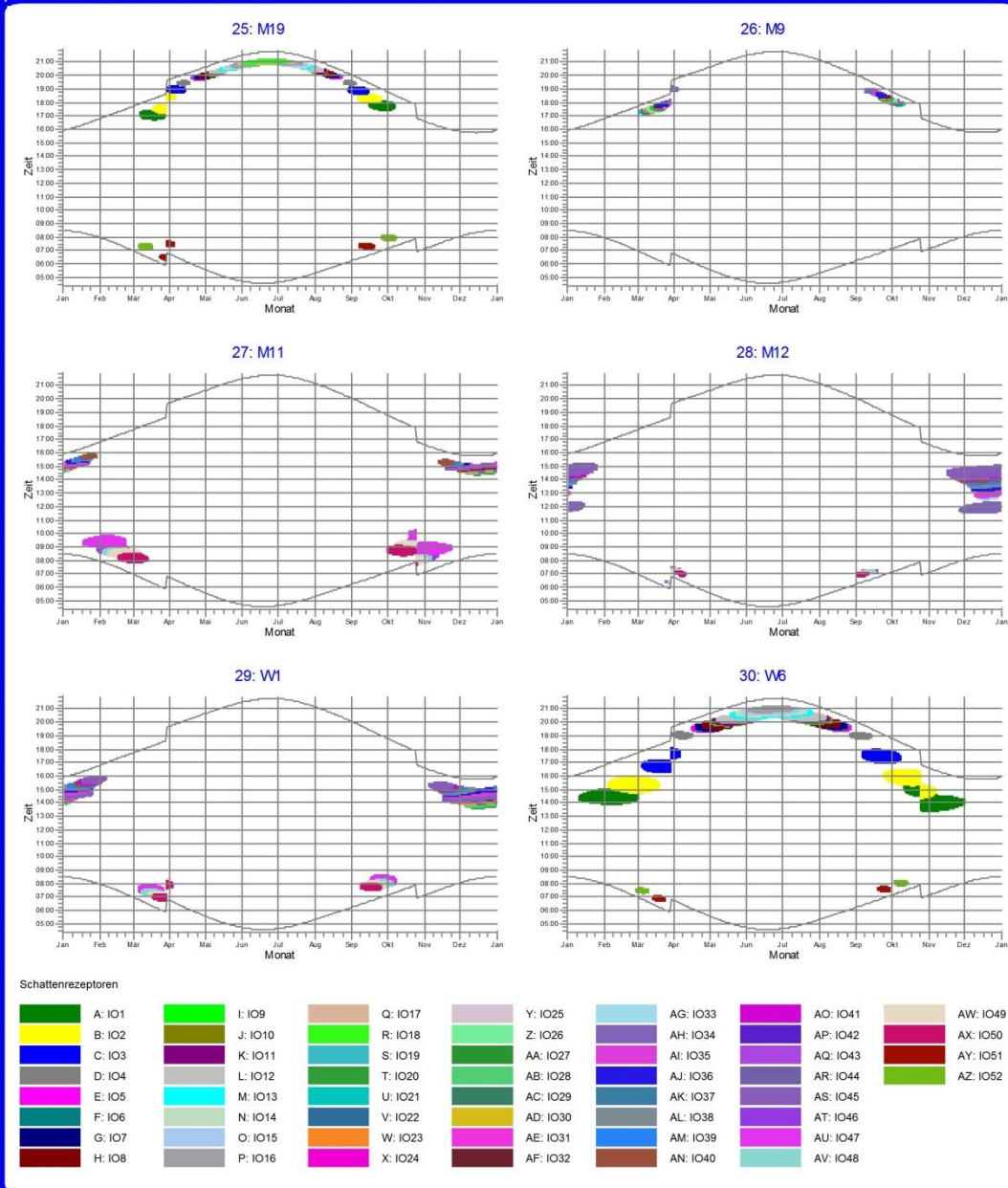
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