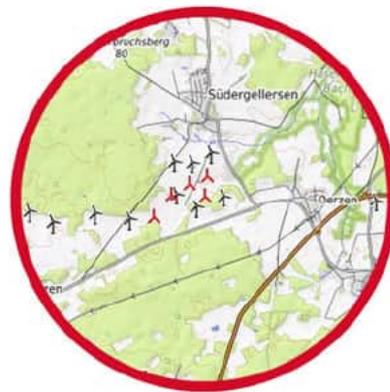


# Schattengutachten

mit Schattenausbreitungskarte  
zur Ermittlung des Schattenwurfes von 5 neuen  
Windenergieanlagen an einem Standort bei  
Südergellersen (Niedersachsen)

Landwind Planung GmbH & Co. KG



Juli 2025

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## INHALT

<b>1</b>	<b>EINLEITUNG</b>	<b>3</b>
<b>2</b>	<b>DER STANDORT</b>	<b>4</b>
<b>3</b>	<b>ALLGEMEINES ZUM SCHATTENWURF</b>	<b>5</b>
<b>4</b>	<b>BERECHNUNG DES SCHATTENWURFS</b>	<b>7</b>
<b>5</b>	<b>ERLÄUTERUNG ZU DEN RESULTATAUSDRUCKEN</b>	<b>10</b>
	SHADOW – HAUPTERGEBNIS	10
	SHADOW – KALENDER	10
	SHADOW – KALENDER, GRAFISCH	11
	SHADOW – KARTE DER SCHATTENDAUERLINIEN	12
<b>6</b>	<b>ERGEBNIS DER SCHATTENWURFBERECHNUNG</b>	<b>13</b>
<b>7</b>	<b>ZUSAMMENFASSUNG</b>	<b>18</b>
<b>8</b>	<b>LITERATURVERZEICHNIS</b>	<b>19</b>

## ANHANG

### ERGEBNISSE DER WINDPRO BERECHNUNG SHADOW:

#### Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand

Hauptergebnis	4 Seiten
Kalender	100 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

#### Berechnung: Zusatzbelastung Repowering 5x N175

Hauptergebnis	4 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

#### Berechnung: Vorbelastung Repowering 18 Bestand

Hauptergebnis	4 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

## **1 Einleitung**

Die Landwind Planung GmbH & Co. KG plant südlich der Ortschaft Südergellersen (Landkreis Lüneburg, Niedersachsen) als Repowering-Projekt den Neubau eines Windparks, bestehend aus 5 Anlagen mit 179 m Nabenhöhe. Dazu wird der bestehende Windpark um 5 Anlagen zurückgebaut. Zwei weitere Anlagen (A4, A5) werden bis zur Inbetriebnahme der geplanten Anlagen zurückgebaut.

Für dieses Vorhaben wird in dem vorliegenden Gutachten eine Prognose über den zu erwartenden Schattenwurf in der Umgebung erstellt. Dazu werden an den vom Auftraggeber vorgesehenen Standorten 5 neue Windenergieanlagen neben 18 weiteren zu berücksichtigenden Anlagen angesetzt.

Es wird die aus dem Betrieb aller 23 Windenergieanlagen resultierende Beschattung im Umfeld der Anlagen, insbesondere an ausgewählten Gebäuden mit Wohnnutzung in den umliegenden Ortschaften, ermittelt.

## **2 Der Standort**

Eine Standortbesichtigung des Anlagenstandortes und der Immissionsorte fand am 27.06.2025 durch den Mitarbeiter Herrn Helms statt. Eine Fotodokumentation wurde dabei erstellt.

Die geplanten Anlagen liegen ca. 8,5 km südwestlich von der Kreisstadt Lüneburg. Im Westen (ca. 2 km) liegt Oerzen und im Norden (ca. 1 km) liegt Südergellersen. Die nähere Standortumgebung ist gekennzeichnet durch großflächige, landwirtschaftliche Nutzflächen, sowie kleinere Waldflächen innerhalb des Windparks sowie größere Waldgebiete im Süden und im Westen.

Das Gelände ist im nahen Umfeld eben mit Höhen zwischen 35 m und 70 m ü. NHN. Im westlichen Waldgebiet werden Höhen über 80 m ü. NHN erreicht. Die geplanten Windanlagen stehen auf Höhen zwischen 42 und 49 m ü. NHN.

Im vorliegenden Gutachten werden als Schatten-Verursacher die 5 geplanten Anlagen - NORDEX N175/6.X-6.800, mit 179 m Nabenhöhe, neben 18 bestehenden Anlagen, an den vom Auftraggeber vorgegebenen Positionen angesetzt. Überlagerungen durch den gleichzeitigen Betrieb aller 23 Anlagen werden bei der Berechnung berücksichtigt.

Die Lage der Immissionsorte wird auf der Kartengrundlage gewählt und ist den Karten im Anhang zu entnehmen.

### **3 Allgemeines zum Schattenwurf**

Bei der Ermittlung des Standortes von geplanten Windenergieanlagen sind viele Faktoren zu beachten. Neben den positiven Aspekten gehören dazu auch negative Einflüsse der Anlagen auf ihre nähere Umgebung. Einen dieser Einflüsse stellt der Schattenwurf der Anlage dar. Zum einen werfen Turm und Maschinenhaus einen ruhenden Schatten, dieser wird in der Regel jedoch nicht als störend empfunden. Zum anderen verursacht der Rotor durch seine Bewegung einen häufigen Helligkeitswechsel im Beschattungsbereich. Dieser dynamische Schatten wird schnell als unangenehm empfunden und kann bei längerer Dauer stark belastend sein. Aus diesem Grund wird der Schattenwurf einer Windenergieanlage als erhebliche Belästigung im Sinne des Bundes-Immissionsschutzgesetz (BImSchG) angesehen [1].

Um eine unzumutbare Beeinträchtigung der Bewohner in der Nähe einer geplanten Windenergieanlage zu vermeiden, ist daher vor dem Bau der Anlage eine Genehmigung nach Bundes-Immissionsschutzgesetz nötig. Dafür wird im Rahmen eines Schattengutachtens der zu erwartende Schattenwurf der Anlage simuliert und auf seine Auswirkungen auf die Anwohner untersucht. Für die Bewertung dieser Auswirkungen gibt es keine rechtsverbindlichen Vorschriften, stattdessen wird hierbei auf die Schattenwurfhinweise der Bund/Länder-Arbeitsgemeinschaft Immissionsschutz (LAI) zurückgegriffen. Dort werden allgemein anerkannte Richtwerte zur maximalen Dauer der Schatteneinwirkung gegeben. [2].

Für die Simulation des Schattenwurfs sind zunächst die genauen Standorte der Anlagen erforderlich. Hierbei sind neben den geplanten Anlagen auch bereits bestehenden Anlagen in der Umgebung zu berücksichtigen, da diese ebenfalls das betrachtete Gebiet beschatten können. Für jede der betrachteten Anlagen wird anschließend der Schattenwurf simuliert. Hierbei müssen auch die Eigenschaften des Geländes wie etwa Höhenunterschiede berücksichtigt werden. Das zu betrachtende Gebiet richtet sich hierbei nach der Entfernung zu den Windenergieanlagen: Alle Orte, an denen die Sonnenfläche zu mindestens 20 % durch einen Rotorflügel verdeckt werden kann, müssen berücksichtigt werden. Zur Vereinfachung wird dabei von einem rechteckigen Rotorflügel mit mittlerer Blatttiefe ausgegangen.

Einen großen Einfluss auf den Schatten hat die Bewölkung. Durch sie kann zu jeder Tageszeit ein Schattenwurf verhindert werden. Den größten Einfluss hat jedoch die Position der Sonne. Zum einen bestimmt sie durch ihre Himmelsrichtung die Richtung in die der Schatten fällt. Zum anderen beeinflusst sie durch ihre Höhe über dem Horizont die Länge des Schattens. Da sich die Himmelsrichtung der Sonne im Verlauf des Tages und die Höhe der Sonne über dem Horizont sowohl im Tages- als auch im Jahresverlauf ändern, entsteht hierbei ein wandernder Schatten. Dabei ist der Schatten morgens und abends länger als am Mittag, und im Winter länger als im Sommer. Der längste Schattenwurf ist hierbei kurz nach Sonnenaufgang und kurz vor Sonnenuntergang zu erwarten. Da sich die Höhe der Sonne über dem Horizont zu diesen Zeiten aber besonders schnell ändert, ändert sich auch die Länge des Schattens entsprechend schnell. Für die Berechnung werden nur Zeiten betrachtet, bei denen die Sonne mindestens 3 Grad über dem Horizont steht. Für einen niedrigeren Sonnenstand ist aufgrund von Bebauung, Bewuchs und der zu durchdringenden Atmosphärenschicht nicht mit Schattenwurf zu rechnen.

Zur Bewertung des Schattenwurfs ist die Ermittlung der Standorte der maßgeblichen Immissionsorte erforderlich. Hierbei handelt es sich um Räume in Gebäuden, bei denen aufgrund ihrer Nutzung die potenzielle Beeinträchtigung durch Schatten besonders groß

sind. Diese Räume sind vor allem in Wohngebäuden zu finden (z.B. Wohn- und Schlaf- räume), aber auch Unterrichts-, Praxis-, Büro- und Arbeitsräume zählen dazu. Um den Berechnungsaufwand zu begrenzen, werden lediglich die Immissionsorte betrachtet, bei denen aufgrund ihrer Position eine besonders starke Beeinflussung durch Schattenwurf zu erwarten ist.

Um eine übermäßige Belastung der Anwohner möglichst sicher ausschließen zu können, wird bei der Berechnung der „Worst Case“ angewendet. Es wird davon ausgegangen, dass die Sonne nie durch Bewölkung verdeckt wird, sowie dass die Anlagen immer in Betrieb sind. Es gibt also keinen Stillstand aufgrund von Windmangel, Defekten oder Wartungsarbeiten. Des Weiteren wird davon ausgegangen, dass der Wind immer aus der gleichen Richtung weht, wie die Sonne scheint. Auch wird eine Verdeckung der Immissionsorte durch Bewuchs oder Bebauung ausgeschlossen. Durch diese Annahmen wird sichergestellt, dass für die Immissionsorte die astronomisch maximal mögliche Beschattungsdauer errechnet wird. Die Berechnung soll für einen punktförmigen Rezeptor in 2 m Höhe erfolgen. Für die hier vorliegende Betrachtung wird von den oben genannten Bedingungen ausgegangen. Der Rezeptor wird aus programmtechnischen Gründen jedoch nicht punktförmig, sondern mit einer Fläche von 10 cm x 10 cm angenommen. Dadurch liegen die berechneten Schattenwurfdauern leicht über den Ergebnissen für punktförmige Rezeptoren. Die Rezeptoren sind wegen der großen Anzahl von Windenergieanlagen auf den Gewächshausmodus eingestellt. Hier wird der Schatten im Gegensatz zum Fenstermodus aus allen Richtungen empfangen.

Die Ergebnisse der Berechnungen werden anschließend für jeden Immissionsort mit den Vorgaben des LAI abgeglichen: Um eine unzumutbare Beeinträchtigung zu verhindern, darf die maximale tägliche Verschattungsdauer 30 Minuten und die die maximale jährliche Verschattungsdauer 30 Stunden nicht überschreiten. Sollte an einem Immissionsort durch den Bau einer neuen Anlage eine Überschreitung der Grenzwerte zu erwarten sein, so sind Maßnahmen zur Einhaltung des Grenzwertes zu ergreifen: Dazu kann eine Abschaltvorrichtung in der Anlage installiert werden. Diese schaltet die Anlage ab, wenn sie den betroffenen Immissionsort verschatten würde.

## 4 Berechnung des Schattenwurfs

In Berechnungen von Schattenwurf-Weiten und Zeiten werden alle Randbedingungen, die vorstehend geschildert wurden, mit ihren ungünstigsten Ausprägungen angesetzt. D.h. es wird davon ausgegangen, dass es nie Wolken gibt, keine Flaute herrscht und somit die Windenergieanlagen sich immer drehen und der Wind immer aus der gleichen Richtung wie die Sonne kommt und damit die größte mögliche Fläche von Schatten betroffen ist.

Die Berechnung des Schattenwurfes wird mit dem Programm WindPRO von EMD International A/S (Aalborg-Dänemark) in der aktuellen Version 4.1.287 vom Juni 2025 mit dem Programmteil *Shadow* vorgenommen.

Als Schattenverursacher werden 23 Windenergieanlagen an den vom Auftraggeber vorgegebenen Positionen angenommen. Diese sind die 5 vom Auftraggeber beantragten Standort und 18 einer bereits genehmigten bestehende bzw. geplanten Windenergieanlagen. Die angesetzten Koordinaten sind dem Anhang (Shadow-Hauptergebnis) zu entnehmen. Dabei werden die folgenden technischen Daten der Windenergieanlagen zugrunde gelegt. Die Nummerierung der Anlagen bezieht sich auf die im Berechnungsausdruck SHADOW (siehe Anhang) angegebene Liste:

- o **Gesamtbelastung:**  
alle 23 WEA im Windpark Südergellersen
  
- o **Zusatzbelastung:**  
  
  - 5 x Nordex N175 6.X-6.800**
  - 6.800 kW Nennleistung
  - 175 m Rotordurchmesser
  - 179 m Nabenhöhe
  
- o **Vorbelastung:**  
18 weiter bestehende WEA

**Tabelle 1:** Die Windenergieanlagen der Vorbelastung

WEA	Hersteller	Typ, Generator	Leistung [kW]	Rotor [m]	Nabe [m]
B 01	NORDEX	N149/4.0-4.5-4.500	4.500	149,0	125,0
B 02	NORDEX	N131/3300-3.300	3.300	131,0	134,0
B 03	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 04	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 05	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 06	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 07	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 08	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 09	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0
B 10	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0
B 11	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0
B 12	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0
B 13	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0
Oerzen 1	NORDEX	N175/6.X-6.800	6.800	175,0	179,0
Oerzen 2	NORDEX	N175/6.X-6.800	6.800	175,0	179,0
Oerzen 3	NORDEX	N175/6.X-6.800	6.800	175,0	179,0
Oerzen 4	NORDEX	N175/6.X-6.800	6.800	175,0	179,0
Oerzen 5	NORDEX	N175/6.X-6.800	6.800	175,0	179,0

In einem ersten Schritt werden die Schattenwurfzeiten an ausgewählten, auf der Kartengrundlage erkennbaren Gebäuden, im Umfeld der Windenergieanlagen mit vermuteter Wohnnutzung ermittelt, die den neu zu errichtenden Windenergieanlagen am nächsten liegen.

Die dadurch entstehenden Untersuchungspunkte werden im Vokabular der verwendeten Software als „Schattenrezeptoren“ bezeichnet. Hier im Text werden sie auch Immissionsorte (IO) genannt. Die Schattenrezeptoren werden entsprechend der Vorgabe des „Arbeitskreises Schattenwurf von Windenergieanlagen“ angesetzt. Konkret sind jeweils über den entsprechenden Hauswänden in einer Höhe von 2 m ebene Rezeptoren (Neigung des Fensters gleich 0°) mit einer Größe von 0,1 m x 0,1 m angenommen (annähernd punktförmig). Als Ausrichtungsmodus wird der Gewächshausmodus gewählt, da dieser Schatteneinfall aus allen Richtungen berücksichtigt. Für real in den Gebäuden vorhandene Fenster können sich andere Beschattungsdauern, als hier rechnerisch ermittelt, ergeben, da die Positionen und Größen von den hier getroffenen Annahmen abweichen werden. Allerdings bleibt auch ggf. vorhandener schattenverdeckender Bewuchs vor den Fenstern hier unbeachtet.

In einem *zweiten Schritt* werden Schattendauerlinien für die Umgebung des Windparks berechnet. Hier wird für jeden Punkt auf einem Raster von 20 \* 20 Metern die im Jahresverlauf auftretende Beschattung ermittelt und Punkte gleicher Beschattungsdauer werden durch Linien verbunden. Im Anhang befinden sich die Ausdrücke der Berechnungen.

Die folgende Tabelle gibt eine Übersicht über die Lage der Immissionsorte.

**Tabelle 2:** Koordinaten der Immissionsorte, Alle Koordinatenangaben in: UTM (north)- ETRS89 Zone: 32

IO-Nr.	Name	Ost	Nord	Z [m]
s01	Neu Oerzen, Soltauer Straße 1	588.101,7	5.893.084,2	46,4
s02	Oerzen, Am Ohfeld 1	588.404,8	5.894.762,2	45,3
s03	Oerzen, Am Ohfeld 4	588.478,4	5.894.877,5	40,0
s04	Oerzen, Am Ohfeld 9	588.431,5	5.894.865,5	40,0
s05	Oerzen, Am Ohfeld 15	588.429,4	5.894.972,8	43,6
s06	Oerzen, Im Dorfe 14	588.496,1	5.894.607,3	48,1
s07	Oerzen, Im Dorfe 16	588.303,1	5.894.557,6	47,8
s08	Oerzen, Im Dorfe 19	588.526,8	5.894.534,4	50,0
s09	Oerzen, Im Dorfe 25	588.443,9	5.894.543,8	50,0
s10	Oerzen, Westerheide 1	588.389,1	5.894.636,1	49,6
s11	Oerzen, Westerheide 3	588.370,1	5.894.675,9	47,7
s12	Oerzen, Westerheide 4	588.427,4	5.894.685,8	48,0
s13	Oerzen, Westerheide 5	588.381,0	5.894.813,7	42,6
s14	Oerzen, Westerheide 12A	588.325,0	5.894.865,9	42,6
s15	Oerzen, Westerheide 12C	588.306,5	5.894.823,7	44,5
s16	Oerzen, Westerheide 18	588.256,0	5.894.856,0	45,0
s17	Oerzen, Westerheide 19	588.291,4	5.894.974,5	48,1
s18	Oerzen, Westerheide 20	588.229,9	5.894.881,8	47,7
s19	Oerzen, Westerheide 22	588.185,2	5.894.847,2	46,0
s20	Oerzen, Westerheide 28	588.102,7	5.894.825,3	47,2
s21	Oerzen, Zum Hasel 5	587.786,3	5.893.215,0	57,9
s22	Oerzen, Zum Hasel 10	588.158,0	5.893.781,7	45,8
s23	Oerzen, Mühlenweg 10	588.545,4	5.894.776,2	44,6
s24	Oerzen, Mühlenweg 18	588.468,7	5.894.823,3	42,4
s25	Südergellersen, Auf dem Brink 6	586.477,5	5.896.246,7	67,4
s26	Südergellersen, Auf dem Brink 7	586.498,2	5.896.189,4	65,8
s27	Südergellersen, Birkenweg 7	586.547,8	5.896.410,5	65,2
s28	Südergellersen, Forstweg 4	586.302,3	5.896.127,2	65,0
s29	Südergellersen, Forstweg 8	586.230,1	5.896.140,7	65,0
s30	Südergellersen, Forstweg 11	586.166,4	5.896.101,6	63,6

s31	Südergellersen, Forstweg 16	586.112,1	5.896.167,0	64,0
s32	Südergellersen, Forstweg 17	586.094,1	5.896.128,7	62,5
s33	Südergellersen, Gewerbegebiet 587	587.007,3	5.895.062,8	43,3
s34	Südergellersen, Heidberg 2	586.177,4	5.896.183,9	66,8
s35	Südergellersen, Heidberg 3	586.154,2	5.896.223,0	66,9
s36	Südergellersen, Heiligenthaler Weg 2	586.863,9	5.896.155,5	55,9
s37	Südergellersen, Heiligenthaler Weg 3	586.792,8	5.896.190,0	58,8
s38	Südergellersen, Heiligenthaler Weg 3c	586.833,1	5.896.217,7	58,1
s39	Südergellersen, Heiligenthaler Weg 11	586.911,1	5.896.239,1	52,2
s40	Südergellersen, Im Alten Dorfe 2	586.402,6	5.896.082,0	64,0
s41	Südergellersen, Im Alten Dorfe 3	586.453,7	5.896.115,5	65,2
s42	Südergellersen, Im Alten Dorfe 4	586.480,0	5.896.021,4	61,1
s43	Südergellersen, Im Alten Dorfe 5	586.561,2	5.896.156,3	63,0
s44	Südergellersen, Im Alten Dorfe 7	586.616,6	5.896.197,1	62,0
s45	Südergellersen, Im Alten Dorfe 8	586.561,9	5.896.067,6	60,9
s46	Südergellersen, Im Alten Dorfe 10A	586.625,5	5.896.101,5	60,2
s47	Südergellersen, Kirchgellerser Straße 2	586.638,0	5.896.277,9	62,7
s48	Südergellersen, Kirchgellerser Straße 3	586.594,8	5.896.327,3	63,8
s49	Südergellersen, Kirchgellerser Straße 6	586.637,2	5.896.375,2	63,6
s50	Südergellersen, Kirchgellerser Straße 9	586.617,5	5.896.432,1	64,5
s51	Südergellersen, Kirchgellerser Straße 10	586.660,0	5.896.465,5	63,2
s52	Südergellersen, Kirchgellerser Straße 13	586.632,2	5.896.499,1	64,0
s53	Südergellersen, Kirchgellerser Straße 15	586.747,3	5.896.191,6	60,0
s54	Südergellersen, Kirchgellerser Straße 16	586.731,0	5.896.121,0	59,3
s55	Südergellersen, Oerzer Str. 13A	586.909,5	5.895.981,7	53,8
s56	Südergellersen, Oerzer Str. 15	587.010,6	5.895.899,8	50,0
s57	Südergellersen, Oerzer Str. 18	586.781,3	5.896.062,2	56,4
s58	Südergellersen, Oerzer Str. 19	586.879,7	5.895.864,2	49,3
s59	Südergellersen, Poggenpohl 7	586.751,1	5.895.922,0	55,9
s60	Südergellersen, Poggenpohl 8	586.640,6	5.895.995,8	58,5
s61	Südergellersen, Schwarzer Weg 2	586.403,0	5.896.246,5	71,4
s62	Südergellersen, Schwarzer Weg 9	586.404,8	5.896.338,8	69,4
s63	Südergellersen, Westergellerser Weg 1	586.545,3	5.896.256,4	63,9
s64	Südergellersen, Westergellerser Weg 4	586.498,9	5.896.338,8	65,0
s65	Südergellersen, Wetzter Weg 3	586.268,4	5.896.052,0	63,3
s66	Südergellersen, Wetzter Weg 6	586.172,4	5.895.854,5	57,8
s67	Südergellersen, In de Masch 8	586.717,4	5.896.250,8	61,1
s68	Wetzen, Zum Lerchenberg 5	583.085,3	5.892.839,1	65,0
s69	Wetzen, Zum Lerchenberg 10	583.242,4	5.892.711,0	60,0
s70	Wetzen, Zum Lerchenberg 37	582.866,7	5.892.994,9	69,4

## **5 Erläuterung zu den Resultatausdrucken**

Die Berechnungsergebnisse des Programmes WindPRO, Programmteil Shadow zum Berechnen des Schattenwurfes im Rahmen dieses Gutachtens befinden sich im Anhang, nachfolgend einige ergänzende Erläuterungen zu den einzelnen Berechnungsergebnissen.

### **SHADOW – Hauptergebnis**

Auf dieser Ausgabeseite werden die Berechnungsgrundlagen und eine Kurzfassung der Berechnungsergebnisse aufgeführt. Das Berechnungsverfahren ist kurz textlich erläutert und die berücksichtigten Anlagenstandorte und Schattenrezeptoren sind tabellarisch angegeben.

Für die Windenergieanlagen sind neben den genauen Standorten und den entscheidenden technischen Daten Nabenhöhe und Rotordurchmesser auch weitere Angaben enthalten, wie z.B. den Beschattungsbereich (s Kapitel 3) und wenn vorhanden die Rotordrehzahl.

Die Schattenrezeptoren (Immissionsorte) sind in einer gesonderten Tabelle mit allen relevanten Daten abgedruckt. Im Ausrichtungsmodus „Gewächshaus-Modus“ wird Schatten aus allen Himmelsrichtungen empfangen. Die „Neigung des Fensters“ bezieht sich auf die Neigung gegenüber dem Boden. Fenster in den Außenwänden haben einen Winkel von 90 Grad, gegebenenfalls vorhandene Dachfenster haben entsprechend abweichende Ausrichtungen. Ebene Rezeptoren (Flachdach, Terrasse) haben eine Neigung von 0°.

Unter „Berechnungsergebnisse“ werden die unter „Worst Case“-Annahmen, (d. h. die astronomische, maximale Beschattungsdauer) berechneten Ergebnisse kurz zusammengefasst. Diese sind neben der Anzahl der Tage im Jahr an denen Schattenwurf am Immissionsort auftritt, die Gesamtdauer in Stunden und Minuten pro Jahr sowie die maximalen täglichen Schattendauern in Stunden und Minuten pro Tag.

### **SHADOW – Kalender**

Der Ausdruck Kalender (nur ausgedruckt für die Rezeptoren an denen Schatten auftritt) zeigt für jeden Schattenrezeptor separat, an welchen Tagen im Jahr und über welche Dauer am einzelnen Tag mit Schatten zu rechnen ist.

In einer Tabelle sind spaltenweise die Monate und zeilenweise die Tage (zwei Zeilen pro Tag) angegeben. Für jeden Tag sind die Sonnenaufgangs- und die Sonnenuntergangszeit ausgedruckt. Fällt an dem entsprechenden Tag ein Schatten einer Windenergieanlage auf das Fenster wird die Schattendauer, die Anfangs- und Endzeit des Schattens sowie die Bezeichnung der verursachenden Windenergieanlage aufgeführt.

Eine Erläuterung der einzelnen Werte befindet sich unterhalb der Tabelle. Als letzte Zeile der Tabelle sind die Schattendauern in Minuten pro Monat aufaddiert. Im Shadow Kalender sind nur die Schatten verursachenden Windenergieanlagen aufgeführt.

Anhand der Angaben kann ermittelt werden, welchen Beitrag zur Gesamtbeschattung die einzelnen Anlagen liefern.

## SHADOW – Kalender, grafisch

Die grafische Kalenderdarstellung ist eine übersichtliche Aufbereitung und Ergänzung zu den tabellarischen Kalendern. Die Darstellung ist für alle Schattenrezeptoren, die vom Schattenwurf der Windenergieanlagen betroffen sind, ausgeführt. In den Grafiken ist für die einzelnen Rezeptoren schnell erkennbar, wie sich die Beschattungszeiten über das Jahr und die einzelnen Tage verteilen. Als Anhaltspunkte sind jeweils die Zeiten des Sonnenauf- und -untergangs, für die Sommermonate unter Berücksichtigung der Sommerzeit, als Begrenzungslinien eingetragen. Die Schattenanteile der verschiedenen Anlagenstandorte sind durch die Farbgebung identifizierbar.

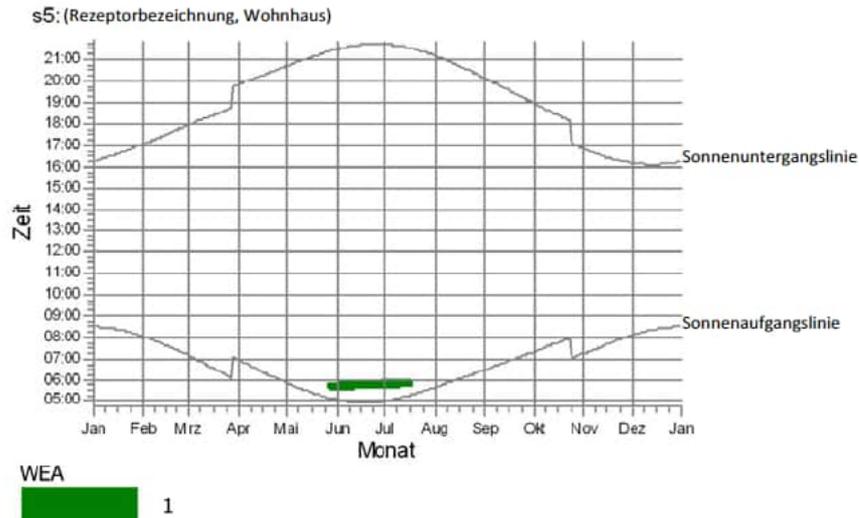
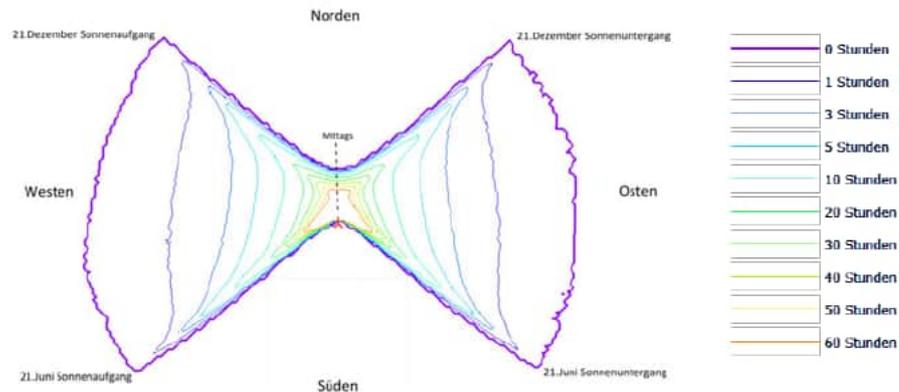


Abbildung 1: grafische Kalenderdarstellung

## SHADOW – Karte der Schattendauerlinien

Als letzter Ausdruck findet sich eine Karte mit eingetragenen Linien gleicher Schattendauer pro Jahr. Aus dieser Karte ist leicht ablesbar, welche Bereiche am stärksten vom Schattenwurf betroffen sind. Die Karte zeigt deutlich, dass die Schattenwirkung weit nach Osten und Westen reicht und in direkter Nord- bzw. Süd-Richtung unproblematischer ist.



**Abbildung 2:** Schattendauerdiagramm für eine Windanlage für ein ganzes Jahr

Das Diagramm zeigt die komplette Fläche, auf der eine Windanlage im Laufe eines Jahres Schatten werfen kann.

Die Windanlage ist der rote Stern in der Mitte. Dort und in deren näherer Umgebung ist der meiste Schatten möglich, da dort die Sonne oben am Himmel steht (die rote bis zu den grünen Linien). Diese hohen Sonnenwinkel, in deren Folge der Schattenwurf auf einer Fläche weniger wird, sind häufiger als die sehr niedrigen zur Dämmerung, wenn auch weiter entfernte Gebiete erreicht werden (die blauen Linien).

Die violette Linie ist die Grenze, ab der kein Schatten mehr vorkommt.

Die Farben der Linien in der Karte im Anhang können von den hier beschriebenen abweichen.

## 6 Ergebnis der Schattenwurfberechnung

An dieser Stelle werden kurz die Endergebnisse der im Anhang befindlichen Ausdrücke zusammengefasst. Die Berechnungen wurden für die 5 geplanten Windenergieanlagen (**Zusatzbelastung**), die 18 bestehenden (**Vorbelastung**) und für alle 23 Windenergieanlagen (**Gesamtbelastung**) durchgeführt.

Der real entstehende Anteil der Beschattung wird langfristig gesehen bei nur ca. 25% dieser berechneten Werte liegen. Hinzu kommt, dass bei diesen Werten eine Abschirmung der Fenster durch Hindernisse und auch Bäume nicht berücksichtigt wird, und so die Schattenwirkung besonders von Frühjahr bis Herbst weiter gemindert wird.

Auf dem Kalender und den grafischen Kalenderausdrücken ist der Schattenwurfanteil der vom Auftraggeber beantragten Windenergieanlagen gut zu erkennen. Der Kalender und der grafische Kalender, für die vom Schattenwurf betroffenen Rezeptoren, befinden sich im Anhang. An den im Einzelnen betrachteten Schattenrezeptoren ergibt sich folgende Situation der astronomisch maximal möglichen Beschattungsdauer:

**Tabelle 3:** Die **jährlichen** Schattenzeiten an den Rezeptoren für die Gesamtbelastung, sowie Vor- und Zusatz-Belastung. Überschreitungen sind fett gedruckt und grau hinterlegt.

IO Nr.	Name	Gesamt- belastung	Zusatz- belastung	Vorbelastung
		Stunden / Jahr [Std:Min]	Stunden / Jahr [Std:Min]	Stunden / Jahr [Std:Min]
s01	Neu Oerzen, Soltauer Straße 1	0:00	0:00	0:00
s02	Oerzen, Am Ohfeld 1	<b>54:40</b>	17:41	<b>38:32</b>
s03	Oerzen, Am Ohfeld 4	<b>47:02</b>	15:56	<b>34:15</b>
s04	Oerzen, Am Ohfeld 9	<b>50:47</b>	16:55	<b>37:04</b>
s05	Oerzen, Am Ohfeld 15	<b>49:31</b>	16:19	<b>38:01</b>
s06	Oerzen, Im Dorfe 14	<b>51:18</b>	16:02	<b>35:16</b>
s07	Oerzen, Im Dorfe 16	<b>71:46</b>	21:28	<b>51:06</b>
s08	Oerzen, Im Dorfe 19	<b>35:44</b>	0:00	<b>35:44</b>
s09	Oerzen, Im Dorfe 25	<b>57:14</b>	17:24	<b>40:22</b>
s10	Oerzen, Westerheide 1	<b>59:19</b>	18:20	<b>40:59</b>
s11	Oerzen, Westerheide 3	<b>59:58</b>	18:45	<b>41:31</b>
s12	Oerzen, Westerheide 4	<b>54:14</b>	17:14	<b>37:23</b>
s13	Oerzen, Westerheide 5	<b>55:53</b>	18:04	<b>40:17</b>
s14	Oerzen, Westerheide 12A	<b>60:09</b>	19:12	<b>44:42</b>
s15	Oerzen, Westerheide 12C	<b>62:51</b>	19:42	<b>46:09</b>
s16	Oerzen, Westerheide 18	<b>67:54</b>	20:59	<b>50:58</b>
s17	Oerzen, Westerheide 19	<b>61:44</b>	19:07	<b>48:29</b>
s18	Oerzen, Westerheide 20	<b>70:26</b>	21:24	<b>53:49</b>
s19	Oerzen, Westerheide 22	<b>77:16</b>	23:01	<b>58:29</b>
s20	Oerzen, Westerheide 28	<b>98:48</b>	<b>33:57</b>	<b>69:53</b>
s21	Oerzen, Zum Hasel 5	16:16	0:00	16:16
s22	Oerzen, Zum Hasel 10	<b>47:29</b>	26:11	23:07
s23	Oerzen, Mühlenweg 10	<b>30:40</b>	0:00	<b>30:40</b>
s24	Oerzen, Mühlenweg 18	<b>48:19</b>	16:11	<b>34:27</b>
s25	Südergellersen, Auf dem Brink 6	0:00	0:00	0:00
s26	Südergellersen, Auf dem Brink 7	0:00	0:00	0:00
s27	Südergellersen, Birkenweg 7	0:00	0:00	0:00
s28	Südergellersen, Forstweg 4	5:50	0:00	5:50

s29	Südergellersen, Forstweg 8	11:10	2:23	8:47
s30	Südergellersen, Forstweg 11	28:05	12:28	15:37
s31	Südergellersen, Forstweg 16	20:52	7:51	13:01
s32	Südergellersen, Forstweg 17	<b>31:03</b>	14:18	16:45
s33	Südergellersen, Gewerbegebiet 729	<b>729:45</b>	<b>377:57</b>	<b>359:00</b>
s34	Südergellersen, Heidberg 2	7:45	0:00	7:45
s35	Südergellersen, Heidberg 3	5:56	0:00	5:56
s36	Südergellersen, Heiligenthaler Weg 2	<b>31:23</b>	6:38	24:45
s37	Südergellersen, Heiligenthaler Weg 3	19:41	0:00	19:41
s38	Südergellersen, Heiligenthaler Weg 3c	19:25	0:00	19:25
s39	Südergellersen, Heiligenthaler Weg 11	21:43	0:00	21:43
s40	Südergellersen, Im Alten Dorfe 2	3:43	0:00	3:43
s41	Südergellersen, Im Alten Dorfe 3	0:00	0:00	0:00
s42	Südergellersen, Im Alten Dorfe 4	28:18	6:22	21:56
s43	Südergellersen, Im Alten Dorfe 5	4:40	0:00	4:40
s44	Südergellersen, Im Alten Dorfe 7	5:15	0:00	5:15
s45	Südergellersen, Im Alten Dorfe 8	17:07	0:00	17:07
s46	Südergellersen, Im Alten Dorfe 10A	18:07	0:00	18:07
s47	Südergellersen, Kirchgellerser Straße 2	0:00	0:00	0:00
s48	Südergellersen, Kirchgellerser Straße 3	0:00	0:00	0:00
s49	Südergellersen, Kirchgellerser Straße 6	0:00	0:00	0:00
s50	Südergellersen, Kirchgellerser Straße 9	0:00	0:00	0:00
s51	Südergellersen, Kirchgellerser Straße 10	0:00	0:00	0:00
s52	Südergellersen, Kirchgellerser Straße 13	0:00	0:00	0:00
s53	Südergellersen, Kirchgellerser Straße 15	16:39	0:00	16:39
s54	Südergellersen, Kirchgellerser Straße 16	22:55	0:00	22:55
s55	Südergellersen, Oerzer Str. 13A	<b>84:16</b>	<b>66:04</b>	18:12
s56	Südergellersen, Oerzer Str. 15	<b>116:41</b>	<b>102:41</b>	14:00
s57	Südergellersen, Oerzer Str. 18	<b>45:20</b>	15:37	29:43
s58	Südergellersen, Oerzer Str. 19	<b>130:08</b>	<b>107:22</b>	22:46
s59	Südergellersen, Poggenpohl 7	<b>94:05</b>	<b>62:25</b>	<b>31:40</b>
s60	Südergellersen, Poggenpohl 8	<b>46:42</b>	14:55	<b>31:47</b>
s61	Südergellersen, Schwarzer Weg 2	0:00	0:00	0:00
s62	Südergellersen, Schwarzer Weg 9	0:00	0:00	0:00

s63	Südergellersen, Westergellenser Weg 1	0:00	0:00	0:00
s64	Südergellersen, Westergellenser Weg 4	0:00	0:00	0:00
s65	Südergellersen, Wetzter Weg 3	27:07	12:22	14:45
s66	Südergellersen, Wetzter Weg 6	<b>114:34</b>	<b>56:26</b>	<b>58:08</b>
s67	Südergellersen, In de Masch 8	8:07	0:00	8:07
s68	Wetzen, Zum Lerchenberg 5	20:25	0:00	20:25
s69	Wetzen, Zum Lerchenberg 10	13:47	0:00	13:47
s70	Wetzen, Zum Lerchenberg 37	<b>35:54</b>	0:00	<b>35:54</b>

**Tabelle 4:** Die **täglichen** Schattenzeiten an den Rezeptoren für die Gesamtbelastung, sowie Vor- und Zusatzbelastung. Überschreitungen sind fett gedruckt und grau hinterlegt.

IO Nr.	Name	Gesamtbelastung	Zusatzbelastung	Vorbelastung
		Stunden / Jahr [Std:Min]	Stunden / Jahr [Std:Min]	Stunden / Jahr [Std:Min]
s01	Neu Oerzen, Soltauer Straße 1	0:00	0:00	0:00
s02	Oerzen, Am Ohfeld 1	<b>0:48</b>	0:23	<b>0:38</b>
s03	Oerzen, Am Ohfeld 4	<b>0:41</b>	0:22	<b>0:38</b>
s04	Oerzen, Am Ohfeld 9	<b>0:43</b>	0:23	<b>0:41</b>
s05	Oerzen, Am Ohfeld 15	<b>0:44</b>	0:23	<b>0:44</b>
s06	Oerzen, Im Dorfe 14	<b>0:48</b>	0:22	<b>0:32</b>
s07	Oerzen, Im Dorfe 16	<b>0:55</b>	0:24	<b>0:39</b>
s08	Oerzen, Im Dorfe 19	<b>0:32</b>	0:00	<b>0:32</b>
s09	Oerzen, Im Dorfe 25	<b>0:49</b>	0:23	<b>0:34</b>
s10	Oerzen, Westerheide 1	<b>0:53</b>	0:23	<b>0:35</b>
s11	Oerzen, Westerheide 3	<b>0:53</b>	0:24	<b>0:35</b>
s12	Oerzen, Westerheide 4	<b>0:50</b>	0:23	<b>0:33</b>
s13	Oerzen, Westerheide 5	<b>0:48</b>	0:23	<b>0:41</b>
s14	Oerzen, Westerheide 12A	<b>0:47</b>	0:24	<b>0:46</b>
s15	Oerzen, Westerheide 12C	<b>0:49</b>	0:24	<b>0:45</b>
s16	Oerzen, Westerheide 18	<b>0:50</b>	0:25	<b>0:49</b>
s17	Oerzen, Westerheide 19	<b>0:51</b>	0:25	<b>0:51</b>
s18	Oerzen, Westerheide 20	<b>0:52</b>	0:25	<b>0:52</b>
s19	Oerzen, Westerheide 22	<b>0:55</b>	0:27	<b>0:54</b>
s20	Oerzen, Westerheide 28	<b>1:08</b>	0:30	<b>1:00</b>
s21	Oerzen, Zum Hasel 5	0:24	0:00	0:24
s22	Oerzen, Zum Hasel 10	0:30	0:25	0:28
s23	Oerzen, Mühlenweg 10	<b>0:32</b>	0:00	<b>0:32</b>
s24	Oerzen, Mühlenweg 18	<b>0:43</b>	0:22	<b>0:38</b>
s25	Südergellersen, Auf dem Brink 6	0:00	0:00	0:00
s26	Südergellersen, Auf dem Brink 7	0:00	0:00	0:00
s27	Südergellersen, Birkenweg 7	0:00	0:00	0:00
s28	Südergellersen, Forstweg 4	0:17	0:00	0:17
s29	Südergellersen, Forstweg 8	<b>0:32</b>	0:12	0:20
s30	Südergellersen, Forstweg 11	<b>0:51</b>	0:26	0:25
s31	Südergellersen, Forstweg 16	<b>0:43</b>	0:21	0:23
s32	Südergellersen, Forstweg 17	<b>0:52</b>	0:28	0:25
s33	Südergellersen, Gewerbegebiet 729	<b>3:06</b>	<b>1:43</b>	<b>2:14</b>
s34	Südergellersen, Heidberg 2	0:19	0:00	0:19
s35	Südergellersen, Heidberg 3	0:17	0:00	0:17

s36	Südergellersen, Heiligenthaler Weg 2	<b>0:46</b>	0:24	0:27
s37	Südergellersen, Heiligenthaler Weg 3	0:27	0:00	0:27
s38	Südergellersen, Heiligenthaler Weg 3c	0:26	0:00	0:26
s39	Südergellersen, Heiligenthaler Weg 11	0:25	0:00	0:25
s40	Südergellersen, Im Alten Dorfe 2	0:14	0:00	0:14
s41	Südergellersen, Im Alten Dorfe 3	0:00	0:00	0:00
s42	Südergellersen, Im Alten Dorfe 4	<b>1:06</b>	0:20	<b>0:46</b>
s43	Südergellersen, Im Alten Dorfe 5	0:16	0:00	0:16
s44	Südergellersen, Im Alten Dorfe 7	0:16	0:00	0:16
s45	Südergellersen, Im Alten Dorfe 8	0:29	0:00	0:29
s46	Südergellersen, Im Alten Dorfe 10A	0:29	0:00	0:29
s47	Südergellersen, Kirchgellerser Straße 2	0:00	0:00	0:00
s48	Südergellersen, Kirchgellerser Straße 3	0:00	0:00	0:00
s49	Südergellersen, Kirchgellerser Straße 6	0:00	0:00	0:00
s50	Südergellersen, Kirchgellerser Straße 9	0:00	0:00	0:00
s51	Südergellersen, Kirchgellerser Straße 10	0:00	0:00	0:00
s52	Südergellersen, Kirchgellerser Straße 13	0:00	0:00	0:00
s53	Südergellersen, Kirchgellerser Straße 15	0:26	0:00	0:26
s54	Südergellersen, Kirchgellerser Straße 16	0:29	0:00	0:29
s55	Südergellersen, Oerzer Str. 13A	<b>1:34</b>	<b>1:34</b>	0:28
s56	Südergellersen, Oerzer Str. 15	<b>1:38</b>	<b>1:38</b>	0:27
s57	Südergellersen, Oerzer Str. 18	<b>1:15</b>	<b>0:50</b>	0:29
s58	Südergellersen, Oerzer Str. 19	<b>2:06</b>	<b>1:51</b>	0:30
s59	Südergellersen, Poggenpohl 7	<b>1:51</b>	<b>1:38</b>	<b>0:32</b>
s60	Südergellersen, Poggenpohl 8	<b>1:21</b>	<b>0:49</b>	<b>0:33</b>
s61	Südergellersen, Schwarzer Weg 2	0:00	0:00	0:00
s62	Südergellersen, Schwarzer Weg 9	0:00	0:00	0:00
s63	Südergellersen, Westergellerser Weg 1	0:00	0:00	0:00
s64	Südergellersen, Westergellerser Weg 4	0:00	0:00	0:00
s65	Südergellersen, Wetzter Weg 3	<b>0:52</b>	0:27	0:25
s66	Südergellersen, Wetzter Weg 6	<b>2:17</b>	<b>1:04</b>	<b>1:14</b>

s67	Südergellersen, In de Masch 8	0:20	0:00	0:20
s68	Wetzen, Zum Lerchenberg 5	0:19	0:00	0:19
s69	Wetzen, Zum Lerchenberg 10	0:18	0:00	0:18
s70	Wetzen, Zum Lerchenberg 37	<b>0:40</b>	0:00	<b>0:40</b>

Die Verteilung der Schattenwurfdauer auf der gesamten betrachteten Fläche kann der Karte im Anhang anhand der Iso-Schattenlinien für den jährlichen Schattenwurf entnommen werden.

An den umliegenden Dörfern und Häusern kommt es durch die geplanten Anlagen zum Teil zu großen Überschreitungen der Grenzwerte (max. 30 Stunden im Jahr und max. 30 Minuten täglich). Durch den großen Rotordurchmesser ist der Beschattungsbereich mit 1893 m sehr weit. Die Anlagen haben dagegen teilweise nur ca. 350 bis 900 m Abstand zu den Immissionsorten.

Benachbarte Häuser können ähnliche Beschattungswerte haben, wie die hier beispielhaft untersuchten Immissionsorte.

Für die Einhaltung der Grenzwerte muss eine spezielle Steuerung die Schattenwurf verursachenden Windenergieanlagen abschalten. Das Abschaltmodul besteht aus einem Sonnenscheindetektor und einer Steuereinheit, die bei einem möglichen Schattenwurf (in Abhängigkeit des Azimutwinkels der Windanlage und des Sonnenstands) die entsprechenden Windkraftanlagen abschaltet. Durch dieses Modul wird sichergestellt, dass die Windenergieanlagen, in dem kritischen Zeitraum mit Schattenwurf auf die betroffenen Immissionsorte, abgeschaltet werden und so die Richtwerte nicht überschritten werden.

## **7 Zusammenfassung**

Durch Errichtung und Betrieb der beantragten neuen Windenergieanlagen ist Schattenwurf an einigen der umliegenden Häuser zu erwarten.

Dabei kommt es zu Schattenwurf, der über den Grenzwerten (max. 30 Stunden im Jahr und max. 30 Minuten täglich) liegt.

Um die Überschreitungen zu verhindern und für die Einhaltung der Grenzwerte müssen die geplanten Anlagen mit einem Schattenabschaltmodul ausgestattet werden.

Bei der Bewertung der berechneten Zahlen ist zu berücksichtigen, dass sie jeweils unter „Worst Case“-Annahmen zustande gekommen sind und in der Realität wesentlich geringere Schattendauern festzustellen sein werden. Insbesondere ist zu bemerken, dass bereits vorhandene lichtundurchlässige Hindernisse vor den betrachteten Objekten nicht berücksichtigt wurden.

Für die Untersuchung wurden die durch den Auftraggeber dieses Gutachtens beantragten 5 Windenergieanlagen des Typs NORDEX N175/6.X-6.800 mit einer Nabenhöhe von 179 m und einem Rotordurchmesser von 175 m neben 18 bestehenden, genehmigten Windenergieanlagen an den vom Auftraggeber vorgegebenen Positionen angesetzt.

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SOWIWAS - Energie GmbH

Energie aus Sonne, Wind, Wasser und mehr

Watenstedter Straße 11

3 8 3 8 4 G e v e n s l e b e n

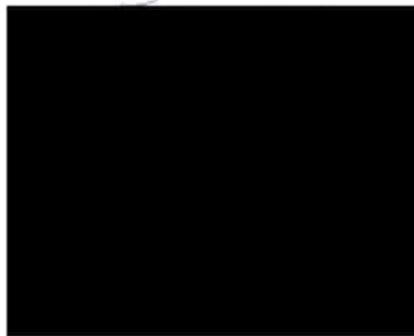
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Gevensleben, den 22. Juli 2025



## Anhang

### Ergebnisse der WindPRO Berechnung Shadow:

#### **Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand**

Hauptergebnis	4 Seiten
Kalender	100 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

#### **Berechnung: Zusatzbelastung Repowering 5x N175**

Hauptergebnis	4 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

#### **Berechnung: Vorbelastung Repowering 18 Bestand**

Hauptergebnis	4 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

Projekt:  
**Süderheide**

Lizenzierter Anwender:  
**SOWIWAS - Energie GmbH**  
Watenstedter Straße 11  
DE-38384 Gevensleben  
+49 0 53 54 / 99 06 - 235  
gutachten@sowiwas.de  
Berechnet:  
21.07.2025 15:59/4.1.287

## SHADOW - Hauptergebnis

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand

### Annahmen für Schattenwurfberechnung

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

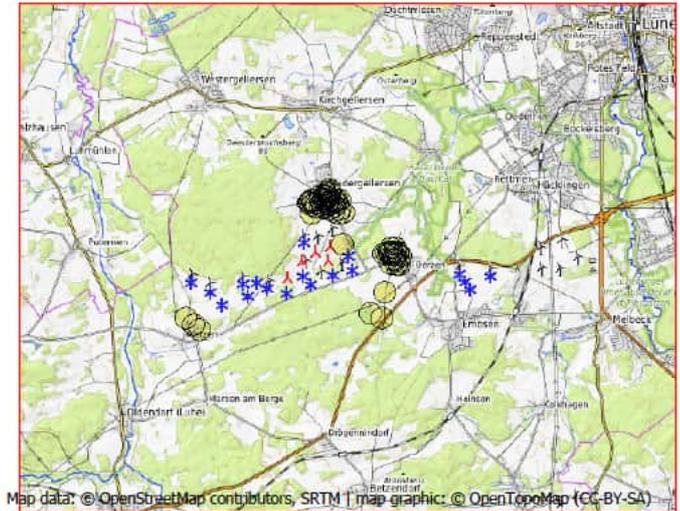
Minimale relevante Sonnenhöhe über Horizont 3 °  
Tage zwischen Berechnungen 1 Tag(e)  
Berechnungszeitsprung 1 Minuten

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

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

DHM: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)  
Rasterauflösung: 1,0 m

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



Maßstab 1:200.000  
▲ Neue WEA    \* Existierende WEA    ● Schattenrezeptor

### WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ		Typ	Nennleistung	Rotor-durchmesser	Schattendaten		
					Aktuell	Hersteller				NH	Beschatt.-Bereich	U/min
			[m]				[kW]	[m]	[m]	[m]	[U/min]	
B 01	585.971,6	5.895.090,6	50,0	NORDEX N1...	Ja	NORDEX	N149/4.0-4.5-4.500	4.500	149,0	125,0	1.822	10,7
B 02	585.959,5	5.894.188,5	45,0	NORDEX N1...	Ja	NORDEX	N131/3300 DE-3.300	3.300	131,0	134,0	1.722	10,9
B 03	585.020,8	5.893.835,6	50,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 04	584.733,6	5.893.984,8	50,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 05	584.375,7	5.893.950,2	55,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 06	584.497,2	5.893.629,8	56,7	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 07	583.821,9	5.893.385,7	64,4	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 08	583.491,9	5.893.713,6	60,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 09	582.991,2	5.893.966,5	55,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 10	590.139,5	5.894.321,8	37,1	ENERCON E-...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 11	590.290,9	5.894.120,4	40,0	ENERCON E-...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 12	590.431,2	5.893.915,7	42,1	ENERCON E-...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 13	590.960,7	5.894.291,0	45,6	ENERCON E-...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
Oerzen 1	587.151,9	5.894.746,2	45,6	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 2	587.284,9	5.894.361,9	40,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 3	586.751,2	5.894.214,7	49,2	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 4	586.171,4	5.893.951,1	50,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 5	585.523,5	5.893.709,1	56,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 10	586.619,0	5.894.596,4	42,4	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 11	586.661,3	5.895.000,3	44,3	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 5	585.563,4	5.894.124,0	45,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 8	585.927,2	5.894.596,0	48,8	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 9	586.287,4	5.894.833,5	45,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8

### Schattenrezeptor-Eingabe

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
s01	Neu Oerzen, Soltauer Straße 1	588.101,7	5.893.084,2	46,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s02	Oerzen, Am Ohfeld 1	588.404,8	5.894.762,2	45,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s03	Oerzen, Am Ohfeld 4	588.478,4	5.894.877,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s04	Oerzen, Am Ohfeld 9	588.431,5	5.894.865,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s05	Oerzen, Am Ohfeld 15	588.429,4	5.894.972,8	43,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s06	Oerzen, Im Dorfe 14	588.496,1	5.894.607,3	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s07	Oerzen, Im Dorfe 16	588.303,1	5.894.557,6	47,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0

(Fortsetzung nächste Seite)...

**SHADOW - Hauptergebnis****Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand**

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
s08	Oerzen, Im Dorfe 19	588.526,8	5.894.534,4	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s09	Oerzen, Im Dorfe 25	588.443,9	5.894.543,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s10	Oerzen, Westerheide 1	588.389,1	5.894.636,1	49,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s11	Oerzen, Westerheide 3	588.370,1	5.894.675,9	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s12	Oerzen, Westerheide 4	588.427,4	5.894.685,8	48,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s13	Oerzen, Westerheide 5	588.381,0	5.894.813,7	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s14	Oerzen, Westerheide 12A	588.325,0	5.894.865,9	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s15	Oerzen, Westerheide 12C	588.306,5	5.894.823,7	44,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s16	Oerzen, Westerheide 18	588.256,0	5.894.856,0	45,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s17	Oerzen, Westerheide 19	588.291,4	5.894.974,5	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s18	Oerzen, Westerheide 20	588.229,9	5.894.881,8	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s19	Oerzen, Westerheide 22	588.185,2	5.894.847,2	46,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s20	Oerzen, Westerheide 28	588.102,7	5.894.825,3	47,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s21	Oerzen, Zum Hasel 5	587.786,3	5.893.215,0	57,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s22	Oerzen, Zum Hasel 10	588.158,0	5.893.781,7	45,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s23	Oerzen, Mühlenweg 10	588.545,4	5.894.776,2	44,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s24	Oerzen, Mühlenweg 18	588.468,7	5.894.823,3	42,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s25	Südergellersen, Auf dem Brink 6	586.477,5	5.896.246,7	67,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s26	Südergellersen, Auf dem Brink 7	586.498,2	5.896.189,4	65,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s27	Südergellersen, Birkenweg 7	586.547,8	5.896.410,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s28	Südergellersen, Forstweg 4	586.302,3	5.896.127,2	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s29	Südergellersen, Forstweg 8	586.230,1	5.896.140,7	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s30	Südergellersen, Forstweg 11	586.166,4	5.896.101,6	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s31	Südergellersen, Forstweg 16	586.112,1	5.896.167,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s32	Südergellersen, Forstweg 17	586.094,1	5.896.128,7	62,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s33	Südergellersen, Gewerbegebiet	587.007,3	5.895.062,8	43,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s34	Südergellersen, Heidberg 2	586.177,4	5.896.183,9	66,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s35	Südergellersen, Heidberg 3	586.154,2	5.896.223,0	66,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s36	Südergellersen, Heiligenthaler Weg 2	586.863,9	5.896.155,5	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s37	Südergellersen, Heiligenthaler Weg 3	586.792,8	5.896.190,0	58,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s38	Südergellersen, Heiligenthaler Weg 3c	586.833,1	5.896.217,7	58,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s39	Südergellersen, Heiligenthaler Weg 11	586.911,1	5.896.239,1	52,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s40	Südergellersen, Im Alten Dorfe 2	586.402,6	5.896.082,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s41	Südergellersen, Im Alten Dorfe 3	586.453,7	5.896.115,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s42	Südergellersen, Im Alten Dorfe 4	586.480,0	5.896.021,4	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s43	Südergellersen, Im Alten Dorfe 5	586.561,2	5.896.156,3	63,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s44	Südergellersen, Im Alten Dorfe 7	586.616,6	5.896.197,1	62,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s45	Südergellersen, Im Alten Dorfe 8	586.561,9	5.896.067,6	60,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s46	Südergellersen, Im Alten Dorfe 10A	586.625,5	5.896.101,5	60,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s47	Südergellersen, Kirchgellerser Straße 2	586.638,0	5.896.277,9	62,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s48	Südergellersen, Kirchgellerser Straße 3	586.594,8	5.896.327,3	63,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s49	Südergellersen, Kirchgellerser Straße 6	586.637,2	5.896.375,2	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s50	Südergellersen, Kirchgellerser Straße 9	586.617,5	5.896.432,1	64,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s51	Südergellersen, Kirchgellerser Straße 10	586.660,0	5.896.465,5	63,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s52	Südergellersen, Kirchgellerser Straße 13	586.632,2	5.896.499,1	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s53	Südergellersen, Kirchgellerser Straße 15	586.747,3	5.896.191,6	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s54	Südergellersen, Kirchgellerser Straße 16	586.731,0	5.896.121,0	59,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s55	Südergellersen, Oerzer Str. 13A	586.909,5	5.895.981,7	53,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s56	Südergellersen, Oerzer Str. 15	587.010,6	5.895.899,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s57	Südergellersen, Oerzer Str. 18	586.781,3	5.896.062,2	56,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s58	Südergellersen, Oerzer Str. 19	586.879,7	5.895.864,2	49,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s59	Südergellersen, Poggenpohl 7	586.751,1	5.895.922,0	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s60	Südergellersen, Poggenpohl 8	586.640,6	5.895.995,8	58,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s61	Südergellersen, Schwarzer Weg 2	586.403,0	5.896.246,5	71,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s62	Südergellersen, Schwarzer Weg 9	586.404,8	5.896.338,8	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s63	Südergellersen, Westergellerser Weg 1	586.545,3	5.896.256,4	63,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s64	Südergellersen, Westergellerser Weg 4	586.498,9	5.896.338,8	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s65	Südergellersen, Wetzter Weg 3	586.268,4	5.896.052,0	63,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s66	Südergellersen, Wetzter Weg 6	586.172,4	5.895.854,5	57,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s67	Südergellersen, In de Masch 8	586.717,4	5.896.250,8	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s68	Wetzen, Zum Lerchenberg 5	583.085,3	5.892.839,1	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s69	Wetzen, Zum Lerchenberg 10	583.242,4	5.892.711,0	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s70	Wetzen, Zum Lerchenberg 37	582.866,7	5.892.994,9	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0

Projekt:

Süderheide

Lizenzierter Anwender:

SOWIWAS - Energie GmbH

Watenstedter Straße 11

DE-38384 Gevensleben

+49 0 53 54 / 99 06 - 235

/ gutachten@sowiwas.de

Berechnet:

21.07.2025 15:59/4.1.287

## SHADOW - Hauptergebnis

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand

### Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr [h/a]	Schattentage/Jahr [d/a]	Max.Schattendauer/Tag [h/d]
s01	Neu Oerzen, Soltauer Straße 1	0:00	0	0:00
s02	Oerzen, Am Ohfeld 1	54:40	112	0:48
s03	Oerzen, Am Ohfeld 4	47:02	107	0:41
s04	Oerzen, Am Ohfeld 9	50:47	112	0:43
s05	Oerzen, Am Ohfeld 15	49:31	110	0:44
s06	Oerzen, Im Dorfe 14	51:18	108	0:48
s07	Oerzen, Im Dorfe 16	71:46	123	0:55
s08	Oerzen, Im Dorfe 19	35:44	92	0:32
s09	Oerzen, Im Dorfe 25	57:14	113	0:49
s10	Oerzen, Westerheide 1	59:19	115	0:53
s11	Oerzen, Westerheide 3	59:58	116	0:53
s12	Oerzen, Westerheide 4	54:14	111	0:50
s13	Oerzen, Westerheide 5	55:53	116	0:48
s14	Oerzen, Westerheide 12A	60:09	120	0:47
s15	Oerzen, Westerheide 12C	62:51	122	0:49
s16	Oerzen, Westerheide 18	67:54	126	0:50
s17	Oerzen, Westerheide 19	61:44	122	0:51
s18	Oerzen, Westerheide 20	70:26	128	0:52
s19	Oerzen, Westerheide 22	77:16	134	0:55
s20	Oerzen, Westerheide 28	98:48	144	1:08
s21	Oerzen, Zum Hasel 5	16:16	55	0:24
s22	Oerzen, Zum Hasel 10	47:29	116	0:30
s23	Oerzen, Mühlenweg 10	30:40	77	0:32
s24	Oerzen, Mühlenweg 18	48:19	109	0:43
s25	Südergellersen, Auf dem Brink 6	0:00	0	0:00
s26	Südergellersen, Auf dem Brink 7	0:00	0	0:00
s27	Südergellersen, Birkenweg 7	0:00	0	0:00
s28	Südergellersen, Forstweg 4	5:50	26	0:17
s29	Südergellersen, Forstweg 8	11:10	32	0:32
s30	Südergellersen, Forstweg 11	28:05	46	0:51
s31	Südergellersen, Forstweg 16	20:52	42	0:43
s32	Südergellersen, Forstweg 17	31:03	48	0:52
s33	Südergellersen, Gewerbegebiet	729:45	365	3:06
s34	Südergellersen, Heidberg 2	7:45	31	0:19
s35	Südergellersen, Heidberg 3	5:56	27	0:17
s36	Südergellersen, Heiligenthaler Weg 2	31:23	64	0:46
s37	Südergellersen, Heiligenthaler Weg 3	19:41	52	0:27
s38	Südergellersen, Heiligenthaler Weg 3c	19:25	52	0:26
s39	Südergellersen, Heiligenthaler Weg 11	21:43	60	0:25
s40	Südergellersen, Im Alten Dorfe 2	3:43	20	0:14
s41	Südergellersen, Im Alten Dorfe 3	0:00	0	0:00
s42	Südergellersen, Im Alten Dorfe 4	28:18	42	1:06
s43	Südergellersen, Im Alten Dorfe 5	4:40	22	0:16
s44	Südergellersen, Im Alten Dorfe 7	5:15	24	0:16
s45	Südergellersen, Im Alten Dorfe 8	17:07	44	0:29
s46	Südergellersen, Im Alten Dorfe 10A	18:07	46	0:29
s47	Südergellersen, Kirchgellerser Straße 2	0:00	0	0:00
s48	Südergellersen, Kirchgellerser Straße 3	0:00	0	0:00
s49	Südergellersen, Kirchgellerser Straße 6	0:00	0	0:00
s50	Südergellersen, Kirchgellerser Straße 9	0:00	0	0:00
s51	Südergellersen, Kirchgellerser Straße 10	0:00	0	0:00
s52	Südergellersen, Kirchgellerser Straße 13	0:00	0	0:00
s53	Südergellersen, Kirchgellerser Straße 15	16:39	46	0:26
s54	Südergellersen, Kirchgellerser Straße 16	22:55	56	0:29
s55	Südergellersen, Oerzer Str. 13A	84:16	90	1:34
s56	Südergellersen, Oerzer Str. 15	116:41	108	1:38
s57	Südergellersen, Oerzer Str. 18	45:20	70	1:15
s58	Südergellersen, Oerzer Str. 19	130:08	106	2:06
s59	Südergellersen, Poggenpohl 7	94:05	88	1:51
s60	Südergellersen, Poggenpohl 8	46:42	66	1:21
s61	Südergellersen, Schwarzer Weg 2	0:00	0	0:00
s62	Südergellersen, Schwarzer Weg 9	0:00	0	0:00

(Fortsetzung nächste Seite)...

## SHADOW - Hauptergebnis

### Berechnung: Gesamtbelastung Repowering 5x N175 +18 Bestand

...(Fortsetzung von vorheriger Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr [h/a]	Schattentage/Jahr [d/a]	Max.Schattendauer/Tag [h/d]
s63	Südergellersen, Westergellenser Weg 1	0:00	0	0:00
s64	Südergellersen, Westergellenser Weg 4	0:00	0	0:00
s65	Südergellersen, Wetzter Weg 3	27:07	44	0:52
s66	Südergellersen, Wetzter Weg 6	114:34	78	2:17
s67	Südergellersen, In de Masch 8	8:07	31	0:20
s68	Wetzen, Zum Lerchenberg 5	20:25	89	0:19
s69	Wetzen, Zum Lerchenberg 10	13:47	66	0:18
s70	Wetzen, Zum Lerchenberg 37	35:54	103	0:40

#### Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]
B 01	NORDEX N149/4.0-4.5 4500 149.0 !O! NH: 125,0 m (Ges:199,5 m) (101)	142:41
B 02	NORDEX N131/3300 DE 3300 131.0 !-! NH: 134,0 m (Ges:199,5 m) (120)	11:43
B 03	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (94)	11:18
B 04	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (95)	12:12
B 05	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (96)	10:15
B 06	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (97)	23:02
B 07	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (98)	20:35
B 08	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (99)	0:00
B 09	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (100)	0:00
B 10	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (103)	0:00
B 11	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (104)	0:00
B 12	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (105)	0:00
B 13	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (106)	0:00
Oerzen 1	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (79)	331:00
Oerzen 2	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (80)	194:07
Oerzen 3	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (81)	115:16
Oerzen 4	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (82)	50:45
Oerzen 5	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (83)	0:00
Rep 10	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)	142:32
Rep 11	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)	462:12
Rep 5	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (329)	10:50
Rep 8	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (330)	76:51
Rep 9	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (331)	134:59

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s01 - Neu Oerzen, Soltauer Straße 1

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:09
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:06	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:13	17:03	17:58	19:54	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:01	07:04	06:50	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:37	21:49	21:12	20:06	18:54	16:45	16:05
4	08:33	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:21	08:14
	16:15	17:07	18:01	19:58	20:52	21:38	21:48	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16	17:09	18:03	20:00	20:54	21:39	21:48	21:08	20:01	18:49	16:42	16:04
6	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:16
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:06	19:59	18:46	16:40	16:03
7	08:32	07:54	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19	17:13	18:07	20:04	20:57	21:41	21:47	21:05	19:56	18:44	16:38	16:03
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:31	07:29	08:19
	16:20	17:15	18:09	20:05	20:59	21:42	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:22	17:17	18:11	20:07	21:00	21:43	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:21
	16:23	17:19	18:13	20:09	21:02	21:44	21:44	20:59	19:49	18:37	16:33	16:02
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29	07:45	06:43	06:29	05:27	04:53	05:06	05:53	06:46	07:39	07:36	08:24
	16:26	17:23	18:16	20:12	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:28	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:40	07:38	08:25
	16:28	17:25	18:18	20:14	21:07	21:46	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28	07:41	06:38	06:25	05:23	04:52	05:09	05:56	06:50	07:42	07:40	08:26
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:25	16:25	16:01
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:27
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:46	19:35	18:23	16:23	16:01
17	08:25	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:28
	16:34	17:33	18:26	20:21	21:14	21:49	21:37	20:44	19:32	18:21	16:22	16:02
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:56	07:50	07:47	08:29
	16:36	17:35	18:27	20:23	21:15	21:49	21:36	20:42	19:30	18:19	16:21	16:02
19	08:23	07:31	06:26	06:13	05:15	04:51	05:15	06:05	06:58	07:51	07:49	08:30
	16:37	17:37	18:29	20:25	21:17	21:49	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22	07:29	06:24	06:11	05:14	04:52	05:16	06:07	07:00	07:53	07:51	08:30
	16:39	17:39	18:31	20:27	21:18	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:20	07:26	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:40	18:33	20:29	21:20	21:50	21:32	20:36	19:23	18:12	16:17	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43	17:42	18:35	20:30	21:21	21:50	21:31	20:33	19:20	18:10	16:15	16:03
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:56	08:32
	16:45	17:44	18:36	20:32	21:23	21:50	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:14	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33
	16:46	17:46	18:38	20:34	21:24	21:50	21:28	20:29	19:15	18:06	16:13	16:04
25	08:15	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:50	21:27	20:27	19:13	17:04	16:12	16:05
26	08:14	07:15	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:04	08:01	08:33
	16:50	17:50	18:42	20:38	21:27	21:50	21:25	20:24	19:10	17:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:33
	16:52	17:52	18:44	20:39	21:29	21:50	21:24	20:22	19:08	16:59	16:10	16:07
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54	17:54	18:45	20:41	21:30	21:50	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10		07:02	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34
	16:56		19:47	20:43	21:31	21:50	21:21	20:18	19:03	16:55	16:08	16:08
30	08:08		07:00	05:50	05:02	04:55	05:31	06:24	07:17	07:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09
31	08:06		06:58		05:01		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	262	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s02 - Oerzen, Am Ohfeld 1

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34   16:11	08:05   17:01	07:09   17:56	17:02 (Oerzen 2)   19:53	06:55   19:17 (Oerzen 1)	05:48   20:47
2	08:34   16:12	08:03   17:03	07:06   17:58	17:00 (Oerzen 2)   19:54	06:53   19:18 (Oerzen 1)	05:45   20:48
3	08:34   16:14	08:01   17:05	07:04   18:00	16:58 (Oerzen 2)   19:56	06:50   19:19 (Oerzen 1)	05:44   20:50
4	08:33   16:15	08:00   17:07	07:02   18:01	17:31 (Oerzen 3)   19:58	06:48   19:18 (Oerzen 1)	05:42   20:52
5	08:33   16:16	07:58   17:09	07:00   18:03	16:56 (Oerzen 2)   20:00	06:46   19:19 (Oerzen 1)	05:40   20:54
6	08:33   16:17	07:56   17:11	06:57   18:05	17:32 (Oerzen 3)   20:02	06:43   19:19 (Oerzen 1)	05:38   20:55
7	08:32   16:19	07:54   17:13	06:55   18:07	16:55 (Oerzen 2)   20:04	06:41   19:18 (Oerzen 1)	05:36   20:57
8	08:32   16:20	07:53   17:15	06:53   18:09	17:32 (Oerzen 3)   20:05	06:39   19:18 (Oerzen 1)	05:34   20:59
9	08:31   16:21	07:51   17:17	06:50   18:11	17:31 (Oerzen 3)   20:07	06:36   19:17 (Oerzen 1)	05:32   21:01
10	08:31   16:23	07:49   17:19	06:48   18:13	16:54 (Oerzen 2)   20:09	06:34   19:16 (Oerzen 1)	05:30   21:02
11	08:30   16:24	07:47   17:21	06:46   18:14	17:30 (Oerzen 3)   20:11	06:32   19:15 (Oerzen 1)	05:28   21:04
12	08:29   16:26	07:45   17:23	06:43   18:16	16:53 (Oerzen 2)   20:13	06:29   19:14 (Oerzen 1)	05:27   21:06
13	08:28   16:27	07:43   17:25	06:41   18:18	17:28 (Oerzen 3)   20:14	06:27   19:13 (Oerzen 1)	05:25   21:07
14	08:28   16:29	07:41   17:27	06:38   18:20	17:25 (Oerzen 2)   20:16	06:25   19:12 (Oerzen 1)	05:23   21:09
15	08:27   16:31	07:39   17:29	06:36   18:22	16:54 (Oerzen 2)   20:18	06:22   19:11 (Oerzen 1)	05:22   21:11
16	08:26   16:32	07:37   17:31	06:34   18:24	17:22 (Oerzen 2)   20:20	06:20   19:10 (Oerzen 1)	05:20   21:12
17	08:25   16:34	07:35   17:33	06:31   18:26	16:57 (Oerzen 2)   20:21	06:18   19:09 (Oerzen 1)	05:18   21:14
18	08:24   16:36	07:33   17:35	06:29   18:27	17:20 (Oerzen 2)   20:23	06:15   19:08 (Oerzen 1)	05:17   21:15
19	08:23   16:37	07:31   17:37	06:26   18:29	16:55 (Oerzen 2)   20:25	06:13   19:07 (Oerzen 1)	05:15   21:17
20	08:22   16:39	07:29   17:38	06:24   18:31	17:21 (Oerzen 2)   20:27	06:11   19:06 (Oerzen 1)	05:14   21:18
21	08:20   16:41	07:26   17:40	06:22   18:33	18:05 (Rep 10)   20:29	06:09   19:05 (Oerzen 1)	05:12   21:20
22	08:19   16:43	07:24   17:42	06:19   18:35	18:07 (Rep 10)   20:30	06:07   19:04 (Oerzen 1)	05:11   21:22
23	08:18   16:44	07:22   17:44	06:17   18:36	17:50 (Rep 10)   20:32	06:04   19:03 (Oerzen 1)	05:10   21:23
24	08:17   16:46	07:20   17:46	06:14   18:38	18:09 (Rep 10)   20:34	06:02   19:02 (Oerzen 1)	05:08   21:24
25	08:15   16:48	07:18   17:48	06:12   18:40	17:48 (Rep 10)   20:36	06:00   19:01 (Oerzen 1)	05:07   21:26
26	08:14   16:50	07:16   17:50	06:10   18:42	17:01 (Oerzen 2)   20:38	05:58   19:00 (Oerzen 1)	05:06   21:27
27	08:13   16:52	07:13   17:52	06:07   18:44	18:03 (Rep 10)   20:39	05:56   19:00 (Oerzen 1)	05:05   21:29
28	08:11   16:54	07:11   17:54	06:05   18:45	18:08 (Rep 10)   20:41	05:54   18:59 (Oerzen 1)	05:04   21:30
29	08:10   16:56		07:02   19:47	17:47 (Rep 10)   20:43	05:52   18:48 (Rep 10)	05:02   21:31
30	08:08   16:58		07:00   19:49	18:09 (Rep 10)   20:45	05:50   18:50 (Rep 10)	05:01   21:33
31	08:06   16:59		06:58   19:51	19:16 (Oerzen 1)   21:34	05:48   19:17 (Oerzen 1)	05:00   21:34
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		29	864	732		

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s02 - Oerzen, Am Ohfeld 1

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember
1	04:56 21:50	05:34 21:16	06:27 20:11	18:46 (Oerzen 1) 19:42 (Rep 11)   18:58	07:19 18:05 (Oerzen 3)   16:49	07:16 16:49   16:06
2	04:57 21:49	05:36 21:14	06:29 20:08	48 18:45 (Oerzen 1)   18:56	32 17:32 (Oerzen 2)   16:47	08:11 16:06   16:06
3	04:57 21:49	05:38 21:12	06:31 20:06	44 18:44 (Oerzen 1)   18:54	35 17:32 (Oerzen 2)   16:45	08:12 16:05   16:05
4	04:58 21:48	05:39 21:10	06:32 20:04	40 18:43 (Oerzen 1)   18:51	36 17:30 (Oerzen 2)   16:43	08:14 16:04   16:04
5	04:59 21:48	05:41 21:08	06:34 20:01	32 18:43 (Oerzen 1)   18:49	37 17:30 (Oerzen 2)   16:42	08:15 16:04   16:04
6	05:00 21:47	05:43 21:07	06:36 19:59	32 18:42 (Oerzen 1)   18:46	38 17:30 (Oerzen 2)   16:40	08:16 16:03   16:03
7	05:01 21:47	05:44 21:05	06:38 19:56	32 18:42 (Oerzen 1)   18:44	37 17:31 (Oerzen 2)   16:38	08:18 16:03   16:03
8	05:02 21:46	05:46 21:03	06:39 19:54	31 18:43 (Oerzen 1)   18:42	37 17:31 (Oerzen 2)   16:36	08:19 16:02   16:02
9	05:03 21:45	05:48 21:01	06:41 19:52	30 18:42 (Oerzen 1)   18:39	35 17:32 (Oerzen 2)   16:34	08:20 16:02   16:02
10	05:04 21:44	05:49 20:59	06:43 19:49	28 18:43 (Oerzen 1)   18:37	34 17:31 (Oerzen 2)   16:33	08:21 16:02   16:02
11	05:05 21:44	05:51 20:57	06:44 19:47	28 18:43 (Oerzen 1)   18:35	29 17:32 (Oerzen 2)   16:31	08:23 16:01   16:01
12	05:06 21:43	05:53 20:55	06:46 19:44	28 18:41 (Rep 10)   18:32	32 17:34 (Oerzen 2)   16:29	08:24 16:01   16:01
13	05:07 21:42	05:55 20:53	06:48 19:42	27 18:40 (Rep 10)   18:30	25 17:36 (Oerzen 2)   16:28	08:25 16:01   16:01
14	05:08 21:41	05:56 20:51	06:50 19:39	27 18:38 (Rep 10)   18:28	20 17:38 (Oerzen 2)   16:26	08:26 16:01   16:01
15	05:10 21:40	05:58 20:49	06:51 19:37	26 18:36 (Rep 10)   18:25	16 17:42 (Oerzen 2)   16:25	08:27 16:01   16:01
16	05:11 21:39	06:00 20:46	06:53 19:35	21 18:36 (Rep 10)   18:23	16 17:44 (Oerzen 2)   16:23	08:28 16:01   16:01
17	05:12 21:38	06:01 20:44	06:55 19:32	22 18:35 (Rep 10)   18:21	16 17:46 (Oerzen 2)   16:22	08:28 16:02   16:02
18	05:14 21:36	06:03 20:42	06:56 19:30	22 18:34 (Rep 10)   18:19	16 17:48 (Oerzen 2)   16:20	08:29 16:02   16:02
19	05:15 21:35	06:05 20:40	06:58 19:27	22 18:34 (Rep 10)   18:16	16 17:51 (Oerzen 2)   16:19	08:30 16:02   16:02
20	05:16 21:34	06:07 20:38	19:33 (Rep 11)   07:00	18:34 (Rep 10)   18:14	16 17:53 (Oerzen 2)   16:18	08:30 16:02   16:02
21	05:18 21:33	06:08 20:36	19:30 (Rep 11)   07:02	18:35 (Rep 10)   18:12	16 17:55 (Oerzen 2)   16:16	08:31 16:03   16:03
22	05:19 21:31	06:10 20:33	19:28 (Rep 11)   07:03	18:35 (Rep 10)   18:10	16 17:57 (Oerzen 2)   16:15	08:32 16:03   16:03
23	05:21 21:30	06:12 20:31	19:26 (Rep 11)   07:05	18:36 (Rep 10)   18:08	16 17:59 (Oerzen 2)   16:14	08:32 16:04   16:04
24	05:22 21:28	06:13 20:29	19:25 (Rep 11)   07:07	17:46 (Oerzen 2)   18:01	16 18:04 (Oerzen 2)   16:13	08:33 16:04   16:04
25	05:24 21:27	06:15 20:27	19:25 (Rep 11)   07:09	18:48 (Rep 10)   18:06	16 17:41 (Oerzen 2)   16:12	08:33 16:05   16:05
26	05:25 21:25	06:17 20:24	19:27 (Rep 11)   07:10	18:44 (Rep 10)   18:01	16 17:39 (Oerzen 2)   16:11	08:33 16:06   16:06
27	05:27 21:24	06:19 20:22	18:55 (Oerzen 1)   07:12	17:37 (Oerzen 2)   17:01	16 18:01 (Oerzen 2)   16:10	08:34 16:06   16:06
28	05:28 21:22	06:20 20:20	19:46 (Rep 11)   19:08	26 18:03 (Oerzen 2)   16:59	16 17:36 (Oerzen 2)   16:09	08:34 16:07   16:07
29	05:30 21:21	06:22 20:18	18:52 (Oerzen 1)   07:14	28 19:46 (Rep 11)   19:06	16 17:34 (Oerzen 2)   16:08	08:34 16:08   16:08
30	05:31 21:19	06:24 20:15	18:50 (Oerzen 1)   07:16	30 19:45 (Rep 11)   19:03	16 18:04 (Oerzen 2)   16:55	08:34 16:08   16:08
31	05:33 21:17	06:25 20:13	18:49 (Oerzen 1)   07:17	31 18:49 (Oerzen 1)   19:01	16 17:33 (Oerzen 2)   16:51	08:34 16:09   16:09
			18:48 (Oerzen 1)			08:34 16:10   16:10
			19:44 (Rep 11)			16:07 16:09   16:09
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung		351	839	465		

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s03 - Oerzen, Am Ohfeld 4

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34 16:11	08:05 17:01	07:09 17:56	16:46 (Oerzen 2) 17:24 (Oerzen 3)	06:55 19:53	18:35 (Oerzen 1) 20:47
2	08:34 16:12	08:03 17:03	07:06 17:58	16:46 (Oerzen 2) 17:24 (Oerzen 3)	06:53 19:54	18:35 (Oerzen 1) 20:48
3	08:34 16:14	08:01 17:05	07:04 18:00	16:45 (Oerzen 2) 17:23 (Oerzen 3)	06:50 19:56	18:36 (Oerzen 1) 20:50
4	08:33 16:15	08:00 17:07	07:02 18:01	16:45 (Oerzen 2) 17:23 (Oerzen 3)	06:48 19:58	18:36 (Oerzen 1) 20:52
5	08:33 16:16	07:58 17:09	07:00 18:03	16:45 (Oerzen 2) 17:23 (Oerzen 3)	06:46 20:00	18:38 (Oerzen 1) 20:54
6	08:33 16:17	07:56 17:11	06:57 18:05	16:45 (Oerzen 2) 17:21 (Oerzen 3)	06:43 20:02	18:39 (Oerzen 1) 20:55
7	08:32 16:19	07:54 17:13	06:55 18:07	16:46 (Oerzen 2) 17:20 (Oerzen 3)	06:41 20:03	18:41 (Oerzen 1) 20:57
8	08:32 16:20	07:53 17:15	06:53 18:09	16:46 (Oerzen 2) 17:18 (Oerzen 3)	06:39 20:05	18:47 (Oerzen 1) 20:59
9	08:31 16:21	07:51 17:17	06:50 18:11	16:47 (Oerzen 2) 17:15 (Oerzen 3)	06:36 20:07	19:12 (Rep 11) 21:01
10	08:31 16:23	07:49 17:19	06:48 18:13	16:48 (Oerzen 2) 17:10 (Oerzen 2)	06:34 20:09	19:11 (Rep 11) 21:02
11	08:30 16:24	07:47 17:21	06:46 18:14	16:49 (Oerzen 2) 17:08 (Oerzen 2)	06:32 20:11	19:11 (Rep 11) 21:04
12	08:29 16:26	07:45 17:23	06:43 18:16	16:52 (Oerzen 2) 17:05 (Oerzen 2)	06:29 20:13	19:12 (Rep 11) 21:06
13	08:28 16:27	07:43 17:25	06:41 18:18	17:05 (Oerzen 2) 18:18	20:13 20:14	19:12 (Rep 11) 21:07
14	08:28 16:29	07:41 17:27	06:38 18:20	17:47 (Rep 10) 17:54 (Rep 10)	06:25 20:16	19:13 (Rep 11) 21:09
15	08:27 16:31	07:39 17:29	06:36 18:22	17:43 (Rep 10) 17:55 (Rep 10)	06:22 20:18	19:14 (Rep 11) 21:11
16	08:26 16:32	07:37 17:31	06:34 18:24	17:42 (Rep 10) 17:58 (Rep 10)	06:20 20:20	19:18 (Rep 11) 21:12
17	08:25 16:34	07:35 17:33	06:31 18:26	17:41 (Rep 10) 18:00 (Rep 10)	06:18 20:21	19:24 (Rep 11) 21:14
18	08:24 16:36	07:33 17:35	06:29 18:27	17:40 (Rep 10) 18:00 (Rep 10)	06:15 20:23	19:29 (Rep 11) 21:15
19	08:23 16:37	07:31 17:37	06:26 18:29	17:39 (Rep 10) 18:00 (Rep 10)	06:13 20:25	19:34 (Rep 11) 21:17
20	08:22 16:41	07:29 17:40	06:24 18:33	17:38 (Rep 10) 17:59 (Rep 10)	06:11 20:27	19:39 (Rep 11) 21:18
21	08:20 16:43	07:26 17:42	06:22 18:35	17:38 (Rep 10) 18:00 (Rep 10)	06:09 20:29	19:44 (Rep 11) 21:20
22	08:19 16:44	07:24 17:44	06:19 18:37	17:39 (Rep 10) 18:02 (Oerzen 1)	06:07 20:30	19:49 (Rep 11) 21:22
23	08:18 16:46	07:22 17:46	06:17 18:39	17:39 (Rep 10) 18:03 (Oerzen 1)	06:04 20:32	19:54 (Rep 11) 21:24
24	08:17 16:48	07:20 17:48	06:14 18:41	17:40 (Rep 10) 18:04 (Oerzen 1)	06:02 20:34	19:59 (Rep 11) 21:26
25	08:15 16:50	07:18 17:50	06:12 18:43	18:04 (Oerzen 1) 18:05 (Oerzen 1)	20:34 20:36	20:00 21:28
26	08:14 16:52	07:16 17:52	06:10 18:45	17:37 (Oerzen 1) 18:05 (Oerzen 1)	05:58 20:38	20:05 21:30
27	08:13 16:54	07:13 17:54	06:07 18:47	17:36 (Oerzen 1) 18:05 (Oerzen 1)	05:56 20:39	20:10 21:32
28	08:11 16:55	07:11 17:55	06:05 18:49	17:36 (Oerzen 1) 18:05 (Oerzen 1)	05:54 20:41	20:15 21:34
29	08:10 16:56	07:09 17:56	06:02 18:51	18:36 (Oerzen 1) 19:05 (Oerzen 1)	05:52 20:43	20:20 21:36
30	08:08 16:58	07:07 17:57	06:00 18:53	18:35 (Oerzen 1) 19:05 (Oerzen 1)	05:50 20:45	20:25 21:38
31	08:06 16:59	07:05 17:58	06:58 19:51	18:35 (Oerzen 1) 19:04 (Oerzen 1)	05:49 20:46	20:30 21:40
Sonnenscheinstunden	253	275	367	419	415	506
astr.max.mögl.Beschattung		198	783			

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s03 - Oerzen, Am Ohfeld 4

### Annahmen für Schattenwurfberechnung

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

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

	Juli	August	September	Oktober	November	Dezember
1	04:56	05:34	06:27	19:10 (Rep 11)   07:19	17:33 (Oerzen 2)   07:16	08:09
	21:50	21:16	20:11	21 19:31 (Rep 11)   18:58	10 17:43 (Oerzen 2)   16:49	16:06
2	04:57	05:36	06:29	19:10 (Rep 11)   07:21	17:29 (Oerzen 2)   07:18	08:11
	21:49	21:14	20:08	22 19:32 (Rep 11)   18:56	17 17:46 (Oerzen 2)   16:47	16:06
3	04:57	05:38	06:31	19:09 (Rep 11)   07:23	17:27 (Oerzen 2)   07:20	08:12
	21:49	21:12	20:06	22 19:31 (Rep 11)   18:54	21 17:48 (Oerzen 2)   16:45	16:05
4	04:58	05:39	06:32	19:09 (Rep 11)   07:24	17:24 (Oerzen 2)   07:21	08:14
	21:48	21:10	20:04	22 19:31 (Rep 11)   18:51	24 17:48 (Oerzen 2)   16:43	16:04
5	04:59	05:41	06:34	18:38 (Oerzen 1)   07:26	17:23 (Oerzen 2)   07:23	08:15
	21:48	21:08	20:01	34 19:30 (Rep 11)   18:49	31 17:54 (Oerzen 3)   16:42	16:04
6	05:00	05:43	06:36	18:34 (Oerzen 1)   07:28	17:22 (Oerzen 2)   07:25	08:16
	21:47	21:07	19:59	39 19:29 (Rep 11)   18:46	34 17:56 (Oerzen 3)   16:40	16:03
7	05:01	05:44	06:38	18:33 (Oerzen 1)   07:30	17:21 (Oerzen 2)   07:27	08:18
	21:47	21:05	19:56	40 19:28 (Rep 11)   18:44	36 17:57 (Oerzen 3)   16:38	16:03
8	05:02	05:46	06:39	18:31 (Oerzen 1)   07:31	17:21 (Oerzen 2)   07:29	08:19
	21:46	21:03	19:54	41 19:27 (Rep 11)   18:42	37 17:58 (Oerzen 3)   16:36	16:02
9	05:03	05:48	06:41	18:29 (Oerzen 1)   07:33	17:20 (Oerzen 2)   07:31	08:20
	21:45	21:01	19:52	38 19:23 (Rep 11)   18:39	38 17:58 (Oerzen 3)   16:34	16:02
10	05:04	05:49	06:43	18:29 (Oerzen 1)   07:35	17:19 (Oerzen 2)   07:33	08:21
	21:44	20:59	19:49	35 19:21 (Rep 11)   18:37	38 17:57 (Oerzen 3)   16:33	16:02
11	05:05	05:51	06:44	18:28 (Oerzen 1)   07:37	17:19 (Oerzen 2)   07:35	08:23
	21:44	20:57	19:47	28 18:56 (Oerzen 1)   18:35	38 17:57 (Oerzen 3)   16:31	16:01
12	05:06	05:53	06:46	18:26 (Oerzen 1)   07:39	17:19 (Oerzen 2)   07:36	08:24
	21:43	20:55	19:44	30 18:56 (Oerzen 1)   18:32	38 17:57 (Oerzen 3)   16:29	16:01
13	05:07	05:55	06:48	18:26 (Oerzen 1)   07:40	17:19 (Oerzen 2)   07:38	08:25
	21:42	20:53	19:42	30 18:56 (Oerzen 1)   18:30	38 17:57 (Oerzen 3)   16:28	16:01
14	05:08	05:56	06:50	18:26 (Oerzen 1)   07:42	17:19 (Oerzen 2)   07:40	08:26
	21:41	20:51	19:39	30 18:56 (Oerzen 1)   18:28	37 17:56 (Oerzen 3)   16:26	16:01
15	05:10	05:58	06:51	18:25 (Oerzen 1)   07:44	17:20 (Oerzen 2)   07:42	08:27
	21:40	20:49	19:37	30 18:55 (Oerzen 1)   18:25	35 17:55 (Oerzen 3)   16:25	16:01
16	05:11	06:00	06:53	18:25 (Oerzen 1)   07:46	17:21 (Oerzen 2)   07:44	08:28
	21:39	20:46	19:35	29 18:54 (Oerzen 1)   18:23	33 17:54 (Oerzen 3)   16:23	16:01
17	05:12	06:01	06:55	18:26 (Oerzen 1)   07:48	17:22 (Oerzen 2)   07:46	08:28
	21:38	20:44	19:32	28 18:54 (Oerzen 1)   18:21	30 17:52 (Oerzen 3)   16:22	16:01
18	05:14	06:03	06:56	18:25 (Oerzen 1)   07:50	17:23 (Oerzen 2)   07:48	08:29
	21:36	20:42	19:30	27 18:52 (Oerzen 1)   18:19	26 17:49 (Oerzen 3)   16:20	16:02
19	05:15	06:05	06:58	18:26 (Oerzen 1)   07:51	17:25 (Oerzen 2)   07:49	08:30
	21:35	20:40	19:27	25 18:51 (Oerzen 1)   18:16	16 17:41 (Oerzen 2)   16:19	16:02
20	05:16	06:07	07:00	18:25 (Rep 10)   07:53	17:27 (Oerzen 2)   07:51	08:30
	21:34	20:38	19:25	25 18:50 (Oerzen 1)   18:14	10 17:37 (Oerzen 2)   16:18	16:02
21	05:18	06:08	07:02	18:25 (Rep 10)   07:55	07:53	08:31
	21:33	20:36	19:22	23 18:48 (Oerzen 1)   18:12	16:16	16:03
22	05:19	06:10	07:03	18:23 (Rep 10)   07:57	07:55	08:32
	21:31	20:33	19:20	22 18:45 (Oerzen 1)   18:10	16:15	16:03
23	05:21	06:12	07:05	18:23 (Rep 10)   07:59	07:56	08:32
	21:30	20:31	19:18	21 18:44 (Rep 10)   18:08	16:14	16:04
24	05:22	06:13	07:07	18:23 (Rep 10)   08:01	07:58	08:33
	21:28	20:29	19:15	21 18:44 (Rep 10)   18:06	16:13	16:04
25	05:24	06:15	07:09	18:22 (Rep 10)   07:03	08:00	08:33
	21:27	20:27	19:13	21 18:43 (Rep 10)   17:03	16:12	16:05
26	05:25	06:17	07:10	18:23 (Rep 10)   07:04	08:01	08:33
	21:25	20:24	19:10	19 18:42 (Rep 10)   17:01	16:11	16:06
27	05:27	06:19	19:19 (Rep 11)   07:12	18:23 (Rep 10)   07:06	08:03	08:34
	21:24	20:22	7 19:26 (Rep 11)   19:08	17 18:40 (Rep 10)   16:59	16:10	16:06
28	05:28	06:20	19:16 (Rep 11)   07:14	18:24 (Rep 10)   07:08	08:05	08:34
	21:22	20:20	13 19:29 (Rep 11)   19:06	14 18:38 (Rep 10)   16:57	16:09	16:07
29	05:30	06:22	19:14 (Rep 11)   07:16	18:25 (Rep 10)   07:10	08:06	08:34
	21:21	20:18	16 19:30 (Rep 11)   19:03	10 18:35 (Rep 10)   16:55	16:08	16:08
30	05:31	06:24	19:12 (Rep 11)   07:17	07:12	08:08	08:34
	21:19	20:15	19 19:31 (Rep 11)   19:01	16:53	16:07	16:09
31	05:33	06:25	19:12 (Rep 11)	07:14		08:34
	21:17	20:13	20 19:32 (Rep 11)	16:51		16:10
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung		75	764	587		

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
	Sonnenuntergang (SS:MM)			

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s04 - Oerzen, Am Ohfeld 9

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34   16:11	08:05   17:01	07:09   17:56	16:43 (Oerzen 2)   19:53	18:34 (Oerzen 1)   20:47	04:59   21:35
2	08:34   16:12	08:03   17:03	07:06   17:58	16:43 (Oerzen 2)   19:54	18:34 (Oerzen 1)   20:48	04:59   21:36
3	08:34   16:14	08:01   17:05	07:04   18:00	16:42 (Oerzen 2)   19:56	18:35 (Oerzen 1)   20:50	04:58   21:37
4	08:33   16:15	08:00   17:07	07:02   18:01	16:43 (Oerzen 2)   19:58	18:35 (Oerzen 1)   20:52	04:57   21:39
5	08:33   16:16	07:58   17:09	07:00   18:03	16:43 (Oerzen 2)   20:00	18:36 (Oerzen 1)   20:54	04:56   21:40
6	08:33   16:17	07:56   17:11	06:57   18:05	16:42 (Oerzen 2)   20:02	18:37 (Oerzen 1)   20:55	04:55   21:41
7	08:32   16:19	07:54   17:13	06:55   18:07	16:43 (Oerzen 2)   20:04	18:38 (Oerzen 1)   20:57	04:55   21:42
8	08:32   16:20	07:53   17:15	06:53   18:09	16:43 (Oerzen 2)   20:05	18:40 (Oerzen 1)   20:59	04:54   21:43
9	08:31   16:21	07:51   17:17	06:50   18:11	16:44 (Oerzen 2)   20:07	18:43 (Oerzen 1)   21:01	04:54   21:43
10	08:31   16:23	07:49   17:19	06:48   18:13	16:46 (Oerzen 2)   20:09	19:12 (Rep 11)   21:02	04:53   21:44
11	08:30   16:24	07:47   17:21	06:46   18:14	16:46 (Oerzen 2)   20:11	19:12 (Rep 11)   21:04	04:53   21:45
12	08:29   16:26	07:45   17:23	06:43   18:16	16:49 (Oerzen 2)   20:13	19:12 (Rep 11)   21:06	04:52   21:46
13	08:28   16:27	07:43   17:25	06:41   18:18	16:52 (Oerzen 2)   20:14	19:12 (Rep 11)   21:07	04:52   21:46
14	08:28   16:29	07:41   17:27	06:38   18:20	17:48 (Rep 10)   20:16	19:12 (Rep 11)   21:09	04:52   21:47
15	08:27   16:31	07:39   17:29	06:36   18:22	17:44 (Rep 10)   20:18	19:13 (Rep 11)   21:11	04:52   21:48
16	08:26   16:32	07:37   17:31	06:34   18:24	17:42 (Rep 10)   20:20	19:15 (Rep 11)   21:12	04:51   21:48
17	08:25   16:34	07:35   17:33	06:31   18:26	17:41 (Rep 10)   20:21	19:17 (Rep 11)   21:14	04:51   21:49
18	08:24   16:36	07:33   17:35	06:29   18:27	17:40 (Rep 10)   20:23	19:26 (Rep 11)   21:15	04:51   21:49
19	08:23   16:37	07:31   17:37	06:26   18:29	17:39 (Rep 10)   20:25	05:15   21:17	04:51   21:49
20	08:22   16:39	07:29   17:39	06:24   18:31	17:38 (Rep 10)   20:27	05:14   21:18	04:51   21:50
21	08:20   16:41	07:26   17:40	06:22   17:03 (Oerzen 2)	17:38 (Rep 10)   20:29	05:12   21:20	04:52   21:50
22	08:19   16:43	07:24   17:42	06:19   17:07 (Oerzen 2)	17:39 (Rep 10)   20:30	05:11   21:22	04:52   21:50
23	08:18   16:44	07:22   17:44	06:17   17:10 (Oerzen 2)	18:01 (Oerzen 1)   20:32	05:10   21:23	04:52   21:50
24	08:17   16:46	07:20   17:46	06:14   17:18 (Oerzen 3)	17:39 (Rep 10)   20:34	05:08   21:24	04:52   21:51
25	08:15   16:48	07:18   17:48	06:12   17:20 (Oerzen 3)	18:04 (Oerzen 1)   20:36	05:07   21:26	04:53   21:51
26	08:14   16:50	07:16   17:50	06:10   17:22 (Oerzen 3)	18:04 (Oerzen 1)   20:38	05:06   21:27	04:53   21:51
27	08:13   16:52	07:13   17:52	06:07   17:23 (Oerzen 3)	18:05 (Oerzen 1)   20:39	05:05   21:29	04:53   21:50
28	08:11   16:54	07:11   17:54	06:05   17:23 (Oerzen 3)	17:36 (Oerzen 1)   20:41	05:04   21:30	04:54   21:50
29	08:10   16:56		07:02   19:47	18:36 (Oerzen 1)   20:43	05:02   21:31	04:55   21:50
30	08:08   16:58		07:00   19:49	18:35 (Oerzen 1)   20:45	05:01   21:33	04:55   21:50
31	08:06   16:59		06:58   19:51	18:35 (Oerzen 1)   19:06 (Oerzen 1)	05:00   21:34	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		218		821	478	

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s04 - Oerzen, Am Ohfeld 9

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	October	November	December
1	04:56	05:34	06:27	19:11 (Rep 11)   07:19	17:29 (Oerzen 2)   07:16	08:09
	21:50	21:16	20:11	22 19:33 (Rep 11)   18:58	14 17:43 (Oerzen 2)   16:49	16:06
2	04:57	05:36	06:29	19:10 (Rep 11)   07:21	17:26 (Oerzen 2)   07:18	08:11
	21:49	21:14	20:08	23 19:33 (Rep 11)   18:56	19 17:45 (Oerzen 2)   16:47	16:06
3	04:57	05:38	06:31	18:40 (Oerzen 1)   07:23	17:24 (Oerzen 2)   07:20	08:12
	21:49	21:12	20:06	31 19:32 (Rep 11)   18:54	23 17:47 (Oerzen 2)   16:45	16:05
4	04:58	05:39	06:32	18:37 (Oerzen 1)   07:24	17:22 (Oerzen 2)   07:21	08:14
	21:48	21:10	20:04	38 19:32 (Rep 11)   18:51	27 17:49 (Oerzen 3)   16:43	16:04
5	04:59	05:41	06:34	18:35 (Oerzen 1)   07:26	17:21 (Oerzen 2)   07:23	08:15
	21:48	21:08	20:01	41 19:31 (Rep 11)   18:49	32 17:53 (Oerzen 3)   16:42	16:04
6	05:00	05:43	06:36	18:32 (Oerzen 1)   07:28	17:20 (Oerzen 2)   07:25	08:16
	21:47	21:07	19:59	43 19:30 (Rep 11)   18:46	35 17:55 (Oerzen 3)   16:40	16:03
7	05:01	05:44	06:38	18:31 (Oerzen 1)   07:30	17:19 (Oerzen 2)   07:27	08:18
	21:47	21:05	19:56	42 19:28 (Rep 11)   18:44	37 17:56 (Oerzen 3)   16:38	16:03
8	05:02	05:46	06:39	18:30 (Oerzen 1)   07:31	17:18 (Oerzen 2)   07:29	08:19
	21:46	21:03	19:54	41 19:27 (Rep 11)   18:42	39 17:57 (Oerzen 3)   16:36	16:02
9	05:03	05:48	06:41	18:28 (Oerzen 1)   07:33	17:18 (Oerzen 2)   07:31	08:20
	21:45	21:01	19:52	38 19:23 (Rep 11)   18:39	39 17:57 (Oerzen 3)   16:34	16:02
10	05:04	05:49	06:43	18:28 (Oerzen 1)   07:35	17:17 (Oerzen 2)   07:33	08:21
	21:44	20:59	19:49	29 18:57 (Oerzen 1)   18:37	40 17:57 (Oerzen 3)   16:33	16:02
11	05:05	05:51	06:44	18:27 (Oerzen 1)   07:37	17:16 (Oerzen 2)   07:35	08:23
	21:44	20:57	19:47	31 18:58 (Oerzen 1)   18:35	41 17:57 (Oerzen 3)   16:31	16:01
12	05:06	05:53	06:46	18:26 (Oerzen 1)   07:39	17:16 (Oerzen 2)   07:36	08:24
	21:43	20:55	19:44	31 18:57 (Oerzen 1)   18:32	40 17:56 (Oerzen 3)   16:29	16:01
13	05:07	05:55	06:48	18:26 (Oerzen 1)   07:40	17:17 (Oerzen 2)   07:38	08:25
	21:42	20:53	19:42	31 18:57 (Oerzen 1)   18:30	39 17:56 (Oerzen 3)   16:28	16:01
14	05:08	05:56	06:50	18:26 (Oerzen 1)   07:42	17:17 (Oerzen 2)   07:40	08:26
	21:41	20:51	19:39	31 18:57 (Oerzen 1)   18:28	38 17:55 (Oerzen 3)   16:26	16:01
15	05:10	05:58	06:51	18:25 (Oerzen 1)   07:44	17:18 (Oerzen 2)   07:42	08:27
	21:40	20:49	19:37	30 18:55 (Oerzen 1)   18:25	36 17:54 (Oerzen 3)   16:25	16:01
16	05:11	06:00	06:53	18:26 (Oerzen 1)   07:46	17:18 (Oerzen 2)   07:44	08:28
	21:39	20:46	19:35	29 18:55 (Oerzen 1)   18:23	35 17:53 (Oerzen 3)   16:23	16:01
17	05:12	06:01	06:55	18:26 (Oerzen 1)   07:48	17:19 (Oerzen 2)   07:46	08:28
	21:38	20:44	19:32	28 18:54 (Oerzen 1)   18:21	33 17:52 (Oerzen 3)   16:22	16:01
18	05:14	06:03	06:56	18:26 (Oerzen 1)   07:50	17:20 (Oerzen 2)   07:48	08:29
	21:36	20:42	19:30	26 18:52 (Oerzen 1)   18:19	29 17:49 (Oerzen 3)   16:20	16:02
19	05:15	06:05	06:58	18:26 (Rep 10)   07:51	17:22 (Oerzen 2)   07:49	08:30
	21:35	20:40	19:27	25 18:51 (Oerzen 1)   18:16	18 17:40 (Oerzen 2)   16:19	16:02
20	05:16	06:07	07:00	18:25 (Rep 10)   07:53	17:24 (Oerzen 2)   07:51	08:31
	21:34	20:38	19:25	24 18:49 (Oerzen 1)   18:14	12 17:36 (Oerzen 2)   16:18	16:02
21	05:18	06:08	07:02	18:24 (Rep 10)   07:55	17:25 (Oerzen 2)   07:53	08:31
	21:33	20:36	19:22	23 18:47 (Oerzen 1)   18:12	16:16	16:03
22	05:19	06:10	07:03	18:23 (Rep 10)   07:57	17:26 (Oerzen 2)   07:55	08:32
	21:31	20:33	19:20	22 18:45 (Rep 10)   18:10	16:15	16:03
23	05:21	06:12	07:05	18:23 (Rep 10)   07:59	17:27 (Oerzen 2)   07:56	08:32
	21:30	20:31	19:18	22 18:45 (Rep 10)   18:08	16:14	16:04
24	05:22	06:13	07:07	18:23 (Rep 10)   08:01	17:28 (Oerzen 2)   07:58	08:33
	21:28	20:29	19:15	21 18:44 (Rep 10)   18:06	16:13	16:04
25	05:24	06:15	07:09	18:22 (Rep 10)   07:03	17:29 (Oerzen 2)   08:00	08:33
	21:27	20:27	19:13	21 18:43 (Rep 10)   17:03	16:12	16:05
26	05:25	06:17	19:19 (Rep 11)   07:10	18:23 (Rep 10)   07:04	17:30 (Oerzen 2)   08:01	08:33
	21:25	20:24	9 19:28 (Rep 11)   19:10	19 18:42 (Rep 10)   17:01	16:11	16:06
27	05:27	06:19	19:17 (Rep 11)   07:12	18:24 (Rep 10)   07:06	17:31 (Oerzen 2)   08:03	08:34
	21:24	20:22	14 19:31 (Rep 11)   19:08	16 18:40 (Rep 10)   16:59	16:10	16:06
28	05:28	06:20	19:15 (Rep 11)   07:14	18:25 (Rep 10)   07:08	17:32 (Oerzen 2)   08:05	08:34
	21:22	20:20	17 19:32 (Rep 11)   19:06	13 18:38 (Rep 10)   16:57	16:09	16:07
29	05:30	06:22	19:13 (Rep 11)   07:16	18:26 (Rep 10)   07:10	17:33 (Oerzen 2)   08:06	08:34
	21:21	20:18	19 19:32 (Rep 11)   19:03	9 18:35 (Rep 10)   16:55	16:08	16:08
30	05:31	06:24	19:12 (Rep 11)   07:17	17:35 (Oerzen 2)   07:12	17:34 (Oerzen 2)   08:08	08:34
	21:19	20:15	21 19:33 (Rep 11)   19:01	2 17:37 (Oerzen 2)   16:53	16:07	16:09
31	05:33	06:25	19:12 (Rep 11)	07:14	17:35 (Oerzen 2)   08:09	08:34
	21:17	20:13	22 19:34 (Rep 11)	16:51	17:36 (Oerzen 2)   16:10	16:10
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung		102	802	626		

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s05 - Oerzen, Am Ohfeld 15

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34 16:11	08:05 17:01	07:09 17:56	16:32 (Oerzen 2) 17:12 (Oerzen 3)	06:55 19:53	18:30 (Oerzen 1) 20:47
2	08:34 16:12	08:03 17:03	07:06 17:58	16:33 (Oerzen 2) 17:11 (Oerzen 3)	06:53 19:54	19:04 (Rep 11) 20:48
3	08:34 16:14	08:02 17:05	07:04 18:00	16:34 (Oerzen 2) 17:08 (Oerzen 3)	06:50 19:56	19:04 (Rep 11) 20:50
4	08:33 16:15	08:00 17:07	07:02 18:01	16:35 (Oerzen 2) 17:05 (Oerzen 3)	06:48 19:58	19:02 (Rep 11) 20:52
5	08:33 16:16	07:58 17:09	07:00 18:03	16:38 (Oerzen 2) 16:52 (Oerzen 2)	06:46 20:00	19:03 (Rep 11) 20:54
6	08:33 16:17	07:56 17:11	06:57 18:05	16:42 (Oerzen 2) 16:46 (Oerzen 2)	06:43 20:02	19:03 (Rep 11) 20:55
7	08:32 16:19	07:54 17:13	06:55 18:07	16:46 (Oerzen 2) 17:09 (Rep 10)	06:41 20:04	19:02 (Rep 11) 20:57
8	08:32 16:20	07:53 17:15	06:53 18:09	16:46 (Oerzen 2) 17:11 (Rep 10)	06:39 20:05	19:03 (Rep 11) 20:59
9	08:31 16:21	07:51 17:17	06:50 18:11	16:46 (Oerzen 2) 17:13 (Rep 10)	06:36 20:07	19:04 (Rep 11) 21:01
10	08:31 16:23	07:49 17:19	06:48 18:13	16:46 (Oerzen 2) 17:14 (Rep 10)	06:34 20:09	19:05 (Rep 11) 21:02
11	08:30 16:24	07:47 17:21	06:46 18:14	16:46 (Oerzen 2) 17:15 (Rep 10)	06:32 20:11	19:07 (Rep 11) 21:04
12	08:29 16:26	07:45 17:23	06:43 18:16	16:46 (Oerzen 2) 17:16 (Rep 10)	06:29 20:13	19:17 (Rep 11) 21:06
13	08:28 16:27	07:43 17:25	06:41 18:18	16:46 (Oerzen 2) 17:17 (Rep 10)	06:27 20:14	19:17 (Rep 11) 21:07
14	08:28 16:29	07:41 17:27	06:38 18:20	16:42 (Oerzen 2) 16:52 (Oerzen 2)	06:25 20:16	19:17 (Rep 11) 21:09
15	08:27 16:31	07:39 17:29	06:36 18:22	16:38 (Oerzen 2) 16:54 (Oerzen 2)	06:22 20:18	19:17 (Rep 11) 21:11
16	08:26 16:32	07:37 17:31	06:34 18:24	16:36 (Oerzen 2) 16:56 (Oerzen 2)	06:20 20:20	19:17 (Rep 11) 21:12
17	08:25 16:34	07:35 17:33	06:31 18:26	16:35 (Oerzen 2) 16:58 (Oerzen 2)	06:18 20:21	19:17 (Rep 11) 21:14
18	08:24 16:36	07:33 17:35	06:29 18:27	16:34 (Oerzen 2) 17:06 (Oerzen 3)	06:15 20:23	19:17 (Rep 11) 21:15
19	08:23 16:37	07:31 17:37	06:26 18:29	16:33 (Oerzen 2) 17:09 (Oerzen 3)	06:13 20:25	19:17 (Rep 11) 21:17
20	08:22 16:39	07:29 17:38	06:24 18:31	16:31 (Oerzen 2) 17:10 (Oerzen 3)	06:11 20:27	19:17 (Rep 11) 21:19
21	08:20 16:41	07:26 17:40	06:22 18:33	16:31 (Oerzen 2) 17:12 (Oerzen 3)	06:09 20:29	19:17 (Rep 11) 21:20
22	08:19 16:43	07:24 17:42	06:19 18:35	16:31 (Oerzen 2) 17:13 (Oerzen 3)	06:07 20:30	19:17 (Rep 11) 21:22
23	08:18 16:44	07:22 17:44	06:17 18:36	16:31 (Oerzen 2) 17:14 (Oerzen 3)	06:04 20:32	19:17 (Rep 11) 21:23
24	08:17 16:46	07:20 17:46	06:14 18:38	16:30 (Oerzen 2) 17:13 (Oerzen 3)	06:02 20:34	19:17 (Rep 11) 21:24
25	08:15 16:48	07:18 17:48	06:12 18:40	16:30 (Oerzen 2) 17:14 (Oerzen 3)	06:00 20:36	19:17 (Rep 11) 21:26
26	08:14 16:50	07:16 17:50	06:10 18:42	16:31 (Oerzen 2) 17:14 (Oerzen 3)	05:58 20:38	19:17 (Rep 11) 21:27
27	08:13 16:52	07:13 17:52	06:07 18:44	16:31 (Oerzen 2) 17:14 (Oerzen 3)	05:56 20:39	19:17 (Rep 11) 21:29
28	08:11 16:54	07:11 17:54	06:05 18:45	16:31 (Oerzen 2) 17:12 (Oerzen 3)	05:54 20:41	19:17 (Rep 11) 21:30
29	08:10 16:56		07:02 19:47		05:52 19:21 (Rep 11)	19:17 (Rep 11) 21:31
30	08:08 16:58		07:00 19:49		05:50 19:23 (Rep 11)	19:17 (Rep 11) 21:33
31	08:06 16:59		06:58 19:51		05:48 19:25 (Rep 11)	19:17 (Rep 11) 21:34
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		514	741	224		

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
	Sonnenuntergang (SS:MM)			

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s05 - Oerzen, Am Ohfeld 15

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September		Oktober		November	Dezember
1	04:56	05:34	06:27		19:06 (Rep 11)   07:19		18:11 (Rep 10)   07:16	08:09
	21:50	21:16	20:11	10	19:16 (Rep 11)   18:58	19	18:30 (Rep 10)   16:49	16:06
2	04:57	05:36	06:29		19:04 (Rep 11)   07:21		18:12 (Rep 10)   07:18	08:11
	21:49	21:14	20:08	14	19:18 (Rep 11)   18:56	16	18:28 (Rep 10)   16:47	16:06
3	04:57	05:38	06:31		19:01 (Rep 11)   07:23		18:13 (Rep 10)   07:20	08:12
	21:49	21:12	20:06	18	19:19 (Rep 11)   18:54	13	18:26 (Rep 10)   16:45	16:05
4	04:58	05:39	06:32		19:00 (Rep 11)   07:24		18:14 (Rep 10)   07:21	08:14
	21:48	21:10	20:04	20	19:20 (Rep 11)   18:51	8	18:22 (Rep 10)   16:43	16:04
5	04:59	05:41	06:34		19:00 (Rep 11)   07:26			07:23   08:15
	21:48	21:08	20:01	20	19:20 (Rep 11)   18:49			16:42   16:04
6	05:00	05:43	06:36		18:58 (Rep 11)   07:28			07:25   08:16
	21:47	21:07	19:59	22	19:20 (Rep 11)   18:46			16:40   16:03
7	05:01	05:44	06:38		18:58 (Rep 11)   07:30			07:27   08:18
	21:47	21:05	19:56	22	19:20 (Rep 11)   18:44			16:38   16:03
8	05:02	05:46	06:39		18:58 (Rep 11)   07:31		17:15 (Oerzen 2)   07:29	08:19
	21:46	21:03	19:54	22	19:20 (Rep 11)   18:42	10	17:25 (Oerzen 2)   16:36	16:02
9	05:03	05:48	06:41		18:57 (Rep 11)   07:33		17:12 (Oerzen 2)   07:31	08:20
	21:45	21:01	19:52	22	19:19 (Rep 11)   18:39	16	17:28 (Oerzen 2)   16:34	16:02
10	05:04	05:49	06:43		18:57 (Rep 11)   07:35		17:09 (Oerzen 2)   07:33	08:21
	21:44	20:59	19:49	22	19:19 (Rep 11)   18:37	30	17:41 (Oerzen 3)   16:33	16:02
11	05:05	05:51	06:44		18:24 (Oerzen 1)   07:37		17:07 (Oerzen 2)   07:35	08:23
	21:44	20:57	19:47	29	19:18 (Rep 11)   18:35	36	17:43 (Oerzen 3)   16:31	16:01
12	05:06	05:53	06:46		18:19 (Oerzen 1)   07:39		17:06 (Oerzen 2)   07:36	08:24
	21:43	20:55	19:44	35	19:16 (Rep 11)   18:32	38	17:44 (Oerzen 3)   16:29	16:01
13	05:07	05:55	06:48		18:17 (Oerzen 1)   07:40		17:05 (Oerzen 2)   07:38	08:25
	21:42	20:53	19:42	35	19:14 (Rep 11)   18:30	40	17:45 (Oerzen 3)   16:28	16:01
14	05:08	05:56	06:50		18:15 (Oerzen 1)   07:42		17:04 (Oerzen 2)   07:40	08:26
	21:41	20:51	19:39	35	19:12 (Rep 11)   18:28	42	17:46 (Oerzen 3)   16:26	16:01
15	05:10	05:58	06:51		18:13 (Oerzen 1)   07:44		17:03 (Oerzen 2)   07:42	08:27
	21:40	20:49	19:37	32	19:09 (Rep 11)   18:25	43	17:46 (Oerzen 3)   16:25	16:01
16	05:11	06:00	06:53		18:12 (Oerzen 1)   07:46		17:03 (Oerzen 2)   07:44	08:28
	21:39	20:46	19:35	27	18:39 (Oerzen 1)   18:23	43	17:46 (Oerzen 3)   16:23	16:01
17	05:12	06:01	06:55		18:11 (Oerzen 1)   07:48		17:02 (Oerzen 2)   07:46	08:28
	21:38	20:44	19:32	29	18:40 (Oerzen 1)   18:21	44	17:46 (Oerzen 3)   16:22	16:01
18	05:14	06:03	06:56		18:10 (Oerzen 1)   07:50		17:02 (Oerzen 2)   07:48	08:29
	21:36	20:42	19:30	29	18:39 (Oerzen 1)   18:19	43	17:45 (Oerzen 3)   16:20	16:02
19	05:15	06:05	06:58		18:09 (Oerzen 1)   07:51		17:02 (Oerzen 2)   07:49	08:30
	21:35	20:40	19:27	31	18:40 (Oerzen 1)   18:16	43	17:45 (Oerzen 3)   16:19	16:02
20	05:16	06:07	07:00		18:09 (Oerzen 1)   07:53		17:02 (Oerzen 2)   07:51	08:31
	21:34	20:38	19:25	31	18:40 (Oerzen 1)   18:14	42	17:44 (Oerzen 3)   16:18	16:02
21	05:18	06:08	07:02		18:09 (Oerzen 1)   07:55		17:02 (Oerzen 2)   07:53	08:31
	21:33	20:36	19:22	31	18:40 (Oerzen 1)   18:12	40	17:42 (Oerzen 3)   16:16	16:03
22	05:19	06:10	07:03		18:08 (Oerzen 1)   07:57		17:02 (Oerzen 2)   07:55	08:32
	21:31	20:33	19:20	30	18:38 (Oerzen 1)   18:10	38	17:40 (Oerzen 3)   16:15	16:03
23	05:21	06:12	07:05		18:08 (Oerzen 1)   07:59		17:03 (Oerzen 2)   07:56	08:32
	21:30	20:31	19:18	30	18:38 (Oerzen 1)   18:08	35	17:38 (Oerzen 3)   16:14	16:04
24	05:22	06:13	07:07		18:09 (Oerzen 1)   08:01		17:03 (Oerzen 2)   07:58	08:33
	21:28	20:29	19:15	28	18:37 (Oerzen 1)   18:06	25	17:28 (Oerzen 2)   16:13	16:04
25	05:24	06:15	07:09		18:08 (Oerzen 1)   07:03		16:05 (Oerzen 2)   08:00	08:33
	21:27	20:27	19:13	27	18:35 (Oerzen 1)   17:03	22	16:27 (Oerzen 2)   16:12	16:05
26	05:25	06:17	07:10		18:09 (Oerzen 1)   07:04		16:06 (Oerzen 2)   08:01	08:33
	21:25	20:24	19:10	25	18:34 (Oerzen 1)   17:01	19	16:25 (Oerzen 2)   16:11	16:06
27	05:27	06:19	07:12		18:10 (Oerzen 1)   07:06		16:08 (Oerzen 2)   08:03	08:34
	21:24	20:22	19:08	23	18:33 (Rep 10)   16:59	15	16:23 (Oerzen 2)   16:10	16:06
28	05:28	06:20	07:14		18:11 (Rep 10)   07:08		16:11 (Oerzen 2)   08:05	08:34
	21:22	20:20	19:06	22	18:33 (Rep 10)   16:57	9	16:20 (Oerzen 2)   16:09	16:07
29	05:30	06:22	07:16		18:10 (Rep 10)   07:10			08:06   08:34
	21:21	20:18	19:03	21	18:31 (Rep 10)   16:55			16:08   16:08
30	05:31	06:24	07:17		18:10 (Rep 10)   07:12			08:08   08:34
	21:19	20:15	19:01	21	18:31 (Rep 10)   16:53			16:07   16:09
31	05:33	06:25						08:34
	21:17	20:13						16:10
Sonnenscheinstunden	509	458	382		329		261	237
astr.max.mögl.Beschattung			763		729			

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s06 - Oerzen, Im Dorfe 14

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März		April		Mai	Juni	
1	08:34	08:05	07:09		06:55		19:01 (Rep 10)	05:48	04:59
	16:11	17:01	17:56		19:53	22	19:23 (Rep 10)	20:47	21:35
2	08:34	08:03	07:06		06:53		19:01 (Rep 10)	05:45	04:59
	16:12	17:03	17:58		19:54	22	19:23 (Rep 10)	20:48	21:36
3	08:34	08:01	07:04		06:50		19:02 (Rep 10)	05:44	04:58
	16:14	17:05	18:00		19:56	20	19:22 (Rep 10)	20:50	21:37
4	08:33	08:00	07:02		06:48		19:01 (Rep 10)	05:42	04:57
	16:15	17:07	18:01		19:58	20	19:21 (Rep 10)	20:52	21:38
5	08:33	07:58	07:00		06:46		19:02 (Rep 10)	05:40	04:56
	16:16	17:09	18:03		20:00	18	19:20 (Rep 10)	20:54	21:40
6	08:33	07:56	06:57		06:43		19:04 (Rep 10)	05:38	04:55
	16:17	17:11	18:05		20:02	21	19:29 (Oerzen 1)	20:55	21:41
7	08:32	07:54	06:55		06:41		19:04 (Rep 10)	05:36	04:55
	16:19	17:13	18:07		20:03	26	19:32 (Oerzen 1)	20:57	21:42
8	08:32	07:53	06:53		17:34 (Oerzen 3)	06:39	19:08 (Rep 10)	05:34	04:54
	16:20	17:15	18:09	8	17:42 (Oerzen 3)	20:05	19:34 (Oerzen 1)	20:59	21:42
9	08:31	07:51	06:50		17:32 (Oerzen 3)	06:36	19:14 (Oerzen 1)	05:32	04:54
	16:21	17:17	18:11	12	17:44 (Oerzen 3)	20:07	19:36 (Oerzen 1)	21:00	21:43
10	08:31	07:49	06:48		17:30 (Oerzen 3)	06:34	19:12 (Oerzen 1)	05:30	04:53
	16:23	17:19	18:13	17	17:47 (Oerzen 3)	20:09	19:36 (Oerzen 1)	21:02	21:44
11	08:30	07:47	06:46		17:28 (Oerzen 3)	06:32	19:11 (Oerzen 1)	05:28	04:53
	16:24	17:21	18:14	20	17:48 (Oerzen 3)	20:11	19:37 (Oerzen 1)	21:04	21:45
12	08:29	07:45	06:43		17:28 (Oerzen 3)	06:29	19:10 (Oerzen 1)	05:27	04:52
	16:26	17:23	18:16	21	17:49 (Oerzen 3)	20:12	19:38 (Oerzen 1)	21:06	21:46
13	08:28	07:43	06:41		17:26 (Oerzen 3)	06:27	19:09 (Oerzen 1)	05:25	04:52
	16:27	17:25	18:18	22	17:48 (Oerzen 3)	20:14	19:37 (Oerzen 1)	21:07	21:46
14	08:28	07:41	06:38		17:24 (Oerzen 2)	06:25	19:08 (Oerzen 1)	05:23	04:52
	16:29	17:27	18:20	25	17:49 (Oerzen 3)	20:16	19:38 (Oerzen 1)	21:09	21:47
15	08:27	07:39	06:36		17:22 (Oerzen 2)	06:22	19:08 (Oerzen 1)	05:22	04:52
	16:31	17:29	18:22	27	17:49 (Oerzen 2)	20:18	19:50 (Rep 11)	21:11	21:48
16	08:26	07:37	06:34		17:21 (Oerzen 2)	06:20	19:08 (Oerzen 1)	05:20	04:51
	16:32	17:31	18:24	29	17:50 (Oerzen 2)	20:20	19:52 (Rep 11)	21:12	21:48
17	08:25	07:35	06:31		17:21 (Oerzen 2)	06:18	19:08 (Oerzen 1)	05:18	04:51
	16:34	17:33	18:26	30	17:51 (Oerzen 2)	20:21	19:54 (Rep 11)	21:14	21:49
18	08:24	07:33	06:29		17:19 (Oerzen 2)	06:15	19:07 (Oerzen 1)	05:17	04:51
	16:36	17:35	18:27	31	17:50 (Oerzen 2)	20:23	19:55 (Rep 11)	21:15	21:49
19	08:23	07:31	06:26		17:19 (Oerzen 2)	06:13	19:08 (Oerzen 1)	05:15	04:51
	16:37	17:37	18:29	32	17:51 (Oerzen 2)	20:25	19:57 (Rep 11)	21:17	21:49
20	08:22	07:29	06:24		17:18 (Oerzen 2)	06:11	19:08 (Oerzen 1)	05:14	04:51
	16:39	17:38	18:31	32	17:50 (Oerzen 2)	20:27	19:57 (Rep 11)	21:18	21:50
21	08:20	07:26	06:22		17:18 (Oerzen 2)	06:09	19:09 (Oerzen 1)	05:12	04:52
	16:41	17:40	18:33	32	17:50 (Oerzen 2)	20:29	19:58 (Rep 11)	21:20	21:50
22	08:19	07:24	06:19		17:19 (Oerzen 2)	06:07	19:10 (Oerzen 1)	05:11	04:52
	16:43	17:42	18:35	31	17:50 (Oerzen 2)	20:30	19:58 (Rep 11)	21:22	21:50
23	08:18	07:22	06:17		17:18 (Oerzen 2)	06:04	19:11 (Oerzen 1)	05:10	04:52
	16:44	17:44	18:36	31	17:49 (Oerzen 2)	20:32	19:57 (Rep 11)	21:23	21:50
24	08:17	07:20	06:14		17:19 (Oerzen 2)	06:02	19:12 (Oerzen 1)	05:08	04:52
	16:46	17:46	18:38	30	17:49 (Oerzen 2)	20:34	19:57 (Rep 11)	21:24	21:51
25	08:15	07:18	06:12		17:18 (Oerzen 2)	06:00	19:14 (Oerzen 1)	05:07	04:53
	16:48	17:48	18:40	29	17:47 (Oerzen 2)	20:36	19:56 (Rep 11)	21:26	21:51
26	08:14	07:15	06:10		17:19 (Oerzen 2)	05:58	19:16 (Oerzen 1)	05:06	04:53
	16:50	17:50	18:42	34	18:16 (Rep 10)	20:38	19:55 (Rep 11)	21:27	21:51
27	08:13	07:13	06:07		17:20 (Oerzen 2)	05:56	19:38 (Rep 11)	05:05	04:53
	16:52	17:52	18:44	35	18:17 (Rep 10)	20:39	19:54 (Rep 11)	21:29	21:50
28	08:11	07:11	06:05		17:21 (Oerzen 2)	05:54	19:39 (Rep 11)	05:04	04:54
	16:54	17:54	18:45	36	18:19 (Rep 10)	20:41	19:53 (Rep 11)	21:30	21:50
29	08:10		07:02		18:23 (Oerzen 2)	05:52	19:41 (Rep 11)	05:02	04:55
	16:56		19:47	35	19:21 (Rep 10)	20:43	19:51 (Rep 11)	21:31	21:50
30	08:08		07:00		18:25 (Oerzen 2)	05:50		05:01	04:55
	16:58		19:49	33	19:23 (Rep 10)	20:45		21:33	21:50
31	08:06		06:58		19:02 (Rep 10)			05:00	
	16:59		19:51	21	19:23 (Rep 10)			21:34	
Sonnenscheinstunden	253	275	367		419			491	506
astr.max.mögl.Beschattung			653			876			

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s06 - Oerzen, Im Dorfe 14

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	October	November	Dezember	
1	04:56   21:50	05:34   21:16	06:27   20:11	19:10 (Oerzen 1)   07:19	18:06 (Oerzen 3)   07:16	08:09   16:06	
2	04:57   21:49	05:36   21:14	06:29   20:08	19:11 (Oerzen 1)   07:21	18:07 (Oerzen 3)   07:18	08:11   16:06	
3	04:57   21:49	05:38   21:12	06:31   20:06	19:11 (Oerzen 1)   07:23	18:08 (Oerzen 3)   07:20	08:12   16:05	
4	04:58   21:48	05:39   21:10	06:32   20:03	19:05 (Rep 10)   07:24	18:08 (Oerzen 3)   07:21	08:14   16:04	
5	04:59   21:48	05:41   21:08	06:34   20:01	19:02 (Rep 10)   07:26	18:10 (Oerzen 3)   07:23	08:15   16:04	
6	05:00   21:47	05:43   21:07	06:36   19:59	19:29 (Oerzen 1)   07:28	18:14 (Oerzen 3)   07:25	08:16   16:03	
7	05:01   21:47	05:44   21:05	06:38   19:56	19:24 (Oerzen 1)   07:30	18:17 (Oerzen 3)   07:27	08:18   16:03	
8	05:02   21:46	05:46   21:03	06:39   19:54	19:15 (Rep 10)   07:31	18:17 (Oerzen 3)   07:29	08:19   16:02	
9	05:03   21:45	05:48   21:01	06:41   19:52	19:16 (Rep 10)   07:33	18:18 (Oerzen 3)   07:31	08:20   16:02	
10	05:04   21:44	05:49   20:59	06:43   19:49	19:16 (Rep 10)   07:35	18:19 (Oerzen 3)   07:33	08:21   16:02	
11	05:05   21:44	05:51   20:57	06:44   19:47	19:16 (Rep 10)   07:37	18:20 (Oerzen 3)   07:35	08:23   16:01	
12	05:06   21:43	05:53   20:55	06:46   19:44	19:16 (Rep 10)   07:39	18:21 (Oerzen 3)   07:37	08:24   16:01	
13	05:07   21:42	05:55   20:53	19:51 (Rep 11)   06:48	19:15 (Rep 10)   07:40	18:22 (Oerzen 3)   07:38	08:25   16:01	
14	05:08   21:41	05:56   20:51	19:55 (Rep 11)   06:50	19:14 (Rep 10)   07:42	18:23 (Oerzen 3)   07:40	08:26   16:01	
15	05:10   21:40	05:58   20:49	19:48 (Rep 11)   06:51	19:59 (Rep 11)   07:44	18:24 (Oerzen 3)   07:42	08:27   16:01	
16	05:11   21:39	06:00   20:46	19:45 (Rep 11)   06:53	20:00 (Rep 11)   07:46	18:25 (Oerzen 3)   07:44	08:28   16:01	
17	05:12   21:38	06:01   20:44	20:01 (Rep 11)   06:55	19:44 (Rep 11)   07:48	18:26 (Oerzen 3)   07:46	08:29   16:02	
18	05:14   21:36	06:03   20:42	19:22 (Oerzen 1)   06:57	20:02 (Rep 11)   07:50	18:27 (Oerzen 3)   07:48	08:30   16:02	
19	05:15   21:35	06:05   20:40	19:19 (Oerzen 1)   06:58	20:03 (Rep 11)   07:52	18:28 (Oerzen 3)   07:50	08:31   16:02	
20	05:16   21:34	06:07   20:38	20:02 (Rep 11)   07:00	19:17 (Oerzen 1)   07:53	18:29 (Oerzen 3)   07:52	08:32   16:03	
21	05:18   21:33	06:08   20:36	19:16 (Oerzen 1)   07:02	20:03 (Rep 11)   07:55	18:30 (Oerzen 3)   07:54	08:33   16:03	
22	05:19   21:31	06:10   20:33	19:14 (Oerzen 1)   07:03	20:02 (Rep 11)   07:57	18:31 (Oerzen 3)   07:56	08:34   16:03	
23	05:21   21:30	06:12   20:31	19:13 (Oerzen 1)   07:05	20:02 (Rep 11)   07:59	18:32 (Oerzen 3)   07:58	08:35   16:04	
24	05:22   21:28	06:13   20:29	19:12 (Oerzen 1)   07:07	20:01 (Rep 11)   08:01	18:33 (Oerzen 3)   08:00	08:36   16:04	
25	05:24   21:27	06:15   20:27	19:11 (Oerzen 1)   07:09	19:11 (Oerzen 1)   08:03	18:34 (Oerzen 3)   08:02	08:37   16:05	
26	05:25   21:25	06:17   20:24	19:10 (Oerzen 1)   07:10	19:59 (Rep 11)   08:05	18:35 (Oerzen 3)   08:04	08:38   16:06	
27	05:27   21:24	06:19   20:22	19:10 (Oerzen 1)   07:12	19:56 (Rep 11)   08:07	18:36 (Oerzen 3)   08:06	08:39   16:06	
28	05:28   21:22	06:20   20:20	19:54 (Rep 11)   07:14	19:10 (Oerzen 1)   08:09	18:37 (Oerzen 3)   08:08	08:40   16:07	
29	05:30   21:21	06:22   20:18	19:10 (Oerzen 1)   07:16	19:52 (Rep 11)   08:11	18:38 (Oerzen 3)   08:10	08:41   16:08	
30	05:31   21:19	06:24   20:15	19:09 (Oerzen 1)   07:17	20:01 (Rep 11)   08:13	18:39 (Oerzen 3)   08:12	08:42   16:09	
31	05:33   21:17	06:25   20:13	19:39 (Oerzen 1)   07:19	19:39 (Oerzen 1)   08:15	18:40 (Oerzen 3)   08:14	08:43   16:10	
	Sonnenscheinstunden	509	458	382	329	261	237
	astr.max.mögl.Beschattung		645	817	87		

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s07 - Oerzen, Im Dorfe 16

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34	08:05	07:09	06:55	18:14 (Oerzen 2)   05:48	19:13 (Oerzen 1)   04:59
	16:11	17:01	17:56	19:53	50 19:26 (Rep 10)   20:47	52 20:05 (Rep 11)   21:35
2	08:34	08:03	07:06	06:53	18:16 (Oerzen 2)   05:46	19:14 (Oerzen 1)   04:59
	16:12	17:03	17:58	19:54	49 19:27 (Rep 10)   20:48	51 20:05 (Rep 11)   21:36
3	08:34	08:01	07:04	06:50	18:18 (Oerzen 2)   05:44	19:14 (Oerzen 1)   04:58
	16:14	17:05	18:00	19:56	46 19:27 (Rep 10)   20:50	48 20:04 (Rep 11)   21:37
4	08:33	08:00	07:02	06:48	18:19 (Oerzen 2)   05:42	19:15 (Oerzen 1)   04:57
	16:15	17:07	18:01	19:58	43 19:27 (Rep 10)   20:52	45 20:03 (Rep 11)   21:38
5	08:33	07:58	07:00	06:46	18:22 (Oerzen 2)   05:40	19:16 (Oerzen 1)   04:56
	16:16	17:09	18:03	20:00	37 19:27 (Rep 10)   20:54	40 20:02 (Rep 11)   21:40
6	08:33	07:56	06:57	06:43	19:03 (Rep 10)   05:38	19:19 (Oerzen 1)   04:55
	16:17	17:11	18:05	20:02	24 19:27 (Rep 10)   20:55	34 20:01 (Rep 11)   21:41
7	08:32	07:54	06:55	06:41	19:03 (Rep 10)   05:36	19:20 (Oerzen 1)   04:55
	16:19	17:13	18:07	20:04	23 19:26 (Rep 10)   20:57	27 19:59 (Rep 11)   21:42
8	08:32	07:53	06:53	06:39	19:03 (Rep 10)   05:34	19:23 (Oerzen 1)   04:54
	16:20	17:15	18:09	20:05	22 19:25 (Rep 10)   20:59	16 19:56 (Rep 11)   21:42
9	08:31	07:51	06:50	17:33 (Oerzen 3)   06:36	19:04 (Rep 10)   05:32	04:54
	16:21	17:17	18:11	10 17:43 (Oerzen 3)   20:07	20 19:24 (Rep 10)   21:01	21:43
10	08:31	07:49	06:48	17:30 (Oerzen 3)   06:34	19:04 (Rep 10)   05:30	04:53
	16:23	17:19	18:13	15 17:45 (Oerzen 3)   20:09	18 19:22 (Rep 10)   21:02	21:44
11	08:30	07:47	06:46	17:28 (Oerzen 3)   06:32	19:05 (Rep 10)   05:28	04:53
	16:24	17:21	18:15	18 17:46 (Oerzen 3)   20:11	16 19:21 (Rep 10)   21:04	21:45
12	08:29	07:45	06:43	17:27 (Oerzen 3)   06:29	19:08 (Rep 10)   05:27	04:52
	16:26	17:23	18:16	21 17:48 (Oerzen 3)   20:13	11 19:19 (Rep 10)   21:06	21:46
13	08:28	07:43	06:41	17:25 (Oerzen 3)   06:27	19:26 (Oerzen 1)   05:25	04:52
	16:27	17:25	18:18	23 17:48 (Oerzen 3)   20:14	12 19:38 (Oerzen 1)   21:07	21:46
14	08:28	07:41	06:38	17:24 (Oerzen 3)   06:25	19:22 (Oerzen 1)   05:23	04:52
	16:29	17:27	18:20	24 17:48 (Oerzen 3)   20:16	18 19:40 (Oerzen 1)   21:09	21:47
15	08:27	07:39	06:36	17:22 (Oerzen 2)   06:22	19:20 (Oerzen 1)   05:22	04:52
	16:31	17:29	18:22	26 17:48 (Oerzen 3)   20:18	22 19:42 (Oerzen 1)   21:11	21:48
16	08:26	07:37	06:34	17:20 (Oerzen 2)   06:20	19:18 (Oerzen 1)   05:20	04:51
	16:32	17:31	18:24	28 17:48 (Oerzen 3)   20:20	26 19:44 (Oerzen 1)   21:12	21:48
17	08:25	07:35	06:31	17:19 (Oerzen 2)   06:18	19:17 (Oerzen 1)   05:18	04:51
	16:34	17:33	18:26	30 17:49 (Oerzen 2)   20:21	28 19:45 (Oerzen 1)   21:14	21:49
18	08:24	07:33	06:29	17:17 (Oerzen 2)   06:15	19:15 (Oerzen 1)   05:17	04:51
	16:36	17:35	18:27	32 17:49 (Oerzen 2)   20:23	30 19:45 (Oerzen 1)   21:15	21:49
19	08:23	07:31	06:26	17:16 (Oerzen 2)   06:13	19:14 (Oerzen 1)   05:15	04:51
	16:37	17:37	18:29	34 17:50 (Oerzen 2)   20:25	31 19:45 (Oerzen 1)   21:17	21:49
20	08:22	07:29	06:24	17:15 (Oerzen 2)   06:11	19:13 (Oerzen 1)   05:14	04:51
	16:39	17:39	18:31	35 17:50 (Oerzen 2)   20:27	40 19:59 (Rep 11)   21:18	21:50
21	08:20	07:26	06:22	17:14 (Oerzen 2)   06:09	19:13 (Oerzen 1)   05:12	04:52
	16:41	17:40	18:33	37 17:51 (Oerzen 2)   20:29	45 20:01 (Rep 11)   21:20	21:50
22	08:19	07:24	06:19	17:14 (Oerzen 2)   06:07	19:13 (Oerzen 1)   05:11	04:52
	16:43	17:42	18:35	37 17:51 (Oerzen 2)   20:30	49 20:02 (Rep 11)   21:22	21:50
23	08:18	07:22	06:17	17:13 (Oerzen 2)   06:04	19:12 (Oerzen 1)   05:10	04:52
	16:44	17:44	18:36	38 17:51 (Oerzen 2)   20:32	52 20:04 (Rep 11)   21:23	21:50
24	08:17	07:20	06:14	17:13 (Oerzen 2)   06:02	19:12 (Oerzen 1)   05:08	04:52
	16:46	17:46	18:38	38 17:51 (Oerzen 2)   20:34	53 20:05 (Rep 11)   21:24	21:51
25	08:15	07:18	06:12	17:12 (Oerzen 2)   06:00	19:12 (Oerzen 1)   05:07	04:53
	16:48	17:48	18:40	38 17:50 (Oerzen 2)   20:36	54 20:06 (Rep 11)   21:26	21:51
26	08:14	07:16	06:10	17:12 (Oerzen 2)   05:58	19:12 (Oerzen 1)   05:06	04:53
	16:50	17:50	18:42	38 17:50 (Oerzen 2)   20:38	54 20:06 (Rep 11)   21:27	21:51
27	08:13	07:13	06:07	17:12 (Oerzen 2)   05:56	19:12 (Oerzen 1)   05:05	04:54
	16:52	17:52	18:44	37 17:49 (Oerzen 2)   20:39	54 20:06 (Rep 11)   21:29	21:50
28	08:11	07:11	06:05	17:12 (Oerzen 2)   05:54	19:12 (Oerzen 1)   05:04	04:54
	16:54	17:54	18:45	37 17:49 (Oerzen 2)   20:41	54 20:06 (Rep 11)   21:30	21:50
29	08:10		07:02	18:13 (Oerzen 2)   05:52	19:12 (Oerzen 1)   05:02	04:55
	16:56		19:47	43 19:21 (Rep 10)   20:43	54 20:06 (Rep 11)   21:31	21:50
30	08:08		07:00	18:13 (Oerzen 2)   05:50	19:13 (Oerzen 1)   05:01	04:55
	16:58		19:49	48 19:23 (Rep 10)   20:45	53 20:06 (Rep 11)   21:33	21:50
31	08:06		06:58	18:14 (Oerzen 2)	05:00	
	17:00		19:51	49 19:25 (Rep 10)	21:34	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung			736	1088	313	

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
	Sonnenuntergang (SS:MM)			

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s07 - Oerzen, Im Dorfe 16

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	October	November	December
1	04:56 21:50	05:35 21:16	06:27 20:11	19:04 (Rep 10) 18:27 (Rep 10)	07:19 18:58	18:05 (Oerzen 3) 16:49
2	04:57 21:49	05:36 21:14	06:29 20:08	19:03 (Rep 10) 18:56	07:21 18:57	18:06 (Oerzen 3) 16:47
3	04:57 21:49	05:38 21:12	06:31 20:06	19:01 (Rep 10) 18:54	07:23 18:54	18:07 (Oerzen 3) 16:45
4	04:58 21:48	05:39 21:10	06:32 20:04	19:00 (Rep 10) 18:51	07:24 18:51	18:08 (Oerzen 3) 16:44
5	04:59 21:48	05:41 21:08	19:32 (Oerzen 1) 20:08 (Rep 11)	06:34 20:01	19:00 (Rep 10) 18:49	18:12 (Oerzen 3) 16:42
6	05:00 21:47	05:43 21:07	19:29 (Oerzen 1) 20:09 (Rep 11)	06:36 19:59	18:58 (Rep 10) 18:46	07:28 16:40
7	05:01 21:47	05:44 21:05	19:27 (Oerzen 1) 20:11 (Rep 11)	06:38 19:56	18:18 (Oerzen 2) 19:22 (Rep 10)	07:30 18:44
8	05:02 21:46	05:46 21:03	19:25 (Oerzen 1) 20:12 (Rep 11)	06:39 19:54	18:14 (Oerzen 2) 19:22 (Rep 10)	07:31 18:42
9	05:03 21:45	05:48 21:01	19:24 (Oerzen 1) 20:13 (Rep 11)	06:41 19:52	18:11 (Oerzen 2) 19:21 (Rep 10)	07:33 18:39
10	05:04 21:44	05:49 20:59	19:23 (Oerzen 1) 20:13 (Rep 11)	06:43 19:49	18:09 (Oerzen 2) 19:20 (Rep 10)	07:35 18:37
11	05:05 21:44	05:51 20:57	19:22 (Oerzen 1) 20:13 (Rep 11)	06:44 19:47	18:08 (Oerzen 2) 19:19 (Rep 10)	07:37 18:35
12	05:06 21:43	05:53 20:55	19:21 (Oerzen 1) 20:14 (Rep 11)	06:46 19:44	18:05 (Oerzen 2) 19:16 (Rep 10)	07:39 18:32
13	05:07 21:42	05:55 20:53	19:20 (Oerzen 1) 20:13 (Rep 11)	06:48 19:42	18:04 (Oerzen 2) 19:14 (Rep 10)	07:40 18:30
14	05:08 21:41	05:56 20:51	19:20 (Oerzen 1) 20:14 (Rep 11)	06:50 19:40	18:03 (Oerzen 2) 19:12 (Rep 10)	07:42 18:28
15	05:10 21:40	05:58 20:49	19:19 (Oerzen 1) 20:13 (Rep 11)	06:51 19:37	18:02 (Oerzen 2) 18:38 (Oerzen 2)	07:44 18:25
16	05:11 21:39	06:00 20:46	19:18 (Oerzen 1) 20:13 (Rep 11)	06:53 19:35	18:01 (Oerzen 2) 18:38 (Oerzen 2)	07:46 18:23
17	05:12 21:38	06:01 20:44	19:18 (Oerzen 1) 20:13 (Rep 11)	06:55 19:32	18:01 (Oerzen 2) 18:39 (Oerzen 2)	07:48 18:21
18	05:14 21:36	06:03 20:42	19:17 (Oerzen 1) 20:11 (Rep 11)	06:56 19:30	18:00 (Oerzen 2) 18:38 (Oerzen 2)	07:50 18:19
19	05:15 21:35	06:05 20:40	19:18 (Oerzen 1) 20:11 (Rep 11)	06:58 19:27	17:59 (Oerzen 2) 18:38 (Oerzen 2)	07:51 18:16
20	05:16 21:34	06:07 20:38	19:18 (Oerzen 1) 20:10 (Rep 11)	07:00 19:25	17:59 (Oerzen 2) 18:37 (Oerzen 2)	07:53 18:14
21	05:18 21:33	06:08 20:36	19:17 (Oerzen 1) 20:07 (Rep 11)	07:02 19:22	18:00 (Oerzen 2) 18:37 (Oerzen 2)	07:55 18:12
22	05:19 21:31	06:10 20:33	19:18 (Oerzen 1) 20:05 (Rep 11)	07:03 19:20	17:59 (Oerzen 2) 18:36 (Oerzen 2)	07:57 18:10
23	05:21 21:30	06:12 20:31	19:17 (Oerzen 1) 20:02 (Rep 11)	07:05 19:18	17:59 (Oerzen 2) 18:35 (Oerzen 2)	07:59 18:08
24	05:22 21:28	06:13 20:29	19:18 (Oerzen 1) 19:49 (Oerzen 1)	07:07 19:15	18:00 (Oerzen 2) 18:34 (Oerzen 2)	08:01 18:06
25	05:24 21:27	06:15 20:27	19:19 (Oerzen 1) 19:48 (Oerzen 1)	07:09 19:13	18:00 (Oerzen 2) 18:32 (Oerzen 2)	07:03 17:03
26	05:25 21:25	06:17 20:24	19:19 (Oerzen 1) 19:47 (Oerzen 1)	07:10 19:10	18:00 (Oerzen 2) 18:31 (Oerzen 2)	07:04 17:01
27	05:27 21:24	06:19 20:22	19:20 (Oerzen 1) 19:45 (Oerzen 1)	07:12 19:08	18:02 (Oerzen 2) 18:30 (Oerzen 3)	07:06 16:59
28	05:28 21:22	06:20 20:20	19:22 (Oerzen 1) 19:44 (Oerzen 1)	07:14 19:06	18:03 (Oerzen 2) 18:30 (Oerzen 3)	07:08 16:57
29	05:30 21:21	06:22 20:18	19:23 (Oerzen 1) 19:41 (Oerzen 1)	07:16 19:03	18:04 (Oerzen 3) 18:28 (Oerzen 3)	07:10 16:55
30	05:31 21:19	06:24 20:15	19:13 (Rep 10) 19:38 (Oerzen 1)	07:17 19:01	18:04 (Oerzen 3) 18:28 (Oerzen 3)	07:12 16:53
31	05:33 21:17	06:25 20:13	19:07 (Rep 10) 19:19 (Rep 10)		07:14 16:51	
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung		1070	1022	77		

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s08 - Oerzen, Im Dorfe 19

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März		April		Mai		Juni
1	08:34 16:11	08:05 17:01	07:09 17:56		06:55 19:53		18:30 (Oerzen 2) 05:48		19:29 (Oerzen 1) 04:59
2	08:34 16:12	08:03 17:03	07:06 17:58		06:53 19:54	24	18:54 (Oerzen 2) 20:47	2	19:31 (Oerzen 1) 21:35
3	08:34 16:14	08:01 17:05	07:04 18:00		06:50 19:56	21	18:53 (Oerzen 2) 20:48		21:36 04:58
4	08:33 16:15	08:00 17:07	07:02 18:01		06:48 19:58	17	18:34 (Oerzen 2) 20:50		21:37 04:57
5	08:33 16:16	07:58 17:09	07:00 18:03		06:46 20:00	11	18:36 (Oerzen 2) 05:42		21:38 04:56
6	08:33 16:17	07:56 17:11	06:57 18:05		06:43 20:02		20:54 05:38		21:40 04:55
7	08:32 16:19	07:54 17:13	06:55 18:07		06:41 20:03		20:55 05:36		21:41 04:55
8	08:32 16:20	07:53 17:15	06:53 18:09		06:39 20:05		20:57 05:34		21:42 04:54
9	08:31 16:21	07:51 17:17	06:50 18:11		06:36 20:07		20:59 05:32		21:42 04:54
10	08:31 16:23	07:49 17:19	06:48 18:13		06:34 20:09		21:00 05:30		21:43 04:53
11	08:30 16:24	07:47 17:21	06:46 18:14		06:32 20:11		21:02 05:28		21:44 04:53
12	08:29 16:26	07:45 17:23	06:43 18:16	2	17:45 (Oerzen 3) 17:47 (Oerzen 3)	12	19:28 (Oerzen 1) 19:40 (Oerzen 1)		21:45 04:52
13	08:28 16:27	07:43 17:25	06:41 18:18	9	17:41 (Oerzen 3) 17:50 (Oerzen 3)	18	19:25 (Oerzen 1) 19:43 (Oerzen 1)		21:46 04:52
14	08:28 16:29	07:41 17:27	06:38 18:20	14	17:38 (Oerzen 3) 17:52 (Oerzen 3)	20	19:23 (Oerzen 1) 19:43 (Oerzen 1)		21:46 04:52
15	08:27 16:31	07:39 17:29	06:36 18:22	18	17:36 (Oerzen 3) 17:54 (Oerzen 3)	24	19:21 (Oerzen 1) 19:45 (Oerzen 1)		21:47 04:52
16	08:27 16:32	07:37 17:31	06:34 18:24	20	17:35 (Oerzen 3) 17:55 (Oerzen 3)	26	19:20 (Oerzen 1) 19:46 (Oerzen 1)		21:47 04:51
17	08:25 16:34	07:35 17:33	06:31 18:26	21	17:34 (Oerzen 3) 17:56 (Oerzen 3)	27	19:19 (Oerzen 1) 19:47 (Oerzen 1)		21:48 04:51
18	08:24 16:36	07:33 17:35	06:29 18:27	22	17:34 (Oerzen 3) 17:57 (Oerzen 2)	28	19:19 (Oerzen 1) 19:47 (Oerzen 1)		21:48 04:51
19	08:23 16:37	07:31 17:37	06:26 18:29	24	17:33 (Oerzen 3) 17:59 (Oerzen 2)	29	19:17 (Oerzen 1) 19:46 (Oerzen 1)		21:49 04:51
20	08:22 16:39	07:29 17:38	06:24 18:31	26	17:33 (Oerzen 3) 17:59 (Oerzen 2)	29	19:17 (Oerzen 1) 19:46 (Oerzen 1)		21:49 04:51
21	08:20 16:41	07:26 17:40	06:22 18:33	26	17:32 (Oerzen 2) 18:00 (Oerzen 2)	29	19:17 (Oerzen 1) 19:46 (Oerzen 1)		21:50 04:52
22	08:19 16:43	07:24 17:42	06:19 18:35	28	17:32 (Oerzen 2) 18:01 (Oerzen 2)	29	19:17 (Oerzen 1) 19:46 (Oerzen 1)		21:50 04:52
23	08:18 16:44	07:22 17:44	06:17 18:36	30	17:31 (Oerzen 2) 18:01 (Oerzen 2)	29	19:17 (Oerzen 1) 19:45 (Oerzen 1)		21:50 04:52
24	08:17 16:46	07:20 17:46	06:14 18:38	31	17:30 (Oerzen 2) 18:01 (Oerzen 2)	28	19:18 (Oerzen 1) 19:45 (Oerzen 1)		21:50 04:52
25	08:15 16:48	07:18 17:48	06:12 18:40	31	17:30 (Oerzen 2) 18:01 (Oerzen 2)	27	19:18 (Oerzen 1) 19:45 (Oerzen 1)		21:51 04:53
26	08:14 16:50	07:15 17:50	06:10 18:42	31	17:29 (Oerzen 2) 18:00 (Oerzen 2)	26	19:18 (Oerzen 1) 19:44 (Oerzen 1)		21:51 04:53
27	08:13 16:52	07:13 17:52	06:07 18:44	31	17:28 (Oerzen 2) 17:59 (Oerzen 2)	24	19:20 (Oerzen 1) 19:42 (Oerzen 1)		21:51 04:53
28	08:11 16:54	07:11 17:54	06:05 18:45	31	17:28 (Oerzen 2) 17:59 (Oerzen 2)	22	19:20 (Oerzen 1) 19:41 (Oerzen 1)		21:50 04:54
29	08:10 16:56		07:02 19:47	30	17:29 (Oerzen 2) 18:29 (Oerzen 2)	20	19:21 (Oerzen 1) 19:39 (Oerzen 1)		21:50 04:55
30	08:08 16:58		07:00 19:49	30	18:29 (Oerzen 2) 18:57 (Oerzen 2)	17	19:24 (Oerzen 1) 19:36 (Oerzen 1)		21:50 04:55
31	08:06 16:59		06:58 19:51	28	18:30 (Oerzen 2) 18:56 (Oerzen 2)	12	20:00 21:34		21:50 04:55
	Sonnenscheinstunden	253	275	367	419	549	491	2	506
	astr.max.mögl.Beschattung			509					

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s08 - Oerzen, Im Dorfe 19

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	October	November	Dezember			
1	04:56 21:50	05:34 21:16	06:27 20:11	19:27 (Oerzen 1) 19:39 (Oerzen 1)	07:19 18:58	18:18 (Oerzen 3) 18:30 (Oerzen 3)	07:16 16:49	08:09 16:06	
2	04:57 21:49	05:36 21:14	06:29 20:08		07:21 18:56	18:21 (Oerzen 3) 18:28 (Oerzen 3)	07:18 16:47	08:11 16:06	
3	04:57 21:49	05:38 21:12	06:31 20:06		07:23 18:53		07:20 16:45	08:12 16:05	
4	04:58 21:48	05:39 21:10	06:32 20:03		07:24 18:51		07:21 16:43	08:14 16:04	
5	04:59 21:48	05:41 21:08	06:34 20:01		07:26 18:49		07:23 16:42	08:15 16:04	
6	05:00 21:47	05:43 21:07	06:36 19:59		07:28 18:46		07:25 16:40	08:16 16:03	
7	05:01 21:47	05:44 21:05	06:38 19:56		07:30 18:44		07:27 16:38	08:18 16:03	
8	05:02 21:46	05:46 21:03	06:39 19:54	18:32 (Oerzen 2) 18:42 (Oerzen 2)	07:31 18:42 (Oerzen 2)		07:29 16:36	08:19 16:02	
9	05:03 21:45	05:48 21:01	06:41 19:52	18:27 (Oerzen 2) 18:44 (Oerzen 2)	07:33 18:39		07:31 16:34	08:20 16:02	
10	05:04 21:44	05:49 20:59	06:43 19:49	18:25 (Oerzen 2) 18:46 (Oerzen 2)	07:35 18:37		07:33 16:33	08:21 16:02	
11	05:05 21:44	05:51 20:57	06:44 19:47	18:24 (Oerzen 2) 18:47 (Oerzen 2)	07:37 18:35		07:35 16:31	08:23 16:01	
12	05:06 21:43	05:53 20:55	19:35 (Oerzen 1) 19:42 (Oerzen 1)	06:46 19:44	18:21 (Oerzen 2) 18:48 (Oerzen 2)	07:39 18:32	07:36 16:29	08:24 16:01	
13	05:07 21:42	05:55 20:53	19:31 (Oerzen 1) 19:45 (Oerzen 1)	06:48 19:42	18:20 (Oerzen 2) 18:48 (Oerzen 2)	07:40 18:30	07:38 16:28	08:25 16:01	
14	05:08 21:41	05:56 20:51	19:29 (Oerzen 1) 19:47 (Oerzen 1)	06:50 19:39	18:20 (Oerzen 2) 18:49 (Oerzen 2)	07:42 18:28	07:40 16:26	08:26 16:01	
15	05:10 21:40	05:58 20:49	19:27 (Oerzen 1) 19:47 (Oerzen 1)	06:51 19:37	18:18 (Oerzen 2) 18:49 (Oerzen 2)	07:44 18:25	07:42 16:25	08:27 16:01	
16	05:11 21:39	06:00 20:46	19:26 (Oerzen 1) 19:49 (Oerzen 1)	06:53 19:35	18:18 (Oerzen 2) 18:49 (Oerzen 2)	07:46 18:23	07:44 16:23	08:27 16:01	
17	05:12 21:38	06:01 20:44	19:25 (Oerzen 1) 19:50 (Oerzen 1)	06:55 19:32	18:17 (Oerzen 2) 18:49 (Oerzen 2)	07:48 18:21	07:46 16:22	08:28 16:02	
18	05:14 21:36	06:03 20:42	19:24 (Oerzen 1) 19:50 (Oerzen 1)	06:56 19:30	18:16 (Oerzen 2) 18:48 (Oerzen 2)	07:50 18:19	07:47 16:20	08:29 16:02	
19	05:15 21:35	06:05 20:40	19:23 (Oerzen 1) 19:51 (Oerzen 1)	06:58 19:27	18:16 (Oerzen 2) 18:48 (Oerzen 2)	07:51 18:16	07:49 16:19	08:30 16:02	
20	05:16 21:34	06:07 20:38	19:23 (Oerzen 1) 19:51 (Oerzen 1)	07:00 19:25	18:16 (Oerzen 2) 18:47 (Oerzen 2)	07:53 18:14	07:51 16:18	08:30 16:02	
21	05:18 21:33	06:08 20:36	19:22 (Oerzen 1) 19:51 (Oerzen 1)	07:02 19:22	18:17 (Oerzen 2) 18:47 (Oerzen 2)	07:55 18:12	07:53 16:16	08:31 16:03	
22	05:19 21:31	06:10 20:33	19:22 (Oerzen 1) 19:51 (Oerzen 1)	07:03 19:20	18:16 (Oerzen 2) 18:45 (Oerzen 2)	07:57 18:10	07:55 16:15	08:32 16:03	
23	05:21 21:30	06:12 20:31	19:21 (Oerzen 1) 19:50 (Oerzen 1)	07:05 19:18	18:17 (Oerzen 2) 18:44 (Oerzen 2)	07:59 18:08	07:56 16:14	08:32 16:04	
24	05:22 21:28	06:13 20:29	19:21 (Oerzen 1) 19:50 (Oerzen 1)	07:07 19:15	18:17 (Oerzen 3) 18:43 (Oerzen 2)	08:01 18:06	07:58 16:13	08:33 16:04	
25	05:24 21:27	06:15 20:27	19:21 (Oerzen 1) 19:50 (Oerzen 1)	07:09 19:13	18:16 (Oerzen 3) 18:40 (Oerzen 2)	07:03 17:03	08:00 16:12	08:33 16:05	
26	05:25 21:25	06:17 20:24	19:21 (Oerzen 1) 19:48 (Oerzen 1)	07:10 19:10	18:16 (Oerzen 3) 18:39 (Oerzen 2)	07:04 17:01	08:01 16:11	08:33 16:06	
27	05:27 21:24	06:19 20:22	19:21 (Oerzen 1) 19:48 (Oerzen 1)	07:12 19:08	18:16 (Oerzen 3) 18:37 (Oerzen 3)	07:06 16:59	08:03 16:10	08:33 16:06	
28	05:28 21:22	06:20 20:20	19:22 (Oerzen 1) 19:47 (Oerzen 1)	07:14 19:06	18:16 (Oerzen 3) 18:37 (Oerzen 3)	07:08 16:57	08:05 16:09	08:34 16:07	
29	05:30 21:21	06:22 20:18	19:22 (Oerzen 1) 19:45 (Oerzen 1)	07:15 19:03	18:16 (Oerzen 3) 18:35 (Oerzen 3)	07:10 16:55	08:06 16:08	08:34 16:08	
30	05:31 21:19	06:24 20:15	19:23 (Oerzen 1) 19:44 (Oerzen 1)	07:17 19:01	18:17 (Oerzen 3) 18:32 (Oerzen 3)	07:12 16:53	08:08 16:07	08:34 16:09	
31	05:33 21:17	06:25 20:13	19:25 (Oerzen 1) 19:42 (Oerzen 1)		07:14 16:51		08:08 16:07	08:34 16:10	
	Sonnenscheinstunden	509	458	382	591	329	19	261	237
	astr.max.mögl.Beschattung		474						

**Tabellen-Layout: Die Daten für jeden Tag 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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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s09 - Oerzen, Im Dorfe 25

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni		
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53	18:25 (Oerzen 2) 19:26 (Rep 10)	05:48 20:47	19:21 (Oerzen 1) 20:02 (Rep 11)	04:59 21:35
2	08:34 16:12	08:03 17:03	07:06 17:58	06:53 19:54	18:27 (Oerzen 2) 19:28 (Rep 10)	05:45 20:48	19:23 (Oerzen 1) 20:00 (Rep 11)	04:59 21:36
3	08:34 16:14	08:01 17:05	07:04 18:00	06:50 19:56	18:29 (Oerzen 2) 19:29 (Rep 10)	05:44 20:50	19:26 (Oerzen 1) 19:59 (Rep 11)	04:58 21:37
4	08:33 16:15	08:00 17:07	07:02 18:01	06:48 19:58	18:31 (Oerzen 2) 19:28 (Rep 10)	05:42 20:52	19:48 (Rep 11) 19:56 (Rep 11)	04:57 21:38
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00	19:06 (Rep 10) 19:28 (Rep 10)	05:40 20:54		04:56 21:40
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02	19:07 (Rep 10) 19:28 (Rep 10)	05:38 20:55		04:55 21:41
7	08:32 16:19	07:54 17:13	06:55 18:07	06:41 20:03	19:06 (Rep 10) 19:27 (Rep 10)	05:36 20:57		04:55 21:42
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05	19:07 (Rep 10) 19:26 (Rep 10)	05:34 20:59		04:54 21:42
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07	19:08 (Rep 10) 19:25 (Rep 10)	05:32 21:00		04:54 21:43
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 17:43 (Oerzen 3)	19:08 (Rep 10) 19:23 (Rep 10)	05:30 21:02		04:53 21:44
11	08:30 16:24	07:47 17:21	06:46 18:14	06:32 17:45 (Oerzen 3)	19:11 (Rep 10) 19:37 (Oerzen 1)	05:28 21:04		04:53 21:45
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 17:35 (Oerzen 3)	19:26 (Oerzen 1) 19:41 (Oerzen 1)	05:27 21:06		04:52 21:46
13	08:28 16:27	07:43 17:25	06:41 18:18	06:27 17:50 (Oerzen 3)	19:22 (Oerzen 1) 19:42 (Oerzen 1)	05:25 21:07		04:52 21:46
14	08:28 16:29	07:41 17:27	06:38 18:20	06:25 17:32 (Oerzen 3)	19:21 (Oerzen 1) 19:44 (Oerzen 1)	05:23 21:09		04:52 21:47
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 17:53 (Oerzen 3)	19:20 (Oerzen 1) 19:45 (Oerzen 1)	05:22 21:11		04:52 21:48
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 17:30 (Oerzen 3)	19:19 (Oerzen 1) 19:46 (Oerzen 1)	05:20 21:12		04:51 21:48
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 17:30 (Oerzen 3)	19:18 (Oerzen 1) 19:46 (Oerzen 1)	05:18 21:14		04:51 21:49
18	08:24 16:36	07:33 17:35	06:29 18:27	06:15 17:54 (Oerzen 2)	19:16 (Oerzen 1) 19:55 (Rep 11)	05:17 21:15		04:51 21:49
19	08:23 16:37	07:31 17:37	06:26 18:29	06:13 17:28 (Oerzen 2)	19:16 (Oerzen 1) 19:57 (Rep 11)	05:15 21:17		04:51 21:49
20	08:22 16:39	07:29 17:38	06:24 18:31	06:11 17:56 (Oerzen 2)	19:16 (Oerzen 1) 19:59 (Rep 11)	05:14 21:18		04:51 21:50
21	08:20 16:41	07:26 17:40	06:22 18:33	06:09 17:26 (Oerzen 2)	19:15 (Oerzen 1) 20:01 (Rep 11)	05:12 21:20		04:52 21:50
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 17:58 (Oerzen 2)	19:15 (Oerzen 1) 20:02 (Rep 11)	05:11 21:22		04:52 21:50
23	08:18 16:44	07:22 17:44	06:17 18:36	06:04 17:24 (Oerzen 2)	19:15 (Oerzen 1) 20:04 (Rep 11)	05:10 21:23		04:52 21:50
24	08:17 16:46	07:20 17:46	06:14 18:38	06:02 17:24 (Oerzen 2)	19:16 (Oerzen 1) 20:05 (Rep 11)	05:08 21:24		04:52 21:51
25	08:15 16:48	07:18 17:48	06:12 18:40	06:00 17:23 (Oerzen 2)	19:16 (Oerzen 1) 20:05 (Rep 11)	05:07 21:26		04:53 21:51
26	08:14 16:50	07:15 17:50	06:10 18:42	05:58 17:57 (Oerzen 2)	19:16 (Oerzen 1) 20:05 (Rep 11)	05:06 21:27		04:53 21:51
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 17:23 (Oerzen 2)	19:17 (Oerzen 1) 20:04 (Rep 11)	05:05 21:29		04:53 21:50
28	08:11 16:54	07:11 17:54	06:05 18:45	05:54 17:56 (Oerzen 2)	19:17 (Oerzen 1) 20:04 (Rep 11)	05:04 21:30		04:54 21:50
29	08:10 16:56		07:02 19:47	05:52 18:24 (Oerzen 2)	19:18 (Oerzen 1) 19:21 (Rep 10)	05:02 20:43		04:55 21:50
30	08:08 16:58		07:00 19:49	05:50 18:24 (Oerzen 2)	19:19 (Oerzen 1) 19:23 (Rep 10)	05:01 20:45		04:55 21:50
31	08:06 16:59		06:58 19:51	05:48 18:25 (Oerzen 2)	20:03 (Rep 11) 19:25 (Rep 10)	21:33 21:34		21:50 21:50
Sonnenscheinstunden	253	275	367	419	491	506		
astr.max.mögl.Beschattung			605	1013	91			

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s09 - Oerzen, Im Dorfe 25

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	October	November	December
1	04:56 21:50	05:34 21:16	06:27 20:11	19:10 (Rep 10) 18:58 (Oerzen 1)	07:19 18:13 (Oerzen 3)	08:09 16:06
2	04:57 21:49	05:36 21:14	06:29 20:08	19:07 (Rep 10) 18:56 (Rep 10)	07:21 18:28 (Oerzen 3)	08:11 16:06
3	04:57 21:49	05:38 21:12	06:31 20:06	19:05 (Rep 10) 18:54 (Rep 10)	07:23 18:26 (Oerzen 3)	08:12 16:05
4	04:58 21:48	05:39 21:10	06:32 20:04	19:04 (Rep 10) 18:51 (Rep 10)	07:24 18:26 (Oerzen 3)	08:14 16:04
5	04:59 21:48	05:41 21:08	06:34 20:01	19:03 (Rep 10) 18:49 (Rep 10)	07:26 18:26 (Oerzen 3)	08:15 16:04
6	05:00 21:47	05:43 21:07	06:36 19:59	19:02 (Rep 10) 18:46 (Rep 10)	07:28 18:26 (Oerzen 3)	08:16 16:03
7	05:01 21:47	05:44 21:05	06:38 19:56	19:02 (Rep 10) 18:44 (Rep 10)	07:30 18:26 (Oerzen 3)	08:18 16:03
8	05:02 21:46	05:46 21:03	20:00 (Rep 11) 19:54	06:39 19:23 (Rep 10)	18:26 (Oerzen 2) 18:42 (Rep 10)	07:31 16:02
9	05:03 21:45	05:48 21:01	19:56 (Rep 11) 20:06 (Rep 11)	06:41 19:52	18:22 (Oerzen 2) 18:39 (Rep 10)	07:33 16:02
10	05:04 21:44	05:49 20:59	19:33 (Oerzen 1) 20:08 (Rep 11)	06:43 19:49	18:20 (Oerzen 2) 18:37 (Rep 10)	07:35 16:02
11	05:05 21:44	05:51 20:57	19:30 (Oerzen 1) 20:09 (Rep 11)	06:44 19:47	18:19 (Oerzen 2) 18:35 (Rep 10)	07:37 16:01
12	05:06 21:43	05:53 20:55	19:29 (Oerzen 1) 20:10 (Rep 11)	06:46 19:44	18:16 (Oerzen 2) 18:32 (Rep 10)	07:39 16:01
13	05:07 21:42	05:55 20:53	19:26 (Oerzen 1) 20:10 (Rep 11)	06:48 19:42	18:15 (Oerzen 2) 18:30 (Rep 10)	07:40 16:01
14	05:08 21:41	05:56 20:51	19:26 (Oerzen 1) 20:11 (Rep 11)	06:50 19:39	18:14 (Oerzen 2) 18:28 (Rep 10)	07:42 16:01
15	05:10 21:40	05:58 20:49	19:24 (Oerzen 1) 20:11 (Rep 11)	06:51 19:37	18:13 (Oerzen 2) 18:25 (Rep 10)	07:44 16:01
16	05:11 21:39	06:00 20:46	19:23 (Oerzen 1) 20:11 (Rep 11)	06:53 19:35	18:12 (Oerzen 2) 18:23 (Rep 10)	07:46 16:01
17	05:12 21:38	06:01 20:44	19:23 (Oerzen 1) 20:11 (Rep 11)	06:55 19:32	18:12 (Oerzen 2) 18:21 (Rep 10)	07:48 16:02
18	05:14 21:36	06:03 20:42	19:21 (Oerzen 1) 20:10 (Rep 11)	06:56 19:30	18:11 (Oerzen 2) 18:19 (Rep 10)	07:50 16:02
19	05:15 21:35	06:05 20:40	19:21 (Oerzen 1) 20:10 (Rep 11)	06:58 19:27	18:11 (Oerzen 2) 18:16 (Rep 10)	07:51 16:02
20	05:16 21:34	06:07 20:38	19:21 (Oerzen 1) 20:10 (Rep 11)	07:00 19:25	18:11 (Oerzen 2) 18:14 (Rep 10)	07:53 16:03
21	05:18 21:33	06:08 20:36	19:20 (Oerzen 1) 20:07 (Rep 11)	07:02 19:22	18:11 (Oerzen 2) 18:12 (Rep 10)	07:55 16:03
22	05:19 21:31	06:10 20:33	19:20 (Oerzen 1) 20:05 (Rep 11)	07:03 19:20	18:10 (Oerzen 2) 18:10 (Rep 10)	07:57 16:03
23	05:21 21:30	06:12 20:31	19:19 (Oerzen 1) 20:02 (Rep 11)	07:05 19:18	18:11 (Oerzen 2) 18:08 (Rep 10)	07:59 16:04
24	05:22 21:28	06:13 20:29	19:20 (Oerzen 1) 20:00 (Rep 11)	07:07 19:15	18:12 (Oerzen 2) 18:06 (Rep 10)	08:01 16:04
25	05:24 21:27	06:15 20:27	19:20 (Oerzen 1) 19:59 (Rep 11)	07:09 19:13	18:12 (Oerzen 3) 17:03 (Rep 10)	08:03 16:05
26	05:25 21:25	06:17 20:24	19:20 (Oerzen 1) 19:48 (Oerzen 1)	07:10 19:10	18:12 (Oerzen 3) 17:01 (Rep 10)	08:04 16:06
27	05:27 21:24	06:19 20:22	19:21 (Oerzen 1) 19:47 (Oerzen 1)	07:12 19:08	18:12 (Oerzen 3) 16:59 (Rep 10)	08:04 16:06
28	05:28 21:22	06:20 20:20	19:22 (Oerzen 1) 19:47 (Oerzen 1)	07:14 19:06	18:12 (Oerzen 3) 16:57 (Rep 10)	08:05 16:07
29	05:30 21:21	06:22 20:18	19:22 (Oerzen 1) 19:44 (Oerzen 1)	07:16 19:03	18:12 (Oerzen 3) 16:55 (Rep 10)	08:06 16:08
30	05:31 21:19	06:24 20:15	19:23 (Oerzen 1) 19:43 (Oerzen 1)	07:17 19:01	18:12 (Oerzen 3) 16:53 (Rep 10)	08:08 16:09
31	05:33 21:17	06:25 20:13	19:26 (Oerzen 1) 19:41 (Oerzen 1)		07:14 16:51	08:34 16:10
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung		819	868	38		

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s10 - Oerzen, Westerheide 1

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März		April		Mai	Juni	
1	08:34	08:05	07:09		06:55		18:57 (Rep 10)	05:48	04:59
	16:11	17:01	17:56		19:53	23	19:20 (Rep 10)	20:47	21:35
2	08:34	08:03	07:06		06:53		18:57 (Rep 10)	05:45	04:59
	16:12	17:03	17:58		19:54	22	19:19 (Rep 10)	20:48	21:36
3	08:34	08:01	07:04		06:50		18:58 (Rep 10)	05:44	04:58
	16:14	17:05	18:00		19:56	21	19:19 (Rep 10)	20:50	21:37
4	08:33	08:00	07:02		06:48		18:58 (Rep 10)	05:42	04:57
	16:15	17:07	18:01		19:58	19	19:17 (Rep 10)	20:52	21:38
5	08:33	07:58	07:00		17:33 (Oerzen 3)		18:59 (Rep 10)	05:40	04:56
	16:16	17:09	18:03	2	17:35 (Oerzen 3)	21	19:24 (Oerzen 1)	20:54	21:40
6	08:33	07:56	06:57		17:27 (Oerzen 3)	06:43	19:01 (Rep 10)	05:38	04:55
	16:17	17:11	18:05	12	17:39 (Oerzen 3)	20:02	19:29 (Oerzen 1)	20:55	21:41
7	08:32	07:54	06:55		17:25 (Oerzen 3)	06:41	19:02 (Rep 10)	05:36	04:55
	16:19	17:13	18:07	16	17:41 (Oerzen 3)	20:04	19:31 (Oerzen 1)	20:57	21:42
8	08:32	07:53	06:53		17:21 (Oerzen 2)	06:39	19:10 (Oerzen 1)	05:34	04:54
	16:20	17:15	18:09	21	17:42 (Oerzen 3)	20:05	19:32 (Oerzen 1)	20:59	21:42
9	08:31	07:51	06:50		17:18 (Oerzen 2)	06:36	19:08 (Oerzen 1)	05:32	04:54
	16:21	17:17	18:11	25	17:43 (Oerzen 3)	20:07	19:34 (Oerzen 1)	21:01	21:43
10	08:31	07:49	06:48		17:17 (Oerzen 2)	06:34	19:06 (Oerzen 1)	05:30	04:53
	16:23	17:19	18:13	27	17:44 (Oerzen 3)	20:09	19:34 (Oerzen 1)	21:02	21:44
11	08:30	07:47	06:46		17:14 (Oerzen 2)	06:32	19:05 (Oerzen 1)	05:28	04:53
	16:24	17:21	18:15	29	17:43 (Oerzen 3)	20:11	19:35 (Oerzen 1)	21:04	21:45
12	08:29	07:45	06:43		17:13 (Oerzen 2)	06:29	19:05 (Oerzen 1)	05:27	04:52
	16:26	17:23	18:16	31	17:44 (Oerzen 3)	20:13	19:35 (Oerzen 1)	21:06	21:46
13	08:28	07:43	06:41		17:11 (Oerzen 2)	06:27	19:03 (Oerzen 1)	05:25	04:52
	16:27	17:25	18:18	32	17:43 (Oerzen 3)	20:14	19:35 (Oerzen 1)	21:07	21:46
14	08:28	07:41	06:38		17:11 (Oerzen 2)	06:25	19:03 (Oerzen 1)	05:23	04:52
	16:29	17:27	18:20	32	17:43 (Oerzen 3)	20:16	19:48 (Rep 11)	21:09	21:47
15	08:27	07:39	06:36		17:09 (Oerzen 2)	06:22	19:03 (Oerzen 1)	05:22	04:52
	16:31	17:29	18:22	34	17:43 (Oerzen 2)	20:18	19:50 (Rep 11)	21:11	21:48
16	08:26	07:37	06:34		17:09 (Oerzen 2)	06:20	19:03 (Oerzen 1)	05:20	04:51
	16:32	17:31	18:24	34	17:43 (Oerzen 2)	20:20	19:52 (Rep 11)	21:12	21:48
17	08:25	07:35	06:31		17:09 (Oerzen 2)	06:18	19:03 (Oerzen 1)	05:18	04:51
	16:34	17:33	18:26	35	17:44 (Oerzen 2)	20:21	19:54 (Rep 11)	21:14	21:49
18	08:24	07:33	06:29		17:08 (Oerzen 2)	06:15	19:02 (Oerzen 1)	05:17	04:51
	16:36	17:35	18:27	35	17:43 (Oerzen 2)	20:23	19:55 (Rep 11)	21:15	21:49
19	08:23	07:31	06:26		17:08 (Oerzen 2)	06:13	19:02 (Oerzen 1)	05:15	04:51
	16:37	17:37	18:29	35	17:43 (Oerzen 2)	20:25	19:56 (Rep 11)	21:17	21:49
20	08:22	07:29	06:24		17:08 (Oerzen 2)	06:11	19:03 (Oerzen 1)	05:14	04:51
	16:39	17:38	18:31	34	17:42 (Oerzen 2)	20:27	19:57 (Rep 11)	21:18	21:50
21	08:20	07:26	06:22		17:08 (Oerzen 2)	06:09	19:03 (Oerzen 1)	05:12	04:52
	16:41	17:40	18:33	34	17:42 (Oerzen 2)	20:29	19:57 (Rep 11)	21:20	21:50
22	08:19	07:24	06:19		17:09 (Oerzen 2)	06:07	19:04 (Oerzen 1)	05:11	04:52
	16:43	17:42	18:35	32	17:41 (Oerzen 2)	20:30	19:57 (Rep 11)	21:22	21:50
23	08:18	07:22	06:17		17:09 (Oerzen 2)	06:04	19:05 (Oerzen 1)	05:10	04:52
	16:44	17:44	18:36	31	17:40 (Oerzen 2)	20:32	19:57 (Rep 11)	21:23	21:50
24	08:17	07:20	06:14		17:10 (Oerzen 2)	06:02	19:06 (Oerzen 1)	05:08	04:52
	16:46	17:46	18:38	29	17:39 (Oerzen 2)	20:34	19:56 (Rep 11)	21:24	21:51
25	08:15	07:18	06:12		17:10 (Oerzen 2)	06:00	19:08 (Oerzen 1)	05:07	04:53
	16:48	17:48	18:40	36	18:14 (Rep 10)	20:36	19:58 (Rep 11)	21:26	21:51
26	08:14	07:16	06:10		17:12 (Oerzen 2)	05:58	19:10 (Oerzen 1)	05:06	04:53
	16:50	17:50	18:42	37	18:16 (Rep 10)	20:38	19:55 (Rep 11)	21:27	21:51
27	08:13	07:13	06:07		17:13 (Oerzen 2)	05:56	19:13 (Oerzen 1)	05:05	04:53
	16:52	17:52	18:44	36	18:17 (Rep 10)	20:39	19:54 (Rep 11)	21:29	21:50
28	08:11	07:11	06:05		17:16 (Oerzen 2)	05:54	19:36 (Rep 11)	05:04	04:54
	16:54	17:54	18:45	34	18:19 (Rep 10)	20:41	19:53 (Rep 11)	21:30	21:50
29	08:10		07:02		18:21 (Oerzen 2)	05:52	19:38 (Rep 11)	05:02	04:55
	16:56		19:47	27	19:21 (Rep 10)	20:43	19:51 (Rep 11)	21:31	21:50
30	08:08		07:00		18:58 (Rep 10)	05:50	19:40 (Rep 11)	05:01	04:55
	16:58		19:49	22	19:20 (Rep 10)	20:45	19:49 (Rep 11)	21:33	21:50
31	08:06		06:58		18:58 (Rep 10)			05:00	
	16:59		19:51	23	19:21 (Rep 10)			21:34	
Sonnenscheinstunden	253	275	367		419			491	506
astr.max.mögl.Beschattung			775			994			

**Tabellen-Layout: Die Daten für jeden Tag 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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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s10 - Oerzen, Westerheide 1

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	October	November	Dezember	
1	04:56	05:34	06:27	19:04 (Oerzen 1)   07:19	17:52 (Oerzen 2)   07:16	08:09	
	21:50	21:16	20:11	30 19:34 (Oerzen 1)   18:58	30 18:22 (Oerzen 3)   16:49	16:06	
2	04:57	05:36	06:29	19:05 (Oerzen 1)   07:21	17:53 (Oerzen 2)   07:18	08:11	
	21:49	21:14	20:08	28 19:33 (Oerzen 1)   18:56	29 18:22 (Oerzen 3)   16:47	16:06	
3	04:57	05:38	06:31	19:05 (Oerzen 1)   07:23	17:54 (Oerzen 2)   07:20	08:12	
	21:49	21:12	20:06	26 19:31 (Oerzen 1)   18:54	28 18:22 (Oerzen 3)   16:45	16:05	
4	04:58	05:39	06:32	19:07 (Oerzen 1)   07:24	17:54 (Oerzen 2)   07:21	08:14	
	21:48	21:10	20:04	22 19:29 (Oerzen 1)   18:51	26 18:20 (Oerzen 3)   16:43	16:04	
5	04:59	05:41	06:34	18:59 (Rep 10)   07:26	17:57 (Oerzen 2)   07:23	08:15	
	21:48	21:08	20:01	29 19:28 (Oerzen 1)   18:49	22 18:19 (Oerzen 3)   16:42	16:04	
6	05:00	05:43	06:36	18:56 (Rep 10)   07:28	18:00 (Oerzen 3)   07:25	08:16	
	21:47	21:07	19:59	28 19:24 (Oerzen 1)   18:46	18 18:18 (Oerzen 3)   16:40	16:03	
7	05:01	05:44	06:38	18:54 (Rep 10)   07:30	18:02 (Oerzen 3)   07:27	08:18	
	21:47	21:05	19:56	23 19:20 (Oerzen 1)   18:44	14 18:16 (Oerzen 3)   16:38	16:03	
8	05:02	05:46	06:39	18:53 (Rep 10)   07:31	18:04 (Oerzen 3)   07:29	08:19	
	21:46	21:03	19:54	19 19:12 (Rep 10)   18:42	9 18:13 (Oerzen 3)   16:36	16:02	
9	05:03	05:48	06:41	18:51 (Rep 10)   07:33		07:31	08:20
	21:45	21:01	19:52	21 19:12 (Rep 10)   18:39		16:34	16:02
10	05:04	05:49	06:43	18:51 (Rep 10)   07:35		07:33	08:21
	21:44	20:59	19:49	22 19:13 (Rep 10)   18:37		16:33	16:02
11	05:05	05:51	06:44	18:50 (Rep 10)   07:37		07:35	08:23
	21:44	20:57	19:47	23 19:13 (Rep 10)   18:35		16:31	16:01
12	05:06	05:53	19:51 (Rep 11)   06:46	18:49 (Rep 10)   07:39		07:36	08:24
	21:43	20:55	3 19:54 (Rep 11)   19:44	23 19:12 (Rep 10)   18:32		16:29	16:01
13	05:07	05:55	19:46 (Rep 11)   06:48	18:49 (Rep 10)   07:40		07:38	08:25
	21:42	20:53	11 19:57 (Rep 11)   19:42	23 19:12 (Rep 10)   18:30		16:28	16:01
14	05:08	05:56	19:45 (Rep 11)   06:50	18:50 (Rep 10)   07:42		07:40	08:26
	21:41	20:51	14 19:59 (Rep 11)   19:39	21 19:11 (Rep 10)   18:28		16:26	16:01
15	05:10	05:58	19:43 (Rep 11)   06:51	18:06 (Oerzen 2)   07:44		07:42	08:27
	21:40	20:49	17 20:00 (Rep 11)   19:37	33 19:09 (Rep 10)   18:25		16:25	16:01
16	05:11	06:00	19:18 (Oerzen 1)   06:53	18:03 (Oerzen 2)   07:46		07:44	08:28
	21:39	20:46	30 20:01 (Rep 11)   19:35	36 19:07 (Rep 10)   18:23		16:23	16:01
17	05:12	06:01	19:16 (Oerzen 1)   06:55	18:01 (Oerzen 2)   07:48		07:46	08:28
	21:38	20:44	37 20:02 (Rep 11)   19:32	37 19:05 (Rep 10)   18:21		16:22	16:02
18	05:14	06:03	19:13 (Oerzen 1)   06:56	17:58 (Oerzen 2)   07:50		07:48	08:29
	21:36	20:42	42 20:02 (Rep 11)   19:30	36 19:02 (Rep 10)   18:19		16:20	16:02
19	05:15	06:05	19:12 (Oerzen 1)   06:58	17:57 (Oerzen 2)   07:51		07:49	08:30
	21:35	20:40	45 20:02 (Rep 11)   19:27	31 18:59 (Rep 10)   18:16		16:19	16:02
20	05:16	06:07	19:11 (Oerzen 1)   07:00	17:56 (Oerzen 2)   07:53		07:51	08:30
	21:34	20:38	48 20:02 (Rep 11)   19:25	30 18:26 (Oerzen 2)   18:14		16:18	16:02
21	05:18	06:08	19:09 (Oerzen 1)   07:02	17:55 (Oerzen 2)   07:55		07:53	08:31
	21:33	20:36	50 20:02 (Rep 11)   19:22	32 18:27 (Oerzen 2)   18:12		16:16	16:03
22	05:19	06:10	19:08 (Oerzen 1)   07:03	17:53 (Oerzen 2)   07:57		07:55	08:32
	21:31	20:33	52 20:02 (Rep 11)   19:20	33 18:26 (Oerzen 2)   18:10		16:15	16:03
23	05:21	06:12	19:06 (Oerzen 1)   07:05	17:52 (Oerzen 2)   07:59		07:56	08:32
	21:30	20:31	53 20:00 (Rep 11)   19:18	35 18:27 (Oerzen 2)   18:08		16:14	16:04
24	05:22	06:13	19:06 (Oerzen 1)   07:07	17:52 (Oerzen 2)   08:01		07:58	08:33
	21:28	20:29	52 20:00 (Rep 11)   19:15	35 18:27 (Oerzen 2)   18:06		16:13	16:04
25	05:24	06:15	19:06 (Oerzen 1)   07:09	17:51 (Oerzen 2)   07:03		08:00	08:33
	21:27	20:27	52 19:59 (Rep 11)   19:13	35 18:26 (Oerzen 2)   17:03		16:12	16:05
26	05:25	06:17	19:05 (Oerzen 1)   07:10	17:51 (Oerzen 2)   07:04		08:01	08:33
	21:25	20:24	48 19:56 (Rep 11)   19:10	35 18:26 (Oerzen 2)   17:01		16:11	16:06
27	05:27	06:19	19:05 (Oerzen 1)   07:12	17:51 (Oerzen 2)   07:06		08:03	08:34
	21:24	20:22	45 19:54 (Rep 11)   19:08	34 18:25 (Oerzen 2)   16:59		16:10	16:06
28	05:28	06:20	19:05 (Oerzen 1)   07:14	17:51 (Oerzen 2)   07:08		08:05	08:34
	21:22	20:20	41 19:52 (Rep 11)   19:06	34 18:25 (Oerzen 2)   16:57		16:09	16:07
29	05:30	06:22	19:04 (Oerzen 1)   07:16	17:50 (Oerzen 2)   07:10		08:06	08:34
	21:21	20:18	33 19:48 (Rep 11)   19:03	33 18:23 (Oerzen 2)   16:55		16:08	16:08
30	05:31	06:24	19:04 (Oerzen 1)   07:17	17:51 (Oerzen 2)   07:12		08:08	08:34
	21:19	20:15	32 19:36 (Oerzen 1)   19:01	32 18:23 (Oerzen 3)   16:53		16:07	16:09
31	05:33	06:25	19:05 (Oerzen 1)				08:34
	21:17	20:13	30 19:35 (Oerzen 1)				16:10
Sonnenscheinstunden	509	458	382	329	261	237	
astr.max.mögl.Beschattung		735	879	176			

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s11 - Oerzen, Westerheide 3

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März		April		Mai	Juni	
1	08:34	08:05	07:09		06:55		18:53 (Rep 10)	05:48	04:59
	16:11	17:01	17:56		19:53	22	19:15 (Rep 10)	20:47	21:35
2	08:34	08:03	07:06		06:53		18:54 (Rep 10)	05:45	04:59
	16:12	17:03	17:58		19:54	20	19:14 (Rep 10)	20:48	21:36
3	08:34	08:01	07:04		06:50		18:55 (Rep 10)	05:44	04:58
	16:14	17:05	18:00	3	17:30 (Oerzen 3)	19:56	19:22 (Oerzen 1)	20:50	21:37
4	08:33	08:00	07:02		06:48		18:56 (Rep 10)	05:42	04:57
	16:15	17:07	18:01	13	17:35 (Oerzen 3)	19:58	19:24 (Oerzen 1)	20:52	21:39
5	08:33	07:58	07:00		06:46		18:58 (Rep 10)	05:40	04:56
	16:16	17:09	18:03	22	17:37 (Oerzen 3)	20:00	19:26 (Oerzen 1)	20:54	21:40
6	08:33	07:56	06:57		06:43		19:03 (Oerzen 1)	05:38	04:55
	16:17	17:11	18:05	25	17:37 (Oerzen 3)	20:02	19:28 (Oerzen 1)	20:55	21:41
7	08:32	07:54	06:55		06:41		19:01 (Oerzen 1)	05:36	04:55
	16:19	17:13	18:07	29	17:39 (Oerzen 3)	20:04	19:28 (Oerzen 1)	20:57	21:42
8	08:32	07:53	06:53		06:39		19:00 (Oerzen 1)	05:34	04:54
	16:20	17:15	18:09	31	17:38 (Oerzen 3)	20:05	19:29 (Oerzen 1)	20:59	21:42
9	08:31	07:51	06:50		06:36		19:00 (Oerzen 1)	05:32	04:54
	16:21	17:17	18:11	33	17:39 (Oerzen 3)	20:07	19:30 (Oerzen 1)	21:01	21:43
10	08:31	07:49	06:48		06:34		18:58 (Oerzen 1)	05:30	04:53
	16:23	17:19	18:13	33	17:39 (Oerzen 3)	20:09	19:29 (Oerzen 1)	21:02	21:44
11	08:30	07:47	06:46		06:32		18:58 (Oerzen 1)	05:28	04:53
	16:24	17:21	18:15	35	17:39 (Oerzen 3)	20:11	19:30 (Oerzen 1)	21:04	21:45
12	08:29	07:45	06:43		06:29		18:57 (Oerzen 1)	05:27	04:52
	16:26	17:23	18:16	34	17:38 (Oerzen 3)	20:13	19:30 (Oerzen 1)	21:06	21:46
13	08:28	07:43	06:41		06:27		18:56 (Oerzen 1)	05:25	04:52
	16:27	17:25	18:18	35	17:37 (Oerzen 3)	20:14	19:47 (Rep 11)	21:07	21:46
14	08:28	07:41	06:38		06:25		18:56 (Oerzen 1)	05:23	04:52
	16:29	17:27	18:20	35	17:37 (Oerzen 3)	20:16	19:48 (Rep 11)	21:09	21:47
15	08:27	07:39	06:36		06:22		18:57 (Oerzen 1)	05:22	04:52
	16:31	17:29	18:22	35	17:36 (Oerzen 2)	20:18	19:50 (Rep 11)	21:11	21:48
16	08:26	07:37	06:34		06:20		18:57 (Oerzen 1)	05:20	04:51
	16:32	17:31	18:24	35	17:36 (Oerzen 2)	20:20	19:52 (Rep 11)	21:12	21:48
17	08:25	07:35	06:31		06:18		18:57 (Oerzen 1)	05:18	04:51
	16:34	17:33	18:26	34	17:36 (Oerzen 2)	20:21	19:53 (Rep 11)	21:14	21:49
18	08:24	07:33	06:29		06:15		18:57 (Oerzen 1)	05:17	04:51
	16:36	17:35	18:27	34	17:35 (Oerzen 2)	20:23	19:53 (Rep 11)	21:15	21:49
19	08:23	07:31	06:26		06:13		18:58 (Oerzen 1)	05:15	04:51
	16:37	17:37	18:29	33	17:35 (Oerzen 2)	20:25	19:53 (Rep 11)	21:17	21:49
20	08:22	07:29	06:24		06:11		18:58 (Oerzen 1)	05:14	04:51
	16:39	17:38	18:31	31	17:33 (Oerzen 2)	20:27	19:53 (Rep 11)	21:18	21:50
21	08:20	07:26	06:22		06:09		18:59 (Oerzen 1)	05:12	04:52
	16:41	17:40	18:33	30	17:33 (Oerzen 2)	20:29	19:53 (Rep 11)	21:20	21:50
22	08:19	07:24	06:19		06:07		19:01 (Oerzen 1)	05:11	04:52
	16:43	17:42	18:35	28	17:32 (Oerzen 2)	20:30	19:53 (Rep 11)	21:22	21:50
23	08:18	07:22	06:17		06:04		19:03 (Oerzen 1)	05:10	04:52
	16:44	17:44	18:36	32	18:10 (Rep 10)	20:32	19:52 (Rep 11)	21:23	21:50
24	08:17	07:20	06:14		06:02		19:05 (Oerzen 1)	05:08	04:52
	16:46	17:46	18:38	33	18:12 (Rep 10)	20:34	19:52 (Rep 11)	21:24	21:51
25	08:15	07:18	06:12		06:00		19:31 (Rep 11)	05:07	04:53
	16:48	17:48	18:40	33	18:14 (Rep 10)	20:36	19:51 (Rep 11)	21:26	21:51
26	08:14	07:16	06:10		05:58		19:32 (Rep 11)	05:06	04:53
	16:50	17:50	18:42	27	18:16 (Rep 10)	20:38	19:50 (Rep 11)	21:27	21:51
27	08:13	07:13	06:07		05:56		19:33 (Rep 11)	05:05	04:53
	16:52	17:52	18:44	21	18:16 (Rep 10)	20:39	19:48 (Rep 11)	21:29	21:50
28	08:11	07:11	06:05		05:54		19:35 (Rep 11)	05:04	04:54
	16:54	17:54	18:45	23	18:17 (Rep 10)	20:41	19:46 (Rep 11)	21:30	21:50
29	08:10		07:02		05:52		19:39 (Rep 11)	05:02	04:55
	16:56		19:47	23	19:17 (Rep 10)	20:43	19:42 (Rep 11)	21:31	21:50
30	08:08		07:00		05:50			05:01	04:55
	16:58		19:49	23	19:16 (Rep 10)	20:45		21:33	21:50
31	08:06		06:58		05:48			05:00	
	16:59		19:51	22	19:16 (Rep 10)			21:34	
Sonnenscheinstunden	253	275	367		419			491	506
astr.max.mögl.Beschattung				825		958			

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s11 - Oerzen, Westerheide 3

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	October	November	Dezember		
1	04:56 21:50	05:34 21:16	06:27 20:11	18:57 (Oerzen 1) 19:29 (Oerzen 1)	07:19 18:58	17:42 (Oerzen 2) 18:17 (Oerzen 3)	07:16 16:49	08:09 16:06
2	04:57 21:49	05:36 21:14	06:29 20:08	18:57 (Oerzen 1) 19:28 (Oerzen 1)	07:21 18:56	17:43 (Oerzen 2) 18:17 (Oerzen 3)	07:18 16:47	08:11 16:06
3	04:57 21:49	05:38 21:12	06:31 20:06	18:57 (Oerzen 1) 19:27 (Oerzen 1)	07:23 18:54	17:43 (Oerzen 2) 18:17 (Oerzen 3)	07:20 16:45	08:12 16:05
4	04:58 21:48	05:39 21:10	06:32 20:04	18:57 (Oerzen 1) 19:26 (Oerzen 1)	07:24 18:51	17:43 (Oerzen 2) 18:16 (Oerzen 3)	07:21 16:43	08:14 16:04
5	04:59 21:48	05:41 21:08	06:34 20:01	18:58 (Oerzen 1) 19:25 (Oerzen 1)	07:26 18:49	17:44 (Oerzen 2) 18:16 (Oerzen 3)	07:23 16:42	08:15 16:04
6	05:00 21:47	05:43 21:07	06:36 19:59	18:58 (Oerzen 1) 19:23 (Oerzen 1)	07:28 18:46	17:45 (Oerzen 2) 18:15 (Oerzen 3)	07:25 16:40	08:16 16:03
7	05:01 21:47	05:44 21:05	06:38 19:56	18:53 (Rep 10) 19:22 (Oerzen 1)	07:30 18:44	17:47 (Oerzen 2) 18:14 (Oerzen 3)	07:27 16:38	08:18 16:03
8	05:02 21:46	05:46 21:03	06:39 19:54	18:51 (Rep 10) 19:20 (Oerzen 1)	07:31 18:42	17:49 (Oerzen 2) 18:13 (Oerzen 3)	07:29 16:36	08:19 16:02
9	05:03 21:45	05:48 21:01	06:41 19:52	18:48 (Rep 10) 19:16 (Oerzen 1)	07:33 18:39	17:52 (Oerzen 2) 18:11 (Oerzen 3)	07:31 16:34	08:20 16:02
10	05:04 21:44	05:49 20:59	06:43 19:49	18:47 (Rep 10) 19:07 (Rep 10)	07:35 18:37	17:58 (Oerzen 3) 18:07 (Oerzen 3)	07:33 16:33	08:21 16:02
11	05:05 21:44	05:51 20:57	06:44 19:47	18:46 (Rep 10) 19:08 (Rep 10)	07:37 18:35	18:07 (Rep 10) 18:35	07:35 16:31	08:23 16:01
12	05:06 21:43	05:53 20:55	06:46 19:44	18:45 (Rep 10) 19:07 (Rep 10)	07:39 18:32	18:35 (Rep 10) 19:07 (Rep 10)	07:36 16:29	08:24 16:01
13	05:07 21:42	05:55 20:53	06:48 19:42	18:45 (Rep 10) 19:07 (Rep 10)	07:40 18:30	19:07 (Rep 10) 18:30	07:38 16:28	08:25 16:01
14	05:08 21:41	05:56 20:51	19:45 (Rep 11) 19:51 (Rep 11)	06:50 19:39	18:45 (Rep 10) 19:07 (Rep 10)	07:42 18:28	07:40 16:26	08:26 16:01
15	05:10 21:40	05:58 20:49	19:41 (Rep 11) 19:53 (Rep 11)	06:51 19:37	18:44 (Rep 10) 19:06 (Rep 10)	07:44 18:25	07:42 16:25	08:27 16:01
16	05:11 21:39	06:00 20:46	19:39 (Rep 11) 19:55 (Rep 11)	06:53 19:35	18:44 (Rep 10) 19:06 (Rep 10)	07:46 18:23	07:44 16:23	08:28 16:01
17	05:12 21:38	06:01 20:44	19:38 (Rep 11) 19:56 (Rep 11)	06:55 19:32	18:03 (Oerzen 2) 19:05 (Rep 10)	07:48 18:21	07:46 16:22	08:28 16:02
18	05:14 21:36	06:03 20:42	19:15 (Oerzen 1) 19:57 (Rep 11)	06:56 19:30	17:56 (Oerzen 2) 19:02 (Rep 10)	07:50 18:19	07:48 16:20	08:29 16:02
19	05:15 21:35	06:05 20:40	19:10 (Oerzen 1) 19:57 (Rep 11)	06:58 19:27	17:54 (Oerzen 2) 18:59 (Rep 10)	07:51 18:16	07:49 16:19	08:30 16:02
20	05:16 21:34	06:07 20:38	19:08 (Oerzen 1) 19:58 (Rep 11)	07:00 19:25	17:52 (Oerzen 2) 18:57 (Rep 10)	07:53 18:14	07:51 16:18	08:30 16:02
21	05:18 21:33	06:08 20:36	19:05 (Oerzen 1) 19:57 (Rep 11)	07:02 19:22	17:50 (Oerzen 2) 18:55 (Rep 10)	07:55 18:12	07:53 16:16	08:31 16:03
22	05:19 21:31	06:10 20:33	19:04 (Oerzen 1) 19:58 (Rep 11)	07:03 19:20	17:48 (Oerzen 2) 18:17 (Oerzen 2)	07:57 18:10	07:55 16:15	08:32 16:03
23	05:21 21:30	06:12 20:31	19:02 (Oerzen 1) 19:57 (Rep 11)	07:05 19:18	17:47 (Oerzen 2) 18:18 (Oerzen 2)	07:59 18:08	07:56 16:14	08:32 16:04
24	05:22 21:28	06:13 20:29	19:01 (Oerzen 1) 19:57 (Rep 11)	07:07 19:15	17:46 (Oerzen 2) 18:18 (Oerzen 2)	08:01 18:06	07:58 16:13	08:33 16:04
25	05:24 21:27	06:15 20:27	19:00 (Oerzen 1) 19:57 (Rep 11)	07:09 19:13	17:44 (Oerzen 2) 18:18 (Oerzen 2)	07:03 17:03	08:00 16:12	08:33 16:05
26	05:25 21:25	06:17 20:24	18:59 (Oerzen 1) 19:55 (Rep 11)	07:10 19:10	17:44 (Oerzen 2) 18:18 (Oerzen 2)	07:04 17:01	08:01 16:11	08:33 16:06
27	05:27 21:24	06:19 20:22	18:59 (Oerzen 1) 19:54 (Rep 11)	07:12 19:08	17:43 (Oerzen 2) 18:18 (Oerzen 2)	07:06 16:59	08:03 16:10	08:34 16:06
28	05:28 21:22	06:20 20:20	18:58 (Oerzen 1) 19:52 (Rep 11)	07:14 19:06	17:43 (Oerzen 2) 18:18 (Oerzen 2)	07:08 16:57	08:05 16:09	08:34 16:07
29	05:30 21:21	06:22 20:18	18:57 (Oerzen 1) 19:49 (Rep 11)	07:16 19:03	17:42 (Oerzen 2) 18:17 (Oerzen 2)	07:10 16:55	08:06 16:08	08:34 16:08
30	05:31 21:19	06:24 20:15	18:57 (Oerzen 1) 19:47 (Rep 11)	07:17 19:01	17:42 (Oerzen 2) 18:17 (Oerzen 3)	07:12 16:53	08:08 16:07	08:34 16:09
31	05:33 21:17	06:25 20:13	18:57 (Oerzen 1) 19:30 (Oerzen 1)		07:14 16:51			08:34 16:10
Sonnenscheinstunden		509	458	382	329	277	261	237
astr.max.mögl.Beschattung			673	865				

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s12 - Oerzen, Westerheide 4

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März		April		Mai	Juni	
1	08:34	08:05	07:09		06:55		18:54 (Rep 10)	05:48	04:59
	16:11	17:01	17:56		19:53	19	19:13 (Rep 10)	20:47	21:35
2	08:34	08:03	07:06		06:53		18:55 (Rep 10)	05:45	04:59
	16:12	17:03	17:58		19:54	27	19:22 (Oerzen 1)	20:48	21:36
3	08:34	08:01	07:04		06:50		18:56 (Rep 10)	05:44	04:58
	16:14	17:05	18:00		19:56	29	19:25 (Oerzen 1)	20:50	21:37
4	08:33	08:00	07:02		06:48		18:58 (Rep 10)	05:42	04:57
	16:15	17:07	18:01	11	17:35 (Oerzen 3)	27	19:25 (Oerzen 1)	20:52	21:38
5	08:33	07:58	07:00		06:46		19:02 (Oerzen 1)	05:40	04:56
	16:16	17:09	18:03	19	17:37 (Oerzen 3)	25	19:27 (Oerzen 1)	20:54	21:40
6	08:33	07:56	06:57		06:43		19:01 (Oerzen 1)	05:38	04:55
	16:17	17:11	18:05	24	17:38 (Oerzen 3)	27	19:28 (Oerzen 1)	20:55	21:41
7	08:32	07:54	06:55		06:41		19:00 (Oerzen 1)	05:36	04:55
	16:19	17:13	18:07	27	17:39 (Oerzen 3)	28	19:28 (Oerzen 1)	20:57	21:42
8	08:32	07:53	06:53		06:39		18:59 (Oerzen 1)	05:34	04:54
	16:20	17:15	18:09	29	17:39 (Oerzen 3)	30	19:29 (Oerzen 1)	20:59	21:42
9	08:31	07:51	06:50		06:36		18:59 (Oerzen 1)	05:32	04:54
	16:21	17:17	18:11	31	17:40 (Oerzen 3)	30	19:29 (Oerzen 1)	21:01	21:43
10	08:31	07:49	06:48		06:34		18:57 (Oerzen 1)	05:30	04:53
	16:23	17:19	18:13	32	17:40 (Oerzen 3)	31	19:28 (Oerzen 1)	21:02	21:44
11	08:30	07:47	06:46		06:32		18:57 (Oerzen 1)	05:28	04:53
	16:24	17:21	18:14	32	17:39 (Oerzen 3)	31	19:28 (Oerzen 1)	21:04	21:45
12	08:29	07:45	06:43		06:29		18:57 (Oerzen 1)	05:27	04:52
	16:26	17:23	18:16	33	17:39 (Oerzen 3)	40	19:46 (Rep 11)	21:06	21:46
13	08:28	07:43	06:41		06:27		18:56 (Oerzen 1)	05:25	04:52
	16:27	17:25	18:18	33	17:38 (Oerzen 3)	45	19:47 (Rep 11)	21:07	21:46
14	08:28	07:41	06:38		06:25		18:57 (Oerzen 1)	05:23	04:52
	16:29	17:27	18:20	33	17:38 (Oerzen 2)	46	19:48 (Rep 11)	21:09	21:47
15	08:27	07:39	06:36		06:22		18:57 (Oerzen 1)	05:22	04:52
	16:31	17:29	18:22	33	17:37 (Oerzen 2)	49	19:50 (Rep 11)	21:11	21:48
16	08:26	07:37	06:34		06:20		18:58 (Oerzen 1)	05:20	04:51
	16:32	17:31	18:24	33	17:37 (Oerzen 2)	50	19:52 (Rep 11)	21:12	21:48
17	08:25	07:35	06:31		06:18		18:58 (Oerzen 1)	05:18	04:51
	16:34	17:33	18:26	32	17:37 (Oerzen 2)	49	19:52 (Rep 11)	21:14	21:49
18	08:24	07:33	06:29		06:15		18:58 (Oerzen 1)	05:17	04:51
	16:36	17:35	18:27	32	17:36 (Oerzen 2)	47	19:51 (Rep 11)	21:15	21:49
19	08:23	07:31	06:26		06:13		18:59 (Oerzen 1)	05:15	04:51
	16:37	17:37	18:29	31	17:36 (Oerzen 2)	45	19:51 (Rep 11)	21:17	21:49
20	08:22	07:29	06:24		06:11		19:01 (Oerzen 1)	05:14	04:51
	16:39	17:38	18:31	29	17:34 (Oerzen 2)	41	19:51 (Rep 11)	21:18	21:50
21	08:20	07:26	06:22		06:09		19:03 (Oerzen 1)	05:12	04:52
	16:41	17:40	18:33	27	17:33 (Oerzen 2)	37	19:51 (Rep 11)	21:20	21:50
22	08:19	07:24	06:19		06:07		19:06 (Oerzen 1)	05:11	04:52
	16:43	17:42	18:35	28	18:09 (Rep 10)	30	19:50 (Rep 11)	21:22	21:50
23	08:18	07:22	06:17		06:04		19:30 (Rep 11)	05:10	04:52
	16:44	17:44	18:36	30	18:10 (Rep 10)	19	19:49 (Rep 11)	21:23	21:50
24	08:17	07:20	06:14		06:02		19:31 (Rep 11)	05:08	04:52
	16:46	17:46	18:38	29	18:12 (Rep 10)	17	19:48 (Rep 11)	21:24	21:51
25	08:15	07:18	06:12		06:00		19:32 (Rep 11)	05:07	04:53
	16:48	17:48	18:40	25	18:14 (Rep 10)	15	19:47 (Rep 11)	21:26	21:51
26	08:14	07:16	06:10		05:58		19:34 (Rep 11)	05:06	04:53
	16:50	17:50	18:42	20	18:16 (Rep 10)	11	19:45 (Rep 11)	21:27	21:51
27	08:13	07:13	06:07		05:56		19:37 (Rep 11)	05:05	04:53
	16:52	17:52	18:44	22	18:16 (Rep 10)	4	19:41 (Rep 11)	21:29	21:50
28	08:11	07:11	06:05		05:54			05:04	04:54
	16:54	17:54	18:45	22	18:16 (Rep 10)			21:30	21:50
29	08:10		07:02		05:52			05:02	04:55
	16:56		19:47	22	19:16 (Rep 10)			21:31	21:50
30	08:08		07:00		05:50			05:01	04:55
	16:58		19:49	21	19:15 (Rep 10)			21:33	21:50
31	08:06		06:58		05:48			05:00	
	16:59		19:51	21	19:15 (Rep 10)			21:34	
Sonnenscheinstunden	253	275	367		419			491	506
astr.max.mögl.Beschattung			761			849			

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s12 - Oerzen, Westerheide 4

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember
1	04:56	05:34	06:27	18:56 (Oerzen 1)   07:19	17:45 (Oerzen 2)   07:16	08:09
	21:50	21:16	20:11	31 19:27 (Oerzen 1)   18:58	33 18:18 (Oerzen 3)   16:49	16:06
2	04:57	05:36	06:29	18:56 (Oerzen 1)   07:21	17:45 (Oerzen 2)   07:18	08:11
	21:49	21:14	20:08	31 19:27 (Oerzen 1)   18:56	33 18:18 (Oerzen 3)   16:47	16:06
3	04:57	05:38	06:31	18:56 (Oerzen 1)   07:23	17:46 (Oerzen 2)   07:20	08:12
	21:49	21:12	20:06	30 19:26 (Oerzen 1)   18:54	32 18:18 (Oerzen 3)   16:45	16:05
4	04:58	05:39	06:32	18:56 (Oerzen 1)   07:24	17:45 (Oerzen 2)   07:21	08:14
	21:48	21:10	20:04	30 19:26 (Oerzen 1)   18:51	32 18:17 (Oerzen 3)   16:43	16:04
5	04:59	05:41	06:34	18:57 (Oerzen 1)   07:26	17:46 (Oerzen 2)   07:23	08:15
	21:48	21:08	20:01	28 19:25 (Oerzen 1)   18:49	30 18:16 (Oerzen 3)   16:42	16:04
6	05:00	05:43	06:36	18:56 (Oerzen 1)   07:28	17:47 (Oerzen 2)   07:25	08:16
	21:47	21:07	19:59	27 19:23 (Oerzen 1)   18:46	29 18:16 (Oerzen 3)   16:40	16:03
7	05:01	05:44	06:38	18:57 (Oerzen 1)   07:30	17:49 (Oerzen 2)   07:27	08:18
	21:47	21:05	19:56	25 19:22 (Oerzen 1)   18:44	26 18:15 (Oerzen 3)   16:38	16:03
8	05:02	05:46	06:39	18:53 (Rep 10)   07:31	17:51 (Oerzen 2)   07:29	08:19
	21:46	21:03	19:54	28 19:21 (Oerzen 1)   18:42	22 18:13 (Oerzen 3)   16:36	16:02
9	05:03	05:48	06:41	18:50 (Rep 10)   07:33	17:55 (Oerzen 2)   07:31	08:20
	21:45	21:01	19:52	28 19:18 (Oerzen 1)   18:39	16 18:11 (Oerzen 3)   16:34	16:02
10	05:04	05:49	06:43	18:48 (Rep 10)   07:35	17:59 (Oerzen 3)   07:33	08:21
	21:44	20:59	19:49	27 19:15 (Oerzen 1)   18:37	9 18:08 (Oerzen 3)   16:33	16:02
11	05:05	05:51	06:44	18:47 (Rep 10)   07:37	07:35	08:23
	21:44	20:57	19:47	20 19:07 (Rep 10)   18:35	16:31	16:01
12	05:06	05:53	06:46	18:45 (Rep 10)   07:39	07:36	08:24
	21:43	20:55	19:44	21 19:06 (Rep 10)   18:32	16:29	16:01
13	05:07	05:55	06:48	18:45 (Rep 10)   07:40	07:38	08:25
	21:42	20:53	19:42	22 19:07 (Rep 10)   18:30	16:28	16:01
14	05:08	05:56	06:50	18:45 (Rep 10)   07:42	07:40	08:26
	21:41	20:51	19:39	22 19:07 (Rep 10)   18:28	16:26	16:01
15	05:10	05:58	06:51	18:44 (Rep 10)   07:44	07:42	08:27
	21:40	20:49	19:37	22 19:06 (Rep 10)   18:25	16:25	16:01
16	05:11	06:00	19:42 (Rep 11)   06:53	18:44 (Rep 10)   07:46	07:44	08:28
	21:39	20:46	7 19:49 (Rep 11)   19:35	21 19:05 (Rep 10)   18:23	16:23	16:01
17	05:12	06:01	19:40 (Rep 11)   06:55	18:44 (Rep 10)   07:48	07:46	08:28
	21:38	20:44	12 19:52 (Rep 11)   19:32	21 19:05 (Rep 10)   18:21	16:22	16:02
18	05:14	06:03	19:37 (Rep 11)   06:56	18:03 (Oerzen 2)   07:50	07:48	08:29
	21:36	20:42	16 19:53 (Rep 11)   19:30	23 19:02 (Rep 10)   18:19	16:20	16:02
19	05:15	06:05	19:36 (Rep 11)   06:58	17:58 (Oerzen 2)   07:51	07:49	08:30
	21:35	20:40	18 19:54 (Rep 11)   19:27	29 18:59 (Rep 10)   18:16	16:19	16:02
20	05:16	06:07	19:35 (Rep 11)   07:00	17:56 (Oerzen 2)   07:53	07:51	08:30
	21:34	20:38	20 19:55 (Rep 11)   19:25	30 18:57 (Rep 10)   18:14	16:18	16:02
21	05:18	06:08	19:10 (Oerzen 1)   07:02	17:54 (Oerzen 2)   07:55	07:53	08:31
	21:33	20:36	31 19:55 (Rep 11)   19:22	29 18:55 (Rep 10)   18:12	16:16	16:03
22	05:19	06:10	19:07 (Oerzen 1)   07:03	17:51 (Oerzen 2)   07:57	07:55	08:32
	21:31	20:33	38 19:55 (Rep 11)   19:20	26 18:17 (Oerzen 2)   18:10	16:15	16:03
23	05:21	06:12	19:04 (Oerzen 1)   07:05	17:50 (Oerzen 2)   07:59	07:56	08:32
	21:30	20:31	43 19:55 (Rep 11)   19:18	28 18:18 (Oerzen 2)   18:08	16:14	16:04
24	05:22	06:13	19:03 (Oerzen 1)   07:07	17:49 (Oerzen 2)   08:01	07:58	08:33
	21:28	20:29	46 19:55 (Rep 11)   19:15	30 18:19 (Oerzen 2)   18:06	16:13	16:04
25	05:24	06:15	19:02 (Oerzen 1)   07:09	17:47 (Oerzen 2)   07:03	08:00	08:33
	21:27	20:27	48 19:55 (Rep 11)   19:13	32 18:19 (Oerzen 2)   17:03	16:12	16:05
26	05:25	06:17	19:00 (Oerzen 1)   07:10	17:47 (Oerzen 2)   07:04	08:01	08:33
	21:25	20:24	49 19:54 (Rep 11)   19:10	32 18:19 (Oerzen 2)   17:01	16:11	16:06
27	05:27	06:19	18:59 (Oerzen 1)   07:12	17:46 (Oerzen 2)   07:06	08:03	08:34
	21:24	20:22	50 19:53 (Rep 11)   19:08	33 18:19 (Oerzen 2)   16:59	16:10	16:06
28	05:28	06:20	18:59 (Oerzen 1)   07:14	17:46 (Oerzen 2)   07:08	08:05	08:34
	21:22	20:20	49 19:52 (Rep 11)   19:06	33 18:19 (Oerzen 2)   16:57	16:09	16:07
29	05:30	06:22	18:57 (Oerzen 1)   07:16	17:45 (Oerzen 2)   07:10	08:06	08:34
	21:21	20:18	47 19:49 (Rep 11)   19:03	33 18:18 (Oerzen 2)   16:55	16:08	16:08
30	05:31	06:24	18:57 (Oerzen 1)   07:17	17:45 (Oerzen 2)   07:12	08:08	08:34
	21:19	20:15	44 19:47 (Rep 11)   19:01	33 18:18 (Oerzen 2)   16:53	16:07	16:09
31	05:33	06:25	18:57 (Oerzen 1)	07:14		08:34
	21:17	20:13	39 19:45 (Rep 11)	16:51		16:10
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung		557	825	262		

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s13 - Oerzen, Westerheide 5

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34   16:11	08:05   17:01	07:09   17:56	16:47 (Oerzen 2)   19:53	18:40 (Oerzen 1)   20:47	04:59   21:35
2	08:34   16:12	08:03   17:03	07:06   17:58	16:47 (Oerzen 2)   19:53	18:40 (Oerzen 1)   20:47	04:59   21:36
3	08:34   16:14	08:01   17:05	07:04   18:00	16:46 (Oerzen 2)   19:56	18:40 (Oerzen 1)   20:50	04:58   21:37
4	08:33   16:15	08:00   17:07	07:02   18:01	16:45 (Oerzen 2)   19:58	18:39 (Oerzen 1)   20:52	04:57   21:39
5	08:33   16:16	07:58   17:09	07:00   18:03	16:45 (Oerzen 2)   20:00	18:39 (Oerzen 1)   20:54	04:56   21:40
6	08:33   16:17	07:56   17:11	06:57   18:05	16:45 (Oerzen 2)   20:02	18:39 (Oerzen 1)   20:55	04:55   21:41
7	08:32   16:19	07:54   17:13	06:55   18:07	16:45 (Oerzen 2)   20:04	18:39 (Oerzen 1)   20:57	04:55   21:42
8	08:32   16:20	07:53   17:15	06:53   18:09	16:44 (Oerzen 2)   20:05	18:40 (Oerzen 1)   20:59	04:54   21:43
9	08:31   16:21	07:51   17:17	06:50   18:11	16:45 (Oerzen 2)   20:07	18:40 (Oerzen 1)   21:01	04:54   21:43
10	08:31   16:23	07:49   17:19	06:48   18:13	16:46 (Oerzen 2)   20:09	18:41 (Oerzen 1)   21:02	04:53   21:44
11	08:30   16:24	07:47   17:21	06:46   18:14	16:46 (Oerzen 2)   20:11	18:42 (Oerzen 1)   21:04	04:53   21:45
12	08:29   16:26	07:45   17:23	06:43   18:16	16:47 (Oerzen 2)   20:13	18:44 (Oerzen 1)   21:06	04:52   21:46
13	08:28   16:27	07:43   17:25	06:41   18:18	16:47 (Oerzen 2)   20:14	18:46 (Oerzen 1)   21:07	04:52   21:46
14	08:28   16:29	07:41   17:27	06:38   18:20	16:49 (Oerzen 2)   20:16	19:16 (Rep 11)   21:09	04:52   21:47
15	08:27   16:31	07:39   17:29	06:36   18:22	16:51 (Oerzen 2)   20:18	19:16 (Rep 11)   21:11	04:52   21:48
16	08:26   16:32	07:37   17:31	06:34   18:24	16:54 (Oerzen 2)   20:20	19:17 (Rep 11)   21:12	04:51   21:48
17	08:25   16:34	07:35   17:33	06:31   18:26	17:49 (Rep 10)   20:21	19:17 (Rep 11)   21:14	04:51   21:49
18	08:24   16:36	07:33   17:35	06:29   18:27	17:46 (Rep 10)   20:23	19:17 (Rep 11)   21:15	04:51   21:49
19	08:23   16:37	07:31   17:37	06:26   18:29	17:45 (Rep 10)   20:25	19:18 (Rep 11)   21:17	04:51   21:49
20	08:22   16:39	07:29   17:39	06:24   18:31	17:43 (Rep 10)   20:27	19:20 (Rep 11)   21:18	04:51   21:50
21	08:20   16:41	07:26   17:40	06:22   18:33	17:43 (Rep 10)   20:29	19:24 (Rep 11)   21:20	04:52   21:50
22	08:19   16:43	07:24   17:42	06:19   18:35	17:42 (Rep 10)   20:30	19:29 (Rep 11)   21:22	04:52   21:50
23	08:18   16:44	07:22   17:01 (Oerzen 2)	06:17   17:41 (Rep 10)	17:41 (Rep 10)   20:32	19:34 (Rep 11)   21:24	04:52   21:51
24	08:17   16:46	07:20   17:06 (Oerzen 2)	06:14   17:42 (Rep 10)	17:42 (Rep 10)   20:34	19:38 (Rep 11)   21:26	04:52   21:51
25	08:15   16:48	07:18   17:10 (Oerzen 2)	06:12   17:41 (Rep 10)	17:41 (Rep 10)   20:36	19:42 (Rep 11)   21:28	04:53   21:52
26	08:14   16:50	07:16   17:19 (Oerzen 3)	06:10   17:42 (Rep 10)	18:05 (Oerzen 1)   20:38	19:46 (Rep 11)   21:30	04:53   21:52
27	08:13   16:52	07:13   17:22 (Oerzen 3)	06:07   17:42 (Rep 10)	18:08 (Oerzen 1)   20:40	19:50 (Rep 11)   21:32	04:53   21:53
28	08:11   16:54	07:11   17:24 (Oerzen 3)	06:05   17:43 (Rep 10)	18:09 (Oerzen 1)   20:42	19:54 (Rep 11)   21:34	04:54   21:53
29	08:10   16:56	07:09   17:25 (Oerzen 3)	06:02   17:43 (Rep 10)	18:10 (Oerzen 1)   20:44	19:58 (Rep 11)   21:36	04:54   21:54
30	08:08   16:58	07:07   17:27	06:00   17:44 (Rep 10)	18:11 (Oerzen 1)   20:46	20:02 (Rep 11)   21:38	04:55   21:54
31	08:06   16:59	07:05   17:29	06:58   17:45 (Rep 10)	18:12 (Oerzen 1)   20:48	20:06 (Rep 11)   21:40	04:55   21:55
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		148	874	644		

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s13 - Oerzen, Westerheide 5

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember
1	04:56 21:50	05:34 21:16	06:27 20:11	18:41 (Oerzen 1) 19:39 (Rep 11)   18:58	07:19 27 17:53 (Oerzen 2)   16:49	08:09 16:06
2	04:57 21:49	05:36 21:14	06:29 20:08	45 18:40 (Oerzen 1)   18:56	27 17:53 (Oerzen 2)   16:49	08:11 16:06
3	04:57 21:49	05:38 21:12	06:31 20:06	46 18:38 (Oerzen 1)   18:54	29 17:54 (Oerzen 3)   16:47	08:12 16:05
4	04:58 21:48	05:39 21:10	06:32 20:04	47 18:37 (Oerzen 1)   18:51	34 17:58 (Oerzen 3)   16:45	08:14 16:04
5	04:59 21:48	05:41 21:08	06:34 20:01	45 18:36 (Oerzen 1)   18:49	37 17:59 (Oerzen 3)   16:43	08:15 16:04
6	05:00 21:47	05:43 21:07	06:36 19:59	42 18:34 (Oerzen 1)   18:46	39 18:00 (Oerzen 3)   16:42	08:16 16:03
7	05:01 21:47	05:44 21:05	06:38 19:56	40 18:34 (Oerzen 1)   18:44	40 18:01 (Oerzen 3)   16:40	08:18 16:03
8	05:02 21:46	05:46 21:03	06:39 19:54	32 18:34 (Oerzen 1)   18:42	40 18:01 (Oerzen 3)   16:38	16:03 16:02
9	05:03 21:45	05:48 21:01	06:41 19:52	32 18:33 (Oerzen 1)   18:39	40 18:01 (Oerzen 3)   16:36	08:20 16:02
10	05:04 21:44	05:49 20:59	06:43 19:49	32 18:33 (Oerzen 1)   18:37	41 18:01 (Oerzen 3)   16:34	08:21 16:02
11	05:05 21:44	05:51 20:57	06:44 19:47	31 18:33 (Oerzen 1)   18:35	40 18:00 (Oerzen 3)   16:33	08:23 16:01
12	05:06 21:43	05:53 20:55	06:46 19:44	32 18:32 (Oerzen 1)   18:32	40 18:00 (Oerzen 3)   16:31	08:24 16:01
13	05:07 21:42	05:55 20:53	06:48 19:42	31 18:32 (Oerzen 1)   18:30	39 17:59 (Oerzen 3)   16:29	08:25 16:01
14	05:08 21:41	05:56 20:51	06:50 19:39	29 18:34 (Oerzen 1)   18:28	37 17:58 (Oerzen 3)   16:28	16:01 16:01
15	05:10 21:40	05:58 20:49	06:51 19:37	28 18:33 (Rep 10)   18:25	35 17:57 (Oerzen 3)   16:26	08:27 16:01
16	05:11 21:39	06:00 20:46	06:53 19:35	27 19:00 (Oerzen 1)   18:23	33 17:56 (Oerzen 3)   16:25	08:28 16:01
17	05:12 21:38	06:01 20:44	06:55 19:32	26 18:58 (Oerzen 1)   18:21	30 17:54 (Oerzen 3)   16:23	16:01 16:02
18	05:14 21:36	06:03 20:42	06:56 19:30	24 18:57 (Oerzen 1)   18:19	19 17:48 (Oerzen 3)   16:22	08:29 16:02
19	05:15 21:35	06:05 20:40	06:58 19:27	22 18:53 (Oerzen 1)   18:16	12 17:41 (Oerzen 2)   16:20	08:30 16:02
20	05:16 21:34	06:07 20:38	07:00 19:25	22 18:28 (Rep 10)   18:14	12 17:41 (Oerzen 2)   16:20	08:31 16:02
21	05:18 21:33	06:08 20:36	07:02 19:22	22 18:50 (Rep 10)   18:12	19 17:48 (Oerzen 3)   16:22	08:32 16:03
22	05:19 21:31	06:10 20:33	19:27 (Rep 11)   07:03	22 18:50 (Rep 10)   18:10	12 17:41 (Oerzen 2)   16:20	08:33 16:03
23	05:21 21:30	06:12 20:31	19:34 (Rep 11)   19:20	21 18:49 (Rep 10)   18:08	12 17:41 (Oerzen 2)   16:20	08:34 16:04
24	05:22 21:28	06:13 20:29	19:24 (Rep 11)   19:18	21 18:48 (Rep 10)   18:06	12 17:41 (Oerzen 2)   16:20	08:35 16:04
25	05:24 21:27	06:15 20:27	19:22 (Rep 11)   19:15	21 18:28 (Rep 10)   18:01	12 17:41 (Oerzen 2)   16:20	08:36 16:05
26	05:25 21:25	06:17 20:24	19:38 (Rep 11)   19:13	19 18:47 (Rep 10)   18:00	12 17:41 (Oerzen 2)   16:20	08:37 16:06
27	05:27 21:24	06:19 20:22	19:40 (Rep 11)   19:10	16 18:28 (Rep 10)   17:55	12 17:41 (Oerzen 2)   16:20	08:38 16:06
28	05:28 21:22	06:20 20:20	19:18 (Rep 11)   19:08	14 18:42 (Rep 10)   17:01	12 17:41 (Oerzen 2)   16:20	08:39 16:07
29	05:30 21:21	06:22 20:18	19:41 (Rep 11)   19:06	15 17:38 (Oerzen 2)   17:06	12 17:41 (Oerzen 2)   16:20	08:40 16:08
30	05:31 21:19	06:24 20:15	18:51 (Oerzen 1)   19:03	20 17:30 (Oerzen 2)   17:10	12 17:41 (Oerzen 2)   16:20	08:41 16:09
31	05:33 21:17	06:25 20:13	18:46 (Oerzen 1)   19:17	23 17:51 (Oerzen 2)   16:53	12 17:41 (Oerzen 2)   16:20	08:42 16:10
	Sonnenscheinstunden   509	458	382	329	261	237
	astr.max.mögl.Beschattung	225	850	612		

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s14 - Oerzen, Westerheide 12A

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34   16:11	08:05   17:01	07:09   17:56	16:33 (Oerzen 2)   19:53	18:29 (Oerzen 1)   20:47	04:59   21:35
2	08:34   16:12	08:03   17:03	07:06   17:58	16:34 (Oerzen 2)   19:53	18:30 (Oerzen 1)   20:47	04:59   21:36
3	08:34   16:14	08:02   17:05	07:04   18:00	16:33 (Oerzen 2)   19:56	18:30 (Oerzen 1)   20:50	04:58   21:37
4	08:33   16:15	08:00   17:07	07:02   18:01	16:33 (Oerzen 2)   19:58	18:30 (Oerzen 1)   20:52	04:57   21:39
5	08:33   16:16	07:58   17:09	07:00   18:03	16:34 (Oerzen 2)   20:00	18:31 (Oerzen 1)   20:54	04:56   21:40
6	08:33   16:17	07:56   17:11	06:57   18:05	16:34 (Oerzen 2)   20:02	18:32 (Oerzen 1)   20:55	04:55   21:41
7	08:32   16:19	07:54   17:13	06:55   18:07	16:35 (Oerzen 2)   20:04	18:32 (Oerzen 1)   20:57	04:55   21:42
8	08:32   16:20	07:53   17:15	06:53   18:09	16:35 (Oerzen 2)   20:05	18:34 (Oerzen 1)   20:59	04:54   21:43
9	08:31   16:21	07:51   17:17	06:50   18:11	16:37 (Oerzen 2)   20:07	18:36 (Oerzen 1)   21:01	04:54   21:43
10	08:31   16:23	07:49   17:19	06:48   18:13	16:39 (Oerzen 2)   20:09	18:37 (Oerzen 1)   21:02	04:53   21:44
11	08:30   16:24	07:47   17:21	06:46   18:15	16:40 (Oerzen 2)   20:11	19:11 (Rep 11)   21:04	04:53   21:45
12	08:29   16:26	07:45   17:23	06:43   18:16	16:57 (Oerzen 2)   20:13	19:35 (Rep 11)   21:06	04:52   21:46
13	08:28   16:27	07:43   17:25	06:41   18:18	16:53 (Oerzen 2)   20:14	19:10 (Rep 11)   21:07	04:52   21:46
14	08:28   16:29	07:41   17:27	06:38   18:20	17:43 (Rep 10)   20:16	19:11 (Rep 11)   21:09	04:52   21:47
15	08:27   16:31	07:39   17:29	06:36   18:22	17:40 (Rep 10)   20:18	19:12 (Rep 11)   21:11	04:52   21:48
16	08:26   16:32	07:37   17:31	06:34   18:24	17:39 (Rep 10)   20:20	19:12 (Rep 11)   21:12	04:51   21:48
17	08:25   16:34	07:35   17:33	06:31   18:26	17:57 (Rep 10)   20:22	19:14 (Rep 11)   21:14	04:51   21:49
18	08:24   16:36	07:33   17:35	06:29   18:27	17:37 (Rep 10)   20:23	19:15 (Rep 11)   21:15	04:51   21:49
19	08:23   16:37	07:31   17:37	06:26   18:29	17:36 (Rep 10)   20:25	19:18 (Rep 11)   21:17	04:51   21:49
20	08:22   16:39	07:29   17:39	06:24   18:31	17:59 (Rep 10)   20:27	19:24 (Rep 11)   21:19	04:51   21:50
21	08:20   16:41	07:26   17:40	06:22   18:33	17:35 (Rep 10)   20:29	19:12 (Rep 11)   21:21	04:52   21:50
22	08:19   16:43	07:24   17:42	06:19   18:35	17:36 (Rep 10)   20:30	19:18 (Rep 11)   21:22	04:52   21:50
23	08:18   16:44	07:22   17:44	06:17   18:37	18:00 (Oerzen 1)   20:32	19:24 (Rep 11)   21:24	04:52   21:51
24	08:17   16:46	07:20   17:46	06:14   18:38	17:36 (Rep 10)   20:34	18:01 (Oerzen 1)   20:32	05:08   21:51
25	08:15   16:48	07:18   17:48	06:12   18:40	18:02 (Oerzen 1)   20:36	17:36 (Rep 10)   20:32	05:07   21:51
26	08:14   16:50	07:16   17:50	06:10   18:42	18:03 (Oerzen 1)   20:38	17:34 (Oerzen 1)   20:36	05:06   21:51
27	08:13   16:52	07:13   17:52	06:07   18:44	18:04 (Oerzen 1)   20:40	18:04 (Oerzen 1)   20:38	05:05   21:51
28	08:11   16:54	07:11   17:54	06:05   18:45	18:03 (Oerzen 1)   20:42	18:03 (Oerzen 1)   20:39	05:04   21:50
29	08:10   16:56		07:02   19:47	18:32 (Oerzen 1)   20:44	17:32 (Oerzen 1)   20:41	05:04   21:50
30	08:08   16:58		07:00   19:49	18:31 (Oerzen 1)   20:46	18:04 (Oerzen 1)   20:43	05:02   21:50
31	08:06   16:59		06:58   19:51	18:30 (Oerzen 1)   20:48	18:04 (Oerzen 1)   20:45	05:01   21:50
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		355	865	569		

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s14 - Oerzen, Westerheide 12A

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember	
1	04:56   21:50	05:34   21:16	06:27   20:11	19:10 (Rep 11)   07:19   18:58	07:16   16:49	08:09   16:06	
2	04:57   21:49	05:36   21:14	06:29   20:08	18:36 (Oerzen 1)   07:21   18:56	17:20 (Oerzen 2)   16:47	08:11   16:06	
3	04:57   21:49	05:38   21:12	06:31   20:06	18:33 (Oerzen 1)   07:23   18:54	17:18 (Oerzen 2)   16:45	08:12   16:05	
4	04:58   21:48	05:39   21:10	06:32   20:04	18:31 (Oerzen 1)   07:24   18:51	17:14 (Oerzen 2)   16:43	08:14   16:04	
5	04:59   21:48	05:41   21:08	06:34   20:01	18:29 (Oerzen 1)   07:26   18:49	17:13 (Oerzen 2)   16:42	08:15   16:04	
6	05:00   21:47	05:43   21:07	06:36   19:59	18:27 (Oerzen 1)   07:28   18:46	17:11 (Oerzen 2)   16:40	08:16   16:03	
7	05:01   21:47	05:44   21:05	06:38   19:56	18:26 (Oerzen 1)   07:30   18:44	17:10 (Oerzen 2)   16:38	08:18   16:03	
8	05:02   21:46	05:46   21:03	06:39   19:54	18:25 (Oerzen 1)   07:31   18:42	17:09 (Oerzen 2)   16:36	08:19   16:02	
9	05:03   21:45	05:48   21:01	06:41   19:52	18:24 (Oerzen 1)   07:33   18:39	17:09 (Oerzen 2)   16:34	08:20   16:02	
10	05:04   21:44	05:49   20:59	06:43   19:49	19:21 (Rep 11)   07:35   18:37	17:07 (Oerzen 2)   16:33	08:21   16:02	
11	05:05   21:44	05:51   20:57	06:44   19:47	18:56 (Oerzen 1)   07:37   18:35	17:07 (Oerzen 2)   16:31	08:23   16:01	
12	05:06   21:43	05:53   20:55	06:46   19:44	18:55 (Oerzen 1)   07:39   18:32	17:07 (Oerzen 2)   16:29	08:24   16:01	
13	05:07   21:42	05:55   20:53	06:48   19:42	18:54 (Oerzen 1)   07:40   18:30	17:06 (Oerzen 2)   16:28	08:25   16:01	
14	05:08   21:41	05:56   20:51	06:50   19:40	18:53 (Oerzen 1)   07:42   18:28	17:07 (Oerzen 2)   16:26	08:26   16:01	
15	05:10   21:40	05:58   20:49	06:51   19:37	18:52 (Oerzen 1)   07:44   18:25	17:07 (Oerzen 2)   16:25	08:27   16:01	
16	05:11   21:39	06:00   20:46	06:53   19:35	18:51 (Oerzen 1)   07:46   18:23	17:07 (Oerzen 2)   16:23	08:28   16:01	
17	05:12   21:38	06:01   20:44	06:55   19:32	18:50 (Oerzen 1)   07:48   18:21	17:07 (Oerzen 2)   16:22	08:28   16:02	
18	05:14   21:36	06:03   20:42	06:56   19:30	18:49 (Oerzen 1)   07:50   18:19	17:08 (Oerzen 2)   16:20	08:29   16:02	
19	05:15   21:35	06:05   20:40	06:58   19:27	18:48 (Oerzen 1)   07:51   18:16	17:09 (Oerzen 2)   16:19	08:30   16:02	
20	05:16   21:34	06:07   20:38	07:00   19:25	18:47 (Oerzen 1)   07:53   18:14	17:10 (Oerzen 2)   16:18	08:31   16:02	
21	05:18   21:33	06:08   20:36	07:02   19:22	18:46 (Oerzen 1)   07:55   18:12	17:10 (Oerzen 2)   16:16	08:31   16:03	
22	05:19   21:31	06:10   20:33	07:03   19:20	18:45 (Oerzen 1)   07:57   18:10	17:12 (Oerzen 2)   16:15	08:32   16:03	
23	05:21   21:30	06:12   20:31	07:05   19:18	18:44 (Oerzen 1)   07:59   18:08	17:15 (Oerzen 2)   16:14	08:32   16:04	
24	05:22   21:28	06:13   20:29	19:21 (Rep 11)   07:07   19:15	18:43 (Rep 10)   08:01   18:06	17:28 (Oerzen 2)   16:13	08:33   16:04	
25	05:24   21:27	06:15   20:27	19:18 (Rep 11)   07:09   19:13	18:43 (Rep 10)   07:03   17:03	16:12	08:33   16:05	
26	05:25   21:25	06:17   20:24	19:15 (Rep 11)   07:10   19:10	18:41 (Rep 10)   07:04   17:01	16:11	08:33   16:06	
27	05:27   21:24	06:19   20:22	19:14 (Rep 11)   07:12   19:08	18:40 (Rep 10)   07:06   16:59	16:10	08:34   16:06	
28	05:28   21:22	06:20   20:20	19:13 (Rep 11)   07:14   19:06	18:38 (Rep 10)   07:08   16:57	16:09	08:34   16:07	
29	05:30   21:21	06:22   20:18	19:12 (Rep 11)   07:16   19:03	18:35 (Rep 10)   07:10   16:55	16:08	08:34   16:08	
30	05:31   21:19	06:24   20:15	19:11 (Rep 11)   07:17   19:01	18:34 (Rep 10)   07:12   16:53	16:08	08:34   16:09	
31	05:33   21:17	06:25   20:13	19:11 (Rep 11)   07:14   19:35 (Rep 11)   16:51	18:32 (Rep 10)   07:14   16:51	16:07	08:34   16:10	
Sonnenscheinstunden		509	458	382	329	261	237
astr.max.mögl.Beschattung			147	898	775		

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s15 - Oerzen, Westerheide 12C

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34   16:11	08:05   17:01	07:09   17:56	16:38 (Oerzen 2)   06:55 17:22 (Oerzen 3)   19:53	18:35 (Oerzen 1)   05:48 19:09 (Oerzen 1)   20:47	04:59   21:35
2	08:34   16:12	08:03   17:03	07:06   17:58	16:38 (Oerzen 2)   06:53 17:23 (Oerzen 3)   19:55	18:35 (Oerzen 1)   05:45 19:09 (Oerzen 1)   20:48	04:59   21:36
3	08:34   16:14	08:02   17:05	07:04   18:00	16:37 (Oerzen 2)   06:50 17:22 (Oerzen 3)   19:56	18:35 (Oerzen 1)   05:44 19:10 (Oerzen 1)   20:50	04:58   21:37
4	08:33   16:15	08:00   17:07	07:02   18:01	16:37 (Oerzen 2)   06:48 17:22 (Oerzen 3)   19:58	18:34 (Oerzen 1)   05:42 19:09 (Oerzen 1)   20:52	04:57   21:39
5	08:33   16:16	07:58   17:09	07:00   18:03	16:37 (Oerzen 2)   06:46 17:22 (Oerzen 3)   20:00	18:35 (Oerzen 1)   05:40 19:08 (Oerzen 1)   20:54	04:56   21:40
6	08:33   16:17	07:56   17:11	06:57   18:05	16:37 (Oerzen 2)   06:43 17:21 (Oerzen 3)   20:02	18:35 (Oerzen 1)   05:38 19:35 (Rep 11)   20:55	04:55   21:41
7	08:32   16:19	07:54   17:13	06:55   18:07	16:37 (Oerzen 2)   06:41 17:20 (Oerzen 3)   20:04	18:35 (Oerzen 1)   05:36 19:36 (Rep 11)   20:57	04:55   21:42
8	08:32   16:20	07:53   17:15	06:53   18:09	16:37 (Oerzen 2)   06:39 17:18 (Oerzen 3)   20:05	18:35 (Oerzen 1)   05:34 19:38 (Rep 11)   20:59	04:54   21:42
9	08:31   16:21	07:51   17:17	06:50   18:11	16:38 (Oerzen 2)   06:36 17:16 (Oerzen 3)   20:07	18:36 (Oerzen 1)   05:32 19:39 (Rep 11)   21:01	04:54   21:43
10	08:31   16:23	07:49   17:19	06:48   18:13	16:39 (Oerzen 2)   06:34 17:13 (Oerzen 3)   20:09	18:36 (Oerzen 1)   05:30 19:39 (Rep 11)   21:02	04:53   21:44
11	08:30   16:24	07:47   17:21	06:46   18:15	16:39 (Oerzen 2)   06:32 17:07 (Oerzen 2)   20:11	18:38 (Oerzen 1)   05:28 19:40 (Rep 11)   21:04	04:53   21:45
12	08:29   16:26	07:45   17:23	06:43   18:16	16:41 (Oerzen 2)   06:29 17:06 (Oerzen 2)   20:13	18:39 (Oerzen 1)   05:27 19:40 (Rep 11)   21:06	04:52   21:46
13	08:28   16:27	07:43   17:25	06:41   18:18	16:42 (Oerzen 2)   06:27 17:03 (Oerzen 2)   20:14	18:41 (Oerzen 1)   05:25 19:39 (Rep 11)   21:07	04:52   21:46
14	08:28   16:29	07:41   17:27	06:38   18:20	16:45 (Oerzen 2)   06:25 17:01 (Oerzen 2)   20:16	18:44 (Oerzen 1)   05:23 19:39 (Rep 11)   21:09	04:52   21:47
15	08:27   16:31	07:39   17:29	06:36   18:22	16:49 (Oerzen 2)   06:22 17:54 (Rep 10)   20:18	19:15 (Rep 11)   05:22 19:39 (Rep 11)   21:11	04:52   21:48
16	08:26   16:32	07:37   17:31	06:34   18:24	17:46 (Rep 10)   06:20 17:58 (Rep 10)   20:20	19:15 (Rep 11)   05:20 19:38 (Rep 11)   21:12	04:51   21:48
17	08:25   16:34	07:35   17:33	06:31   18:26	17:44 (Rep 10)   06:18 18:00 (Rep 10)   20:22	19:16 (Rep 11)   05:18 19:38 (Rep 11)   21:14	04:51   21:49
18	08:24   16:36	07:33   17:35	06:29   18:27	17:42 (Rep 10)   06:15 18:01 (Rep 10)   20:23	19:16 (Rep 11)   05:17 19:36 (Rep 11)   21:15	04:51   21:49
19	08:23   16:37	07:31   17:37	06:26   18:29	17:41 (Rep 10)   06:13 18:02 (Rep 10)   20:25	19:17 (Rep 11)   05:15 19:35 (Rep 11)   21:17	04:51   21:49
20	08:22   16:39	07:29   17:38	06:24   18:31	17:40 (Rep 10)   06:11 18:02 (Rep 10)   20:27	19:18 (Rep 11)   05:14 19:33 (Rep 11)   21:19	04:51   21:50
21	08:20   16:41	07:26   17:40	06:22 17:02 (Oerzen 2)   18:33	17:39 (Rep 10)   06:09 18:02 (Rep 10)   20:29	19:20 (Rep 11)   05:12 19:31 (Rep 11)   21:20	04:52   21:50
22	08:19   16:43	07:24   17:42	06:19 17:05 (Oerzen 2)   18:35	17:39 (Rep 10)   06:07 18:03 (Rep 10)   20:30	05:11   21:22	04:52   21:50
23	08:18   16:44	07:22   17:44	06:17 17:14 (Oerzen 3)   18:36	17:39 (Rep 10)   06:04 18:02 (Rep 10)   20:32	05:10   21:23	04:52   21:50
24	08:17   16:46	07:20   17:46	06:14 16:42 (Oerzen 2)   18:38	17:39 (Rep 10)   06:02 18:02 (Rep 10)   20:34	05:08   21:24	04:52   21:51
25	08:15   16:48	07:18   17:48	06:12 16:41 (Oerzen 2)   18:40	17:39 (Rep 10)   06:00 18:04 (Oerzen 1)   20:36	05:07   21:26	04:53   21:51
26	08:14   16:50	07:16   17:50	06:10 16:41 (Oerzen 2)   18:42	17:39 (Rep 10)   05:58 18:06 (Oerzen 1)   20:38	05:06   21:27	04:53   21:51
27	08:13   16:52	07:13   17:52	06:07 16:40 (Oerzen 2)   18:44	17:40 (Rep 10)   05:56 18:07 (Oerzen 1)   20:39	05:05   21:29	04:53   21:50
28	08:11   16:54	07:11   17:54	06:05 16:38 (Oerzen 2)   18:45	17:40 (Oerzen 1)   05:54 18:08 (Oerzen 1)   20:41	05:04   21:30	04:54   21:50
29	08:10   16:56		07:02   19:47	18:39 (Oerzen 1)   05:52 19:09 (Oerzen 1)   20:43	05:02   21:31	04:55   21:50
30	08:08   16:58		07:00   19:49	18:37 (Oerzen 1)   05:50 19:09 (Oerzen 1)   20:45	05:01   21:33	04:55   21:50
31	08:06   16:59		06:58   19:51	18:37 (Oerzen 1)   19:10 (Oerzen 1)	05:00   21:34	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		256	908	708		

**Tabellen-Layout: Die Daten für jeden Tag 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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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s15 - Oerzen, Westerheide 12C

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember
1	04:56 21:50	05:34 21:16	06:27 20:11	18:37 (Oerzen 1) 19:38 (Rep 11)   18:58	07:19 23 17:44 (Oerzen 2)   16:49	08:09 16:06
2	04:57 21:49	05:36 21:14	06:29 20:08	47 18:35 (Oerzen 1)   07:21 49 19:38 (Rep 11)   18:56	26 17:45 (Oerzen 2)   16:47	08:11 16:06
3	04:57 21:49	05:38 21:12	06:31 20:06	49 18:33 (Oerzen 1)   07:23 49 19:36 (Rep 11)   18:54	29 17:46 (Oerzen 2)   16:45	08:12 16:05
4	04:58 21:48	05:39 21:10	06:32 20:04	49 18:32 (Oerzen 1)   07:24 49 19:35 (Rep 11)   18:51	37 17:52 (Oerzen 3)   16:43	08:14 16:04
5	04:59 21:48	05:41 21:08	06:34 20:01	49 18:32 (Oerzen 1)   07:26 47 19:33 (Rep 11)   18:49	40 17:54 (Oerzen 3)   16:42	08:15 16:04
6	05:00 21:47	05:43 21:07	06:36 19:59	43 18:30 (Oerzen 1)   07:28 43 19:30 (Rep 11)   18:46	41 17:55 (Oerzen 2)   16:40	08:16 16:03
7	05:01 21:47	05:44 21:05	06:38 19:56	34 18:30 (Oerzen 1)   07:30 34 19:04 (Oerzen 1)   18:44	43 17:56 (Oerzen 3)   16:38	08:18 16:03
8	05:02 21:46	05:46 21:03	06:39 19:54	34 18:30 (Oerzen 1)   07:31 34 19:04 (Oerzen 1)   18:42	44 17:57 (Oerzen 3)   16:36	08:19 16:02
9	05:03 21:45	05:48 21:01	06:41 19:52	35 18:28 (Oerzen 1)   07:33 35 19:03 (Oerzen 1)   18:39	45 17:57 (Oerzen 3)   16:34	08:20 16:02
10	05:04 21:44	05:49 20:59	06:43 19:49	35 18:28 (Oerzen 1)   07:35 35 19:03 (Oerzen 1)   18:37	45 17:56 (Oerzen 3)   16:33	08:21 16:02
11	05:05 21:44	05:51 20:57	06:44 19:47	33 18:29 (Oerzen 1)   07:37 33 19:02 (Oerzen 1)   18:35	45 17:56 (Oerzen 3)   16:31	08:23 16:01
12	05:06 21:43	05:53 20:55	06:46 19:44	33 18:28 (Oerzen 1)   07:39 33 19:01 (Oerzen 1)   18:32	45 17:56 (Oerzen 3)   16:29	08:24 16:01
13	05:07 21:42	05:55 20:53	06:48 19:42	32 18:28 (Oerzen 1)   07:40 32 19:00 (Oerzen 1)   18:30	44 17:55 (Oerzen 3)   16:28	08:25 16:01
14	05:08 21:41	05:56 20:51	06:50 19:40	31 18:29 (Oerzen 1)   07:42 31 19:00 (Oerzen 1)   18:28	43 17:55 (Oerzen 3)   16:26	08:26 16:01
15	05:10 21:40	05:58 20:49	06:51 19:37	29 18:29 (Oerzen 1)   07:44 29 18:58 (Oerzen 1)   18:25	42 17:54 (Oerzen 3)   16:25	08:27 16:01
16	05:11 21:39	06:00 20:46	06:53 19:35	28 18:29 (Rep 10)   07:46 28 18:57 (Oerzen 1)   18:23	40 17:53 (Oerzen 3)   16:23	08:28 16:01
17	05:12 21:38	06:01 20:44	06:55 19:32	27 18:28 (Rep 10)   07:48 27 18:55 (Oerzen 1)   18:21	37 17:51 (Oerzen 3)   16:22	08:28 16:02
18	05:14 21:36	06:03 20:42	06:56 19:30	26 18:26 (Rep 10)   07:50 26 18:52 (Oerzen 1)   18:19	33 17:48 (Oerzen 3)   16:20	08:29 16:02
19	05:15 21:35	06:05 20:40	06:58 19:27	24 18:26 (Rep 10)   07:51 24 18:50 (Oerzen 1)   18:16	21 17:47 (Oerzen 2)   16:19	08:30 16:02
20	05:16 21:34	06:07 20:38	07:00 19:25	23 18:25 (Rep 10)   07:53 23 18:48 (Rep 10)   18:14	17 17:36 (Oerzen 2)   16:18	08:31 16:02
21	05:18 21:33	06:08 20:36	07:02 19:22	23 18:25 (Rep 10)   07:55 23 18:48 (Rep 10)   18:12	10 17:31 (Oerzen 2)   16:16	08:31 16:03
22	05:19 21:31	06:10 20:33	07:03 19:20	23 18:24 (Rep 10)   07:57 23 18:47 (Rep 10)   18:10	07:55 16:15	08:32 16:03
23	05:21 21:30	06:12 20:31	07:05 19:18	23 18:24 (Rep 10)   07:59 23 18:47 (Rep 10)   18:08	07:56 16:14	08:32 16:04
24	05:22 21:28	06:13 20:29	07:07 19:15	21 19:20 (Rep 11)   07:07 21 18:46 (Rep 10)   18:06	08:01 16:13	08:33 16:04
25	05:24 21:27	06:15 20:27	07:09 19:13	20 19:19 (Rep 11)   07:09 20 18:44 (Rep 10)   17:03	08:00 16:12	08:33 16:05
26	05:25 21:25	06:17 20:24	07:10 19:10	16 19:17 (Rep 11)   07:10 16 18:42 (Rep 10)   17:01	08:01 16:11	08:33 16:06
27	05:27 21:24	06:19 20:22	07:12 19:08	13 19:17 (Rep 11)   07:12 13 18:40 (Rep 10)   16:59	08:03 16:10	08:34 16:06
28	05:28 21:22	06:20 20:20	07:14 19:06	8 19:17 (Rep 11)   07:14 8 18:30 (Rep 10)   16:57	08:05 16:09	08:34 16:07
29	05:30 21:21	06:22 20:18	07:16 19:03	13 18:45 (Oerzen 1)   07:16 13 19:40 (Rep 11)   19:03	08:06 16:08	08:34 16:08
30	05:31 21:19	06:24 20:15	07:17 19:01	13 18:41 (Oerzen 1)   07:17 13 17:39 (Oerzen 2)   16:55	08:08 16:07	08:34 16:09
31	05:33 21:17	06:25 20:13	07:14 19:00	19 18:39 (Oerzen 1)   07:14 19 19:40 (Rep 11)   16:51	16:07 16:10	08:34 16:10
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung		262	887	750		

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s16 - Oerzen, Westerheide 18

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34   16:11	08:05   17:01	07:09   17:56	16:28 (Oerzen 2)   06:55	18:28 (Oerzen 1)   05:48	04:59   21:35
2	08:34   16:12	08:03   17:03	07:06   17:58	16:28 (Oerzen 2)   06:53	18:28 (Oerzen 1)   05:45	04:59   21:36
3	08:34   16:14	08:02   17:05	07:04   18:00	16:28 (Oerzen 2)   06:50	18:28 (Oerzen 1)   05:44	04:58   21:37
4	08:33   16:15	08:00   17:07	07:02   18:01	16:28 (Oerzen 2)   06:48	18:28 (Oerzen 1)   05:42	04:57   21:39
5	08:33   16:16	07:58   17:09	07:00   18:03	16:29 (Oerzen 2)   06:46	18:28 (Oerzen 1)   05:40	04:56   21:40
6	08:33   16:17	07:56   17:11	06:57   18:05	16:29 (Oerzen 2)   06:43	18:29 (Oerzen 1)   05:38	04:55   21:41
7	08:32   16:19	07:54   17:13	06:55   18:07	16:30 (Oerzen 2)   06:41	18:29 (Oerzen 1)   05:36	04:55   21:42
8	08:32   16:20	07:53   17:15	06:53   18:09	16:30 (Oerzen 2)   06:39	18:30 (Oerzen 1)   05:34	04:54   21:43
9	08:31   16:21	07:51   17:17	06:50   18:11	16:32 (Oerzen 2)   06:36	18:31 (Oerzen 1)   05:32	04:54   21:43
10	08:31   16:23	07:49   17:19	06:48   18:13	16:34 (Oerzen 2)   06:34	18:32 (Oerzen 1)   05:30	04:53   21:44
11	08:30   16:24	07:47   17:21	06:46   18:15	16:36 (Oerzen 2)   06:32	18:34 (Oerzen 1)   05:28	04:53   21:45
12	08:29   16:26	07:45   17:23	06:43   18:16	16:40 (Oerzen 2)   06:29	18:38 (Oerzen 1)   05:27	04:52   21:46
13	08:28   16:27	07:43   17:25	06:41   18:18	16:48 (Oerzen 2)   06:27	19:12 (Rep 11)   05:25	04:52   21:46
14	08:28   16:29	07:41   17:27	06:38   18:20	17:42 (Rep 10)   06:25	19:11 (Rep 11)   05:23	04:52   21:47
15	08:27   16:31	07:39   17:29	06:36   18:22	17:39 (Rep 10)   06:22	19:11 (Rep 11)   05:22	04:52   21:48
16	08:26   16:32	07:37   17:31	06:34   18:24	17:38 (Rep 10)   06:20	19:12 (Rep 11)   05:20	04:51   21:48
17	08:25   16:34	07:35   17:33	06:31   18:26	17:37 (Rep 10)   06:18	19:13 (Rep 11)   05:18	04:51   21:49
18	08:24   16:36	07:33   17:35	16:41 (Oerzen 2)   18:26	17:36 (Rep 10)   06:15	19:13 (Rep 11)   05:17	04:51   21:49
19	08:23   16:37	07:31   17:37	16:38 (Oerzen 2)   18:27	17:35 (Rep 10)   06:13	19:14 (Rep 11)   05:15	04:51   21:49
20	08:22   16:39	07:29   17:39	16:36 (Oerzen 2)   18:29	17:35 (Rep 10)   06:11	19:14 (Rep 11)   05:14	04:51   21:50
21	08:20   16:41	07:26   17:40	16:34 (Oerzen 2)   18:31	17:34 (Rep 10)   06:09	19:16 (Rep 11)   05:12	04:52   21:50
22	08:19   16:43	07:24   17:42	16:32 (Oerzen 2)   18:33	17:34 (Rep 10)   06:07	19:18 (Rep 11)   05:11	04:52   21:50
23	08:18   16:44	07:22   17:44	16:32 (Oerzen 2)   18:35	17:34 (Rep 10)   06:04	19:19 (Rep 11)   05:10	04:52   21:50
24	08:17   16:46	07:20   17:46	16:31 (Oerzen 2)   18:36	18:00 (Oerzen 1)   06:02	19:20 (Rep 11)   05:08	04:52   21:51
25	08:15   16:48	07:18   17:48	16:29 (Oerzen 2)   18:38	17:35 (Rep 10)   06:00	19:21 (Rep 11)   05:07	04:53   21:51
26	08:14   16:50	07:16   17:50	16:29 (Oerzen 2)   18:40	17:34 (Rep 10)   05:58	19:22 (Rep 11)   05:06	04:53   21:51
27	08:13   16:52	07:13   17:52	16:29 (Oerzen 2)   18:42	18:03 (Oerzen 1)   05:56	19:23 (Rep 11)   05:05	04:53   21:50
28	08:11   16:54	07:11   17:54	16:29 (Oerzen 2)   18:44	17:31 (Oerzen 1)   05:54	19:24 (Rep 11)   05:04	04:54   21:50
29	08:10   16:56		16:28 (Oerzen 3)   18:45	17:30 (Oerzen 1)   05:52	19:25 (Rep 11)   05:03	04:55   21:50
30	08:08   16:58		17:17 (Oerzen 3)   19:02	18:30 (Oerzen 1)   05:50	19:26 (Rep 11)   05:02	04:55   21:50
31	08:06   16:59		17:00 (Oerzen 3)   19:49	18:29 (Oerzen 1)   05:48	19:27 (Rep 11)   05:01	04:55   21:50
			06:58   19:51	18:29 (Oerzen 1)   419	19:04 (Oerzen 1)   678	05:00   506
			19:51   367			21:34   506
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		440	899	678		

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s16 - Oerzen, Westerheide 18

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember	
1	04:56 21:50	05:34 21:16	06:27 20:11	18:33 (Oerzen 1) 19:36 (Rep 11)   18:58	07:19 17:16 (Oerzen 2)	08:09 16:49	
2	04:57 21:49	05:36 21:14	06:29 20:08	43 18:31 (Oerzen 1) 47 19:35 (Rep 11)   18:56	14 17:30 (Oerzen 2)	16:06 16:06	
3	04:57 21:49	05:38 21:12	06:31 20:06	49 18:28 (Oerzen 1) 49 19:34 (Rep 11)   18:54	20 17:33 (Oerzen 2)	16:45 16:05	
4	04:58 21:48	05:39 21:10	06:32 20:04	50 18:27 (Oerzen 1) 50 19:33 (Rep 11)   18:51	24 17:34 (Oerzen 2)	16:43 16:04	
5	04:59 21:48	05:41 21:08	06:34 20:01	50 18:26 (Oerzen 1) 50 19:32 (Rep 11)   18:49	27 17:35 (Oerzen 2)	16:42 16:04	
6	05:00 21:47	05:43 21:07	06:36 19:59	49 18:24 (Oerzen 1) 49 19:30 (Rep 11)   18:46	40 17:06 (Oerzen 2) 40 17:46 (Oerzen 3)	16:40 16:03	
7	05:01 21:47	05:44 21:05	06:38 19:56	47 18:23 (Oerzen 1) 47 19:28 (Rep 11)   18:44	43 17:05 (Oerzen 2) 43 17:48 (Oerzen 3)	16:38 16:03	
8	05:02 21:46	05:46 21:03	06:39 19:54	39 18:23 (Oerzen 1) 39 19:24 (Rep 11)   18:42	45 17:04 (Oerzen 2) 45 17:49 (Oerzen 3)	16:36 16:02	
9	05:03 21:45	05:48 21:01	06:41 19:52	36 18:21 (Oerzen 1) 36 19:52 (Rep 11)   18:39	46 17:04 (Oerzen 2) 46 17:50 (Oerzen 3)	16:34 16:02	
10	05:04 21:44	05:49 20:59	06:43 19:49	36 18:21 (Oerzen 1) 36 18:57 (Oerzen 1)   18:37	48 17:02 (Oerzen 2) 48 17:50 (Oerzen 3)	16:33 16:02	
11	05:05 21:44	05:51 20:57	06:44 19:47	36 18:21 (Oerzen 1) 36 18:57 (Oerzen 1)   18:35	49 17:01 (Oerzen 2) 49 17:50 (Oerzen 3)	16:31 16:01	
12	05:06 21:43	05:53 20:55	06:46 19:44	36 18:20 (Oerzen 1) 36 18:56 (Oerzen 1)   18:32	49 17:01 (Oerzen 2) 49 17:50 (Oerzen 3)	16:29 16:01	
13	05:07 21:42	05:55 20:53	06:48 19:42	35 18:20 (Oerzen 1) 35 18:55 (Oerzen 1)   18:30	49 17:01 (Oerzen 2) 49 17:50 (Oerzen 3)	16:28 16:01	
14	05:08 21:41	05:56 20:51	06:50 19:40	35 18:20 (Oerzen 1) 35 18:55 (Oerzen 1)   18:28	49 17:01 (Oerzen 2) 49 17:50 (Oerzen 3)	16:26 16:01	
15	05:10 21:40	05:58 20:49	06:51 19:37	34 18:20 (Oerzen 1) 34 18:54 (Oerzen 1)   18:25	49 17:01 (Oerzen 2) 49 17:50 (Oerzen 3)	16:25 16:01	
16	05:11 21:39	06:00 20:46	06:53 19:35	33 18:20 (Oerzen 1) 33 18:53 (Oerzen 1)   18:23	48 17:01 (Oerzen 2) 48 17:49 (Oerzen 3)	16:23 16:01	
17	05:12 21:38	06:01 20:44	06:55 19:32	31 18:21 (Oerzen 1) 31 18:52 (Oerzen 1)   18:21	47 17:01 (Oerzen 2) 47 17:48 (Oerzen 3)	16:22 16:02	
18	05:14 21:36	06:03 20:42	06:56 19:30	29 18:21 (Oerzen 1) 29 18:50 (Oerzen 1)   18:19	45 17:02 (Oerzen 2) 45 17:47 (Oerzen 3)	16:22 16:02	
19	05:15 21:35	06:05 20:40	06:58 19:27	26 18:22 (Rep 10) 26 18:48 (Oerzen 1)   18:16	44 17:02 (Oerzen 2) 44 17:46 (Oerzen 3)	16:21 16:19	
20	05:16 21:34	06:07 20:38	07:00 19:25	26 18:21 (Rep 10) 26 18:47 (Oerzen 1)   18:14	41 17:03 (Oerzen 2) 41 17:44 (Oerzen 3)	16:21 16:18	
21	05:18 21:33	06:08 20:36	07:02 19:23	25 18:20 (Rep 10) 25 18:45 (Oerzen 1)   18:12	35 17:03 (Oerzen 2) 35 17:39 (Oerzen 3)	16:18 16:16	
22	05:19 21:31	06:10 20:33	19:25 (Rep 11) 19:20 (Rep 11)   07:03	24 18:19 (Rep 10) 24 18:43 (Rep 10)   18:10	25 17:04 (Oerzen 2) 25 17:29 (Oerzen 2)	16:16 16:15	
23	05:21 21:30	06:12 20:31	19:20 (Rep 11) 19:18 (Rep 11)   07:05	24 18:19 (Rep 10) 24 18:43 (Rep 10)   18:08	21 17:06 (Oerzen 2) 21 17:27 (Oerzen 2)	16:14 16:14	
24	05:22 21:28	06:13 20:29	19:18 (Rep 11) 19:15 (Rep 11)   07:07	24 18:19 (Rep 10) 24 18:43 (Rep 10)   18:06	17 17:08 (Oerzen 2) 17 17:25 (Oerzen 2)	16:13 16:13	
25	05:24 21:27	06:15 20:27	19:16 (Rep 11) 19:13 (Rep 11)   07:09	23 18:18 (Rep 10) 23 18:41 (Rep 10)   17:03	9 16:12 (Oerzen 2) 9 16:21 (Oerzen 2)	16:12 16:12	
26	05:25 21:25	06:17 20:24	19:15 (Rep 11) 19:10 (Rep 11)   07:10	21 18:19 (Rep 10) 21 18:40 (Rep 10)   17:01	08:01 16:11	16:11 16:06	
27	05:27 21:24	06:19 20:22	19:14 (Rep 11) 19:08 (Rep 11)   07:12	20 18:19 (Rep 10) 20 18:39 (Rep 10)   16:59	08:03 16:10	16:10 16:06	
28	05:28 21:22	06:20 20:20	19:13 (Rep 11) 19:06 (Rep 11)   07:14	17 18:21 (Rep 10) 17 18:38 (Rep 10)   16:57	08:05 16:09	16:09 16:07	
29	05:30 21:21	06:22 20:18	19:12 (Rep 11) 19:03 (Rep 11)   07:16	14 18:21 (Rep 10) 14 18:35 (Rep 10)   16:55	08:06 16:08	16:06 16:08	
30	05:31 21:19	06:24 20:15	19:12 (Rep 11) 19:01 (Rep 11)   07:17	8 18:24 (Rep 10) 8 18:32 (Rep 10)   16:53	08:08 16:07	16:08 16:09	
31	05:33 21:17	06:25 20:13	18:37 (Oerzen 1) 19:37 (Rep 11)	07:14 16:51	08:34 16:10	16:09 16:10	
Sonnenscheinstunden		509	458	382	329	261	237
astr.max.mögl.Beschattung			206	967	884		

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s17 - Oerzen, Westerheide 19

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34	08:05	07:09	16:22 (Oerzen 2)   06:55	18:22 (Oerzen 1)   05:48	04:59
	16:11	17:01	17:56	38 17:03 (Oerzen 3)   19:53	37 19:25 (Rep 11)   20:47	21:35
2	08:34	08:03	07:06	16:24 (Oerzen 2)   06:53	18:27 (Oerzen 1)   05:45	04:59
	16:12	17:03	17:58	28 17:00 (Oerzen 3)   19:55	28 19:25 (Rep 11)   20:48	21:36
3	08:34	08:02	07:04	16:26 (Oerzen 2)   06:50	19:02 (Rep 11)   05:44	04:58
	16:14	17:05	18:00	13 16:39 (Oerzen 2)   19:56	24 19:26 (Rep 11)   20:50	21:37
4	08:33	08:00	07:02	06:48	19:01 (Rep 11)   05:42	04:57
	16:15	17:07	18:01	19:58	24 19:25 (Rep 11)   20:52	21:39
5	08:33	07:58	07:00	06:46	19:01 (Rep 11)   05:40	04:56
	16:16	17:09	18:03	20:00	24 19:25 (Rep 11)   20:54	21:40
6	08:33	07:56	06:57	06:43	19:01 (Rep 11)   05:38	04:55
	16:17	17:11	18:05	20:02	24 19:25 (Rep 11)   20:55	21:41
7	08:32	07:54	06:55	06:41	19:00 (Rep 11)   05:36	04:55
	16:19	17:13	18:07	20:04	24 19:24 (Rep 11)   20:57	21:42
8	08:32	07:53	06:53	17:33 (Rep 10)   06:39	19:01 (Rep 11)   05:34	04:54
	16:20	17:15	18:09	9 17:42 (Rep 10)   20:05	23 19:24 (Rep 11)   20:59	21:43
9	08:31	07:51	16:29 (Oerzen 2)   06:50	17:31 (Rep 10)   06:36	19:02 (Rep 11)   05:32	04:54
	16:21	17:17	11 16:40 (Oerzen 2)   18:11	13 17:44 (Rep 10)   20:07	21 19:23 (Rep 11)   21:01	21:43
10	08:31	07:49	16:26 (Oerzen 2)   06:48	17:29 (Rep 10)   06:34	19:02 (Rep 11)   05:30	04:53
	16:23	17:19	17 16:43 (Oerzen 2)   18:13	18 17:47 (Rep 10)   20:09	19 19:21 (Rep 11)   21:02	21:44
11	08:30	07:47	16:24 (Oerzen 2)   06:46	17:27 (Rep 10)   06:32	19:03 (Rep 11)   05:28	04:53
	16:24	17:21	21 16:45 (Oerzen 2)   18:15	21 17:48 (Rep 10)   20:11	16 19:19 (Rep 11)   21:04	21:45
12	08:29	07:45	16:23 (Oerzen 2)   06:43	17:27 (Rep 10)   06:29	19:05 (Rep 11)   05:27	04:52
	16:26	17:23	24 16:47 (Oerzen 2)   18:16	22 17:49 (Rep 10)   20:13	12 19:17 (Rep 11)   21:06	21:46
13	08:28	07:43	16:21 (Oerzen 2)   06:41	17:26 (Rep 10)   06:27	19:09 (Rep 11)   05:25	04:52
	16:27	17:25	27 16:48 (Oerzen 2)   18:18	22 17:48 (Rep 10)   20:14	3 19:12 (Rep 11)   21:07	21:46
14	08:28	07:41	16:20 (Oerzen 2)   06:38	17:24 (Oerzen 1)   06:25	05:23	04:52
	16:29	17:27	29 16:49 (Oerzen 2)   18:20	25 17:49 (Rep 10)   20:16	21:09	21:47
15	08:27	07:39	16:19 (Oerzen 2)   06:36	17:22 (Oerzen 1)   06:22	05:22	04:52
	16:31	17:29	36 16:59 (Oerzen 3)   18:22	26 17:48 (Rep 10)   20:18	21:11	21:48
16	08:26	07:37	16:18 (Oerzen 2)   06:34	17:20 (Oerzen 1)   06:20	05:20	04:51
	16:32	17:31	44 17:02 (Oerzen 3)   18:24	28 17:48 (Rep 10)   20:20	21:12	21:48
17	08:25	07:35	16:18 (Oerzen 2)   06:31	17:20 (Oerzen 1)   06:18	05:18	04:51
	16:34	17:33	46 17:04 (Oerzen 3)   18:26	29 17:49 (Oerzen 1)   20:22	21:14	21:49
18	08:24	07:33	16:18 (Oerzen 2)   06:29	17:18 (Oerzen 1)   06:15	05:17	04:51
	16:36	17:35	48 17:06 (Oerzen 3)   18:27	31 17:49 (Oerzen 1)   20:23	21:15	21:49
19	08:23	07:31	16:17 (Oerzen 2)   06:26	17:17 (Oerzen 1)   06:13	05:15	04:51
	16:37	17:37	50 17:07 (Oerzen 3)   18:29	33 17:50 (Oerzen 1)   20:25	21:17	21:49
20	08:22	07:29	16:17 (Oerzen 2)   06:24	17:16 (Oerzen 1)   06:11	05:14	04:51
	16:39	17:38	50 17:07 (Oerzen 3)   18:31	33 17:49 (Oerzen 1)   20:27	21:19	21:50
21	08:21	07:26	16:17 (Oerzen 2)   06:22	17:16 (Oerzen 1)   06:09	05:12	04:52
	16:41	17:40	50 17:07 (Oerzen 3)   18:33	34 17:50 (Oerzen 1)   20:29	21:20	21:50
22	08:19	07:24	16:17 (Oerzen 2)   06:19	17:16 (Oerzen 1)   06:07	05:11	04:52
	16:43	17:42	51 17:08 (Oerzen 3)   18:35	34 17:50 (Oerzen 1)   20:30	21:22	21:50
23	08:18	07:22	16:17 (Oerzen 2)   06:17	17:15 (Oerzen 1)   06:04	05:10	04:52
	16:44	17:44	51 17:08 (Oerzen 3)   18:36	34 17:49 (Oerzen 1)   20:32	21:23	21:50
24	08:17	07:20	16:17 (Oerzen 2)   06:14	17:16 (Oerzen 1)   06:02	05:08	04:52
	16:46	17:46	50 17:07 (Oerzen 3)   18:38	33 17:49 (Oerzen 1)   20:34	21:24	21:51
25	08:15	07:18	16:18 (Oerzen 2)   06:12	17:15 (Oerzen 1)   06:00	05:07	04:53
	16:48	17:48	49 17:07 (Oerzen 3)   18:40	33 17:48 (Oerzen 1)   20:36	21:26	21:51
26	08:14	07:16	16:19 (Oerzen 2)   06:10	17:16 (Oerzen 1)   05:58	05:06	04:53
	16:50	17:50	48 17:07 (Oerzen 3)   18:42	32 17:48 (Oerzen 1)   20:38	21:27	21:51
27	08:13	07:13	16:20 (Oerzen 2)   06:07	17:15 (Oerzen 1)   05:56	05:05	04:53
	16:52	17:52	46 17:06 (Oerzen 3)   18:44	31 17:46 (Oerzen 1)   20:39	21:29	21:50
28	08:11	07:11	16:20 (Oerzen 2)   06:05	17:16 (Oerzen 1)   05:54	05:04	04:54
	16:54	17:54	44 17:04 (Oerzen 3)   18:45	30 18:16 (Rep 11)   20:41	21:30	21:50
29	08:10		07:02	18:18 (Oerzen 1)   05:52	05:02	04:55
	16:56		19:47	37 19:21 (Rep 11)   20:43	21:31	21:50
30	08:08		07:00	18:18 (Oerzen 1)   05:50	05:01	04:55
	16:58		19:49	40 19:23 (Rep 11)   20:45	21:33	21:50
31	08:06		06:58	18:20 (Oerzen 1)	05:00	
	16:59		19:51	39 19:24 (Rep 11)	21:34	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		792	766	279		

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s17 - Oerzen, Westerheide 19

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember
1	04:56 21:50	05:34 21:16	06:27 20:11	19:02 (Rep 11) 18:58	18:06 (Rep 10) 18:28 (Rep 10)	07:16 16:49
2	04:57 21:49	05:36 21:14	06:29 20:08	19:01 (Rep 11) 18:56	18:06 (Rep 10) 18:27 (Rep 10)	07:18 16:47
3	04:57 21:49	05:38 21:12	06:31 20:06	19:20 (Rep 11) 18:54	18:07 (Rep 10) 18:26 (Rep 10)	07:20 16:45
4	04:58 21:48	05:39 21:10	06:32 20:04	18:58 (Rep 11) 19:21 (Rep 11) 18:51	18:07 (Rep 10) 18:22 (Rep 10)	07:21 16:43
5	04:59 21:48	05:41 21:08	06:34 20:01	18:57 (Rep 11) 19:21 (Rep 11) 18:49	18:08 (Rep 10) 18:20 (Rep 10)	07:23 16:42
6	05:00 21:47	05:43 21:07	06:36 19:59	18:56 (Rep 11) 19:20 (Rep 11) 18:46	18:11 (Rep 10) 18:18 (Rep 10)	07:25 16:40
7	05:01 21:47	05:44 21:05	06:38 19:56	18:56 (Rep 11) 19:21 (Rep 11) 18:44	07:30 18:44	16:38
8	05:02 21:46	05:46 21:03	06:39 19:54	18:56 (Rep 11) 19:20 (Rep 11) 18:42	07:31 18:42	16:36
9	05:03 21:45	05:48 21:01	06:41 19:52	18:55 (Rep 11) 19:19 (Rep 11) 18:39	07:33 18:39	16:34
10	05:04 21:44	05:49 20:59	06:43 19:49	18:21 (Oerzen 1) 19:19 (Rep 11) 18:37	17:03 (Oerzen 2) 17:11 (Oerzen 2)	07:33 16:33
11	05:05 21:44	05:51 20:57	06:44 19:47	18:15 (Oerzen 1) 19:18 (Rep 11) 18:35	16:59 (Oerzen 2) 17:31 (Oerzen 3)	07:35 16:31
12	05:06 21:43	05:53 20:55	06:46 19:44	18:12 (Oerzen 1) 19:16 (Rep 11) 18:32	16:56 (Oerzen 2) 17:35 (Oerzen 3)	07:37 16:29
13	05:07 21:42	05:55 20:53	06:48 19:42	18:10 (Oerzen 1) 19:14 (Rep 11) 18:30	16:54 (Oerzen 2) 17:36 (Oerzen 3)	07:38 16:28
14	05:08 21:41	05:56 20:51	06:50 19:40	18:08 (Oerzen 1) 19:12 (Rep 11) 18:28	16:53 (Oerzen 2) 17:38 (Oerzen 3)	07:40 16:26
15	05:10 21:40	05:58 20:49	06:51 19:37	18:06 (Oerzen 1) 19:08 (Rep 11) 18:25	16:52 (Oerzen 2) 17:38 (Oerzen 3)	07:42 16:25
16	05:11 21:39	06:00 20:46	06:53 19:35	18:05 (Oerzen 1) 18:35 (Oerzen 1) 18:23	16:51 (Oerzen 2) 17:39 (Oerzen 3)	07:44 16:23
17	05:12 21:38	06:01 20:44	06:55 19:32	18:04 (Oerzen 1) 18:36 (Oerzen 1) 18:21	16:50 (Oerzen 2) 17:39 (Oerzen 3)	07:46 16:22
18	05:14 21:36	06:03 20:42	06:56 19:30	18:03 (Oerzen 1) 18:35 (Oerzen 1) 18:19	16:49 (Oerzen 2) 17:39 (Oerzen 3)	07:48 16:20
19	05:15 21:35	06:05 20:40	06:58 19:27	18:02 (Oerzen 1) 18:36 (Oerzen 1) 18:16	16:49 (Oerzen 2) 17:39 (Oerzen 3)	07:49 16:19
20	05:16 21:34	06:07 20:38	07:00 19:25	18:02 (Oerzen 1) 18:36 (Oerzen 1) 18:14	16:48 (Oerzen 2) 17:39 (Oerzen 3)	07:51 16:18
21	05:18 21:33	06:08 20:36	07:02 19:22	18:02 (Oerzen 1) 18:36 (Oerzen 1) 18:12	16:47 (Oerzen 2) 17:38 (Oerzen 3)	07:53 16:16
22	05:19 21:31	06:10 20:33	07:03 19:20	18:01 (Oerzen 1) 18:34 (Oerzen 1) 18:10	16:47 (Oerzen 2) 17:37 (Oerzen 3)	07:55 16:15
23	05:21 21:30	06:12 20:31	07:05 19:18	18:01 (Oerzen 1) 18:34 (Oerzen 1) 18:08	16:47 (Oerzen 2) 17:36 (Oerzen 3)	07:56 16:14
24	05:22 21:28	06:13 20:29	07:07 19:15	18:01 (Oerzen 1) 18:34 (Oerzen 1) 18:06	16:47 (Oerzen 2) 17:35 (Oerzen 3)	07:58 16:13
25	05:24 21:27	06:15 20:27	07:09 19:13	18:00 (Oerzen 1) 18:32 (Oerzen 1) 17:03	15:47 (Oerzen 2) 16:33 (Oerzen 3)	08:00 16:12
26	05:25 21:25	06:17 20:24	07:10 19:10	18:01 (Oerzen 1) 18:31 (Oerzen 1) 17:01	15:48 (Oerzen 2) 16:31 (Oerzen 3)	08:01 16:11
27	05:27 21:24	06:19 20:22	07:12 19:08	18:02 (Oerzen 1) 18:30 (Oerzen 1) 16:59	15:48 (Oerzen 2) 16:18 (Oerzen 2)	08:03 16:10
28	05:28 21:22	06:20 20:20	07:14 19:06	18:03 (Oerzen 1) 18:30 (Rep 10) 16:57	15:49 (Oerzen 2) 16:17 (Oerzen 2)	08:05 16:09
29	05:30 21:21	06:22 20:18	07:16 19:03	18:03 (Oerzen 1) 18:29 (Rep 10) 16:55	15:51 (Oerzen 2) 16:17 (Oerzen 2)	08:06 16:08
30	05:31 21:19	06:24 20:15	19:09 (Rep 11) 07:17 19:13 (Rep 11)	18:05 (Rep 10) 18:28 (Rep 10) 16:53	15:52 (Oerzen 2) 16:16 (Oerzen 2)	08:08 16:07
31	05:33 21:17	06:25 20:13	19:05 (Rep 11) 19:17 (Rep 11)	07:14 16:51	15:54 (Oerzen 2) 16:14 (Oerzen 2)	08:34 16:10
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung		16	874	951	26	

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s18 - Oerzen, Westerheide 20

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34   16:11	08:05   17:01	07:09   17:56	16:22 (Oerzen 2)   19:53	18:23 (Oerzen 1)   20:47	04:59   21:35
2	08:34   16:12	08:03   17:03	07:06   17:58	16:23 (Oerzen 2)   19:55	18:23 (Oerzen 1)   20:48	04:59   21:36
3	08:34   16:14	08:02   17:05	07:04   18:00	16:23 (Oerzen 2)   19:56	18:24 (Oerzen 1)   20:50	04:58   21:37
4	08:33   16:15	08:00   17:07	07:02   18:01	16:24 (Oerzen 2)   19:58	18:24 (Oerzen 1)   20:52	04:57   21:39
5	08:33   16:16	07:58   17:09	07:00   18:03	16:25 (Oerzen 2)   20:00	18:25 (Oerzen 1)   20:54	04:56   21:40
6	08:33   16:17	07:56   17:11	06:57   18:05	16:25 (Oerzen 2)   20:02	18:26 (Oerzen 1)   20:55	04:55   21:41
7	08:32   16:19	07:54   17:13	06:55   18:07	16:27 (Oerzen 2)   20:04	18:26 (Oerzen 1)   20:57	04:55   21:42
8	08:32   16:20	07:53   17:15	06:53   18:09	16:29 (Oerzen 2)   20:05	18:28 (Oerzen 1)   20:59	04:54   21:43
9	08:31   16:21	07:51   17:17	06:50   18:11	16:32 (Oerzen 2)   20:07	19:35 (Rep 11)   21:01	04:54   21:43
10	08:31   16:23	07:49   17:19	06:48   18:13	16:45 (Oerzen 2)   20:09	18:30 (Oerzen 1)   21:02	04:53   21:44
11	08:30   16:24	07:47   17:21	06:46   18:15	17:01 (Rep 10)   20:11	19:09 (Rep 11)   21:04	04:53   21:45
12	08:29   16:26	07:45   17:23	06:43   18:16	17:37 (Rep 10)   20:13	19:34 (Rep 11)   21:06	04:52   21:46
13	08:28   16:27	07:43   17:25	06:41   18:18	17:52 (Rep 10)   20:14	19:09 (Rep 11)   21:07	04:52   21:46
14	08:28   16:29	07:41   17:27	16:35 (Oerzen 2)   18:20	17:36 (Rep 10)   20:16	19:09 (Rep 11)   21:09	04:52   21:47
15	08:27   16:31	07:39   17:29	16:31 (Oerzen 2)   18:22	17:54 (Rep 10)   20:18	19:33 (Rep 11)   21:11	04:52   21:48
16	08:26   16:32	07:37   17:31	16:29 (Oerzen 2)   18:24	17:33 (Rep 10)   20:20	19:09 (Rep 11)   21:12	04:51   21:48
17	08:25   16:34	07:35   17:33	16:28 (Oerzen 2)   18:26	17:56 (Rep 10)   20:22	19:31 (Rep 11)   21:14	04:51   21:49
18	08:24   16:36	07:33   17:35	16:27 (Oerzen 2)   18:27	17:32 (Rep 10)   20:23	19:30 (Rep 11)   21:15	04:51   21:49
19	08:23   16:37	07:31   17:37	16:26 (Oerzen 2)   18:29	17:32 (Rep 10)   20:25	19:27 (Rep 11)   21:17	04:51   21:49
20	08:22   16:39	07:29   17:39	16:24 (Oerzen 2)   18:31	17:56 (Rep 10)   20:27	19:15 (Rep 11)   21:19	04:51   21:50
21	08:21   16:41	07:26   17:40	16:24 (Oerzen 2)   18:33	17:31 (Rep 10)   20:29	19:24 (Rep 11)   21:21	04:51   21:50
22	08:19   16:43	07:24   17:42	16:23 (Oerzen 2)   18:35	17:57 (Oerzen 1)   20:31	19:09 (Rep 11)   21:23	04:51   21:51
23	08:18   16:44	07:22   17:44	16:23 (Oerzen 2)   18:36	17:31 (Oerzen 1)   20:33	19:33 (Rep 11)   21:25	04:51   21:51
24	08:17   16:46	07:20   17:46	16:22 (Oerzen 2)   18:38	17:58 (Oerzen 1)   20:35	19:10 (Rep 11)   21:27	04:51   21:52
25	08:15   16:48	07:18   17:48	16:22 (Oerzen 2)   18:40	18:00 (Oerzen 1)   20:37	19:31 (Rep 11)   21:29	04:51   21:53
26	08:14   16:50	07:16   17:50	16:22 (Oerzen 2)   18:42	17:32 (Rep 10)   20:39	19:12 (Rep 11)   21:31	04:51   21:54
27	08:13   16:52	07:13   17:52	16:22 (Oerzen 2)   18:44	17:25 (Oerzen 1)   20:41	19:27 (Rep 11)   21:33	04:51   21:55
28	08:11   16:54	07:11   17:54	16:22 (Oerzen 2)   18:45	18:00 (Oerzen 1)   20:43	19:33 (Rep 11)   21:35	04:51   21:56
29	08:10   16:56		07:02   19:47	17:26 (Oerzen 1)   20:45	19:34 (Rep 11)   21:37	04:51   21:57
30	08:08   16:58		07:00   19:49	18:24 (Oerzen 1)   20:47	19:35 (Rep 11)   21:39	04:51   21:58
31	08:06   16:59		06:58   19:51	18:24 (Oerzen 1)   20:49	19:36 (Rep 11)   21:41	04:51   21:59
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		599	875	623		

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s18 - Oerzen, Westerheide 20

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember
1	04:56	05:34	06:27	19:08 (Rep 11)   07:19	18:19 (Rep 10)   07:16	08:09
	21:50	21:16	20:11	25 19:33 (Rep 11)   18:58	11 18:30 (Rep 10)   16:49	16:06
2	04:57	05:36	06:29	18:32 (Oerzen 1)   07:21	18:23 (Rep 10)   07:18	08:11
	21:49	21:14	20:08	36 19:33 (Rep 11)   18:56	3 18:26 (Rep 10)   16:47	16:06
3	04:57	05:38	06:31	18:27 (Oerzen 1)   07:23		07:20
	21:49	21:12	20:06	44 19:32 (Rep 11)   18:54		16:45
4	04:58	05:39	06:32	18:25 (Oerzen 1)   07:24	17:11 (Oerzen 2)   07:21	08:14
	21:48	21:10	20:04	47 19:32 (Rep 11)   18:51	9 17:20 (Oerzen 2)   16:43	16:04
5	04:59	05:41	06:34	18:24 (Oerzen 1)   07:26	17:07 (Oerzen 2)   07:23	08:15
	21:48	21:08	20:01	48 19:31 (Rep 11)   18:49	17 17:24 (Oerzen 2)   16:42	16:04
6	05:00	05:43	06:36	18:21 (Oerzen 1)   07:28	17:04 (Oerzen 2)   07:25	08:16
	21:47	21:07	19:59	50 19:29 (Rep 11)   18:46	22 17:26 (Oerzen 2)   16:40	16:03
7	05:01	05:44	06:38	18:20 (Oerzen 1)   07:30	17:02 (Oerzen 2)   07:27	08:18
	21:47	21:05	19:56	50 19:28 (Rep 11)   18:44	32 17:39 (Oerzen 3)   16:38	16:03
8	05:02	05:46	06:39	18:19 (Oerzen 1)   07:31	17:01 (Oerzen 2)   07:29	08:19
	21:46	21:03	19:54	47 19:26 (Rep 11)   18:42	41 17:42 (Oerzen 3)   16:36	16:02
9	05:03	05:48	06:41	18:17 (Oerzen 1)   07:33	16:59 (Oerzen 2)   07:31	08:20
	21:45	21:01	19:52	43 19:22 (Rep 11)   18:39	45 17:44 (Oerzen 2)   16:34	16:02
10	05:04	05:49	06:43	18:17 (Oerzen 1)   07:35	16:57 (Oerzen 2)   07:33	08:21
	21:44	20:59	19:49	35 18:52 (Oerzen 1)   18:37	47 17:44 (Oerzen 3)   16:33	16:02
11	05:05	05:51	06:44	18:16 (Oerzen 1)   07:37	16:56 (Oerzen 2)   07:35	08:23
	21:44	20:57	19:47	36 18:52 (Oerzen 1)   18:35	49 17:45 (Oerzen 3)   16:31	16:01
12	05:06	05:53	06:46	18:15 (Oerzen 1)   07:39	16:56 (Oerzen 2)   07:37	08:24
	21:43	20:55	19:44	36 18:51 (Oerzen 1)   18:32	50 17:46 (Oerzen 3)   16:29	16:01
13	05:07	05:55	06:48	18:15 (Oerzen 1)   07:40	16:55 (Oerzen 2)   07:38	08:25
	21:42	20:53	19:42	36 18:51 (Oerzen 1)   18:30	51 17:46 (Oerzen 3)   16:28	16:01
14	05:08	05:56	06:50	18:15 (Oerzen 1)   07:42	16:55 (Oerzen 2)   07:40	08:26
	21:41	20:51	19:40	36 18:51 (Oerzen 1)   18:28	51 17:46 (Oerzen 3)   16:26	16:01
15	05:10	05:58	06:51	18:14 (Oerzen 1)   07:44	16:54 (Oerzen 2)   07:42	08:27
	21:40	20:49	19:37	36 18:50 (Oerzen 1)   18:25	52 17:46 (Oerzen 3)   16:25	16:01
16	05:11	06:00	06:53	18:14 (Oerzen 1)   07:46	16:54 (Oerzen 2)   07:44	08:28
	21:39	20:46	19:35	36 18:50 (Oerzen 1)   18:23	52 17:46 (Oerzen 3)   16:23	16:01
17	05:12	06:01	06:55	18:14 (Oerzen 1)   07:48	16:54 (Oerzen 2)   07:46	08:28
	21:38	20:44	19:32	35 18:49 (Oerzen 1)   18:21	52 17:46 (Oerzen 3)   16:22	16:02
18	05:14	06:03	06:56	18:14 (Oerzen 1)   07:50	16:54 (Oerzen 2)   07:48	08:29
	21:36	20:42	19:30	33 18:47 (Oerzen 1)   18:19	51 17:45 (Oerzen 3)   16:20	16:02
19	05:15	06:05	06:58	18:15 (Oerzen 1)   07:51	16:54 (Oerzen 2)   07:49	08:30
	21:35	20:40	19:27	32 18:47 (Oerzen 1)   18:16	50 17:44 (Oerzen 3)   16:19	16:02
20	05:16	06:07	07:00	18:15 (Oerzen 1)   07:53	16:55 (Oerzen 2)   07:51	08:31
	21:34	20:38	19:25	30 18:45 (Oerzen 1)   18:14	48 17:43 (Oerzen 3)   16:18	16:02
21	05:18	06:08	07:02	18:16 (Oerzen 1)   07:55	16:54 (Oerzen 2)   07:53	08:31
	21:33	20:36	19:23	28 18:44 (Oerzen 1)   18:12	47 17:41 (Oerzen 3)   16:16	16:03
22	05:19	06:10	07:03	18:16 (Rep 10)   07:57	16:55 (Oerzen 2)   07:55	08:32
	21:31	20:33	19:20	26 18:42 (Oerzen 1)   18:10	44 17:39 (Oerzen 3)   16:15	16:03
23	05:21	06:12	07:05	18:16 (Rep 10)   07:59	16:56 (Oerzen 2)   07:56	08:32
	21:30	20:31	19:18	24 18:40 (Rep 10)   18:08	38 17:36 (Oerzen 3)   16:14	16:04
24	05:22	06:13	19:18 (Rep 11)   07:07	18:15 (Rep 10)   08:01	16:57 (Oerzen 2)   07:58	08:33
	21:28	20:29	11 19:29 (Rep 11)   19:15	25 18:40 (Rep 10)   18:06	28 17:25 (Oerzen 2)   16:13	16:04
25	05:24	06:15	19:16 (Rep 11)   07:09	18:14 (Rep 10)   07:03	15:58 (Oerzen 2)   08:00	08:33
	21:27	20:27	15 19:31 (Rep 11)   19:13	24 18:38 (Rep 10)   17:03	25 16:23 (Oerzen 2)   16:12	16:05
26	05:25	06:17	19:13 (Rep 11)   07:10	18:14 (Rep 10)   07:04	15:59 (Oerzen 2)   08:01	08:33
	21:25	20:24	19 19:32 (Rep 11)   19:10	24 18:38 (Rep 10)   17:01	22 16:21 (Oerzen 2)   16:11	16:06
27	05:27	06:19	19:12 (Rep 11)   07:12	18:15 (Rep 10)   07:06	16:02 (Oerzen 2)   08:03	08:34
	21:24	20:22	21 19:33 (Rep 11)   19:08	23 18:38 (Rep 10)   16:59	17 16:19 (Oerzen 2)   16:10	16:06
28	05:28	06:20	19:11 (Rep 11)   07:14	18:15 (Rep 10)   07:08	16:05 (Oerzen 2)   08:05	08:34
	21:22	20:20	23 19:34 (Rep 11)   19:06	22 18:37 (Rep 10)   16:57	11 16:16 (Oerzen 2)   16:09	16:07
29	05:30	06:22	19:10 (Rep 11)   07:16	18:15 (Rep 10)   07:10		08:06
	21:21	20:18	23 19:33 (Rep 11)   19:03	20 18:35 (Rep 10)   16:55		16:08
30	05:31	06:24	19:09 (Rep 11)   07:17	18:17 (Rep 10)   07:12		08:08
	21:19	20:15	25 19:34 (Rep 11)   19:01	15 18:32 (Rep 10)   16:53		16:09
31	05:33	06:25	19:09 (Rep 11)			08:34
	21:17	20:13	25 19:34 (Rep 11)			16:10
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung		162	1002	965		

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s19 - Oerzen, Westerheide 22

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	
1	08:34   16:11	08:05   17:01	07:09   17:56	16:21 (Oerzen 2)   06:55 54 17:15 (Oerzen 3)   19:53	18:26 (Oerzen 1)   05:48 38 19:04 (Oerzen 1)   20:47	04:59   21:35	
2	08:34   16:12	08:03   17:03	07:07   17:58	16:21 (Oerzen 2)   06:53 54 17:15 (Oerzen 3)   19:55	18:26 (Oerzen 1)   05:44 38 19:04 (Oerzen 1)   20:48	04:58   21:36	
3	08:34   16:14	08:02   17:05	07:04   18:00	16:21 (Oerzen 2)   06:50 52 17:13 (Oerzen 3)   19:56	18:26 (Oerzen 1)   05:40 38 19:04 (Oerzen 1)   20:50	04:58   21:37	
4	08:33   16:15	08:00   17:07	07:02   18:01	16:22 (Oerzen 2)   06:48 51 17:13 (Oerzen 3)   19:58	18:25 (Oerzen 1)   05:42 38 19:03 (Oerzen 1)   20:52	04:57   21:39	
5	08:33   16:16	07:58   17:09	07:00   18:03	16:22 (Oerzen 2)   06:46 50 17:12 (Oerzen 3)   20:00	18:25 (Oerzen 1)   05:40 40 19:29 (Rep 11)   20:54	04:56   21:40	
6	08:33   16:17	07:56   17:11	06:57   18:05	16:22 (Oerzen 2)   06:43 48 17:10 (Oerzen 3)   20:02	18:26 (Oerzen 1)   05:38 49 19:34 (Rep 11)   20:55	04:55   21:41	
7	08:32   16:19	07:54   17:13	06:55   18:07	16:24 (Oerzen 2)   06:41 44 17:08 (Oerzen 3)   20:04	18:26 (Oerzen 1)   05:36 52 19:35 (Rep 11)   20:57	04:55   21:42	
8	08:32   16:20	07:53   17:15	06:53   18:09	16:24 (Oerzen 2)   06:39 36 17:03 (Oerzen 3)   20:05	18:26 (Oerzen 1)   05:34 55 19:37 (Rep 11)   20:59	04:54   21:43	
9	08:31   16:21	07:51   17:17	06:50   18:11	16:26 (Oerzen 2)   06:36 26 16:52 (Oerzen 2)   20:07	18:27 (Oerzen 1)   05:32 55 19:38 (Rep 11)   21:01	04:54   21:43	
10	08:31   16:23	07:49   17:19	06:48   18:13	16:28 (Oerzen 2)   06:34 22 16:50 (Oerzen 2)   20:09	18:27 (Oerzen 1)   05:30 54 19:38 (Rep 11)   21:02	04:53   21:44	
11	08:30   16:24	07:47   17:21	06:46   18:15	16:30 (Oerzen 2)   06:32 17 16:47 (Oerzen 2)   20:11	18:29 (Oerzen 1)   05:28 52 19:38 (Rep 11)   21:04	04:53   21:45	
12	08:29   16:26	07:45   17:23	06:43   18:16	16:35 (Oerzen 2)   06:29 8 16:43 (Oerzen 2)   20:13	18:30 (Oerzen 1)   05:27 49 19:38 (Rep 11)   21:06	04:52   21:46	
13	08:28   16:27	07:43   17:25	06:41   18:18	16:37 (Rep 10)   06:27 46 17:42 (Rep 10)   20:14	18:33 (Oerzen 1)   05:25 46 19:39 (Rep 11)   21:07	04:52   21:46	
14	08:28   16:29	07:41   17:27	06:38   18:20	17:54 (Rep 10)   06:25 12 17:54 (Rep 10)   20:16	18:35 (Oerzen 1)   05:23 40 19:38 (Rep 11)   21:09	04:52   21:47	
15	08:27   16:31	07:39   17:29	06:36   18:22	17:39 (Rep 10)   06:22 17 17:56 (Rep 10)   20:18	19:12 (Rep 11)   05:22 26 19:38 (Rep 11)   21:11	04:52   21:48	
16	08:26   16:32	07:37   17:31	06:34   18:24	17:37 (Rep 10)   06:20 20 17:57 (Rep 10)   20:20	19:12 (Rep 11)   05:20 25 19:37 (Rep 11)   21:12	04:51   21:48	
17	08:25   16:34	07:35   17:33	06:31   18:26	17:36 (Rep 10)   06:18 22 17:58 (Rep 10)   20:22	19:12 (Rep 11)   05:18 25 19:37 (Rep 11)   21:14	04:51   21:49	
18	08:24   16:36	07:33   17:35	06:29   18:27	17:34 (Rep 10)   06:15 24 17:58 (Rep 10)   20:23	19:12 (Rep 11)   05:17 23 19:35 (Rep 11)   21:15	04:51   21:49	
19	08:23   16:37	07:31   17:37	06:26   18:29	17:34 (Rep 10)   06:13 24 17:58 (Rep 10)   20:25	19:13 (Rep 11)   05:15 21 19:34 (Rep 11)   21:17	04:51   21:49	
20	08:22   16:39	07:29   17:39	06:24   18:31	17:33 (Rep 10)   06:11 25 17:58 (Rep 10)   20:27	19:14 (Rep 11)   05:14 19 19:33 (Rep 11)   21:19	04:51   21:50	
21	08:21   16:41	07:26   17:40	06:22   18:33	17:33 (Rep 10)   06:09 25 17:58 (Rep 10)   20:29	19:15 (Rep 11)   05:12 16 19:31 (Rep 11)   21:20	04:52   21:50	
22	08:19   16:43	07:24   17:42	06:19   18:35	17:33 (Rep 10)   06:07 25 17:58 (Rep 10)   20:30	19:17 (Rep 11)   05:11 12 19:29 (Rep 11)   21:22	04:52   21:50	
23	08:18   16:44	07:22   17:44	06:17   18:36	17:33 (Rep 10)   06:04 25 17:58 (Oerzen 1)   20:32	19:18 (Rep 11)   05:10 21 21:23	04:52   21:50	
24	08:17   16:46	07:20   17:46	06:14   18:38	17:33 (Rep 10)   06:02 27 18:00 (Oerzen 1)   20:34	19:19 (Rep 11)   05:08 21 21:24	04:52   21:51	
25	08:15   16:48	07:18   17:48	06:12   18:40	17:33 (Rep 10)   06:00 28 18:01 (Oerzen 1)   20:36	19:20 (Rep 11)   05:07 21 21:26	04:53   21:51	
26	08:14   16:50	07:16   17:50	06:10   18:42	17:32 (Oerzen 1)   05:58 30 18:02 (Oerzen 1)   20:38	19:21 (Rep 11)   05:06 21 21:27	04:53   21:51	
27	08:13   16:52	07:13   17:52	06:07   18:44	17:30 (Oerzen 1)   05:56 32 18:02 (Oerzen 1)   20:39	19:22 (Rep 11)   05:05 21 21:29	04:53   21:50	
28	08:11   16:54	07:11   17:54	06:05   18:45	17:29 (Oerzen 1)   05:54 34 18:03 (Oerzen 1)   20:41	19:23 (Rep 11)   05:04 21 21:30	04:54   21:50	
29	08:10   16:56		07:02   19:47	18:28 (Oerzen 1)   05:52 36 19:04 (Oerzen 1)   20:43	19:24 (Rep 11)   05:03 21 21:31	04:55   21:50	
30	08:08   16:58		07:00   19:49	18:27 (Oerzen 1)   05:50 37 19:04 (Oerzen 1)   20:45	19:25 (Rep 11)   05:02 21 21:33	04:55   21:50	
31	08:06   16:59		06:58   19:51	18:27 (Oerzen 1)   05:49 37 19:04 (Oerzen 1)   20:45	19:26 (Rep 11)   05:01 21 21:34	04:55   21:50	
	Sonnenscheinstunden	253	275	367	419	491	506
	astr.max.mögl.Beschattung		547	942	811		

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s19 - Oerzen, Westerheide 22

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember	
1	04:56 21:50	05:34 21:16	06:27 20:11	18:28 (Oerzen 1) 19:37 (Rep 11)   18:58	07:19 18:58	07:16 16:49	08:09 16:06
2	04:57 21:49	05:36 21:14	06:29 20:08	18:26 (Oerzen 1) 19:36 (Rep 11)   18:56	07:21 18:56	17:10 (Oerzen 2) 17:24 (Oerzen 2)   16:47	08:11 16:06
3	04:57 21:49	05:38 21:12	06:31 20:06	18:24 (Oerzen 1) 19:35 (Rep 11)   18:54	07:23 18:54	17:07 (Oerzen 2) 17:27 (Oerzen 2)   16:45	08:12 16:05
4	04:58 21:48	05:39 21:10	06:32 20:04	18:23 (Oerzen 1) 19:34 (Rep 11)   18:51	07:24 18:51	17:04 (Oerzen 2) 17:28 (Oerzen 2)   16:44	08:14 16:04
5	04:59 21:48	05:41 21:08	06:34 20:01	18:23 (Oerzen 1) 19:32 (Rep 11)   18:49	07:26 18:49	17:02 (Oerzen 2) 17:30 (Oerzen 2)   16:42	08:15 16:04
6	05:00 21:47	05:43 21:07	06:36 19:59	18:21 (Oerzen 1) 19:29 (Rep 11)   18:46	07:28 18:46	17:00 (Oerzen 2) 17:42 (Oerzen 3)   16:40	08:16 16:03
7	05:01 21:47	05:44 21:05	06:38 19:56	18:21 (Oerzen 1) 19:25 (Rep 11)   18:44	07:30 18:44	16:59 (Oerzen 2) 17:45 (Oerzen 3)   16:38	08:18 16:03
8	05:02 21:46	05:46 21:03	06:39 19:54	18:20 (Oerzen 1) 18:58 (Oerzen 1)   18:42	07:31 18:42	16:58 (Oerzen 2) 17:46 (Oerzen 3)   16:36	08:19 16:02
9	05:03 21:45	05:48 21:01	06:41 19:52	18:19 (Oerzen 1) 18:57 (Oerzen 1)   18:39	07:33 18:39	16:57 (Oerzen 2) 17:47 (Oerzen 3)   16:35	08:20 16:02
10	05:04 21:44	05:49 20:59	06:43 19:49	18:19 (Oerzen 1) 18:57 (Oerzen 1)   18:37	07:35 18:37	16:55 (Oerzen 2) 17:47 (Oerzen 3)   16:33	08:21 16:02
11	05:05 21:44	05:51 20:57	06:44 19:47	18:19 (Oerzen 1) 18:57 (Oerzen 1)   18:35	07:37 18:35	16:55 (Oerzen 2) 17:48 (Oerzen 3)   16:31	08:23 16:01
12	05:06 21:43	05:53 20:55	06:46 19:44	18:18 (Oerzen 1) 18:56 (Oerzen 1)   18:32	07:39 18:32	16:54 (Oerzen 2) 17:48 (Oerzen 3)   16:29	08:24 16:01
13	05:07 21:42	05:55 20:53	06:48 19:42	18:18 (Oerzen 1) 18:55 (Oerzen 1)   18:30	07:40 18:30	16:54 (Oerzen 2) 17:48 (Oerzen 3)   16:28	08:25 16:01
14	05:08 21:41	05:56 20:51	06:50 19:40	18:19 (Oerzen 1) 18:55 (Oerzen 1)   18:28	07:42 18:28	16:54 (Oerzen 2) 17:48 (Oerzen 3)   16:26	08:26 16:01
15	05:10 21:40	05:58 20:49	06:51 19:37	18:18 (Oerzen 1) 18:53 (Oerzen 1)   18:25	07:44 18:25	16:54 (Oerzen 2) 17:47 (Oerzen 3)   16:25	08:27 16:01
16	05:11 21:39	06:00 20:46	06:53 19:35	18:19 (Oerzen 1) 18:52 (Oerzen 1)   18:23	07:46 18:23	16:54 (Oerzen 2) 17:47 (Oerzen 3)   16:23	08:28 16:01
17	05:12 21:38	06:01 20:44	06:55 19:32	18:20 (Oerzen 1) 18:51 (Oerzen 1)   18:21	07:48 18:21	16:54 (Oerzen 2) 17:46 (Oerzen 3)   16:22	08:28 16:02
18	05:14 21:36	06:03 20:42	06:56 19:30	18:20 (Oerzen 1) 18:49 (Oerzen 1)   18:19	07:50 18:19	16:54 (Oerzen 2) 17:45 (Oerzen 3)   16:20	08:29 16:02
19	05:15 21:35	06:05 20:40	06:58 19:27	18:20 (Rep 10) 18:47 (Oerzen 1)   18:16	07:51 18:16	16:55 (Oerzen 2) 17:44 (Oerzen 3)   16:19	08:30 16:02
20	05:16 21:34	06:07 20:38	19:26 (Rep 11) 19:31 (Rep 11)   19:25	07:00 19:25	18:19 (Rep 10) 18:45 (Oerzen 1)   18:14	16:55 (Oerzen 2) 17:43 (Oerzen 3)   16:18	08:31 16:02
21	05:18 21:33	06:08 20:36	19:22 (Rep 11) 19:34 (Rep 11)   19:23	07:02 19:23	18:19 (Rep 10) 18:44 (Rep 10)   18:12	16:55 (Oerzen 2) 17:40 (Oerzen 3)   16:16	08:31 16:03
22	05:19 21:31	06:10 20:33	19:20 (Rep 11) 19:36 (Rep 11)   19:20	07:03 19:20	18:18 (Rep 10) 18:43 (Rep 10)   18:10	16:56 (Oerzen 2) 17:36 (Oerzen 3)   16:15	08:32 16:03
23	05:21 21:30	06:12 20:31	19:17 (Rep 11) 19:37 (Rep 11)   19:18	07:05 19:18	18:17 (Rep 10) 18:43 (Rep 10)   18:08	16:57 (Oerzen 2) 17:25 (Oerzen 2)   16:14	08:32 16:04
24	05:22 21:28	06:13 20:29	19:16 (Rep 11) 19:38 (Rep 11)   19:15	07:07 19:15	18:18 (Rep 10) 18:42 (Rep 10)   18:06	16:59 (Oerzen 2) 17:23 (Oerzen 2)   16:13	08:33 16:04
25	05:24 21:27	06:15 20:27	19:16 (Rep 11) 19:39 (Rep 11)   19:13	07:09 19:13	18:17 (Rep 10) 18:41 (Rep 10)   17:03	16:01 (Oerzen 2) 16:21 (Oerzen 2)   16:12	08:33 16:05
26	05:25 21:25	06:17 20:24	19:14 (Rep 11) 19:39 (Rep 11)   19:10	07:10 19:10	18:18 (Rep 10) 18:40 (Rep 10)   17:01	16:03 (Oerzen 2) 16:18 (Oerzen 2)   16:11	08:33 16:06
27	05:27 21:24	06:19 20:22	19:14 (Rep 11) 19:39 (Rep 11)   19:08	07:12 19:08	18:18 (Rep 10) 18:39 (Rep 10)   16:59	16:08 (Oerzen 2) 16:13 (Oerzen 2)   16:10	08:34 16:06
28	05:28 21:22	06:20 20:20	19:13 (Rep 11) 19:39 (Rep 11)   19:06	07:14 19:06	18:20 (Rep 10) 18:37 (Rep 10)   16:57	08:05 16:09	08:34 16:07
29	05:30 21:21	06:22 20:18	18:35 (Oerzen 1) 19:39 (Rep 11)   19:03	07:16 19:03	18:20 (Rep 10) 18:34 (Rep 10)   16:55	08:06 16:08	08:34 16:08
30	05:31 21:19	06:24 20:15	18:32 (Oerzen 1) 19:39 (Rep 11)   19:01	07:17 19:01	18:23 (Rep 10) 18:31 (Rep 10)   16:53	08:08 16:07	08:34 16:09
31	05:33 21:17	06:25 20:13	18:30 (Oerzen 1) 19:38 (Rep 11)	07:14 19:38 (Rep 11)	16:51	08:34	16:10
Sonnenscheinstunden	509	458	382	329	261	237	
astr.max.mögl.Beschattung		311	1008	1017			

**Tabellen-Layout: Die Daten für jeden Tag 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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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s20 - Oerzen, Westerheide 28

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34	08:05	07:09	16:14 (Oerzen 2)   06:55	18:26 (Oerzen 1)   05:48	04:59
	16:11	17:01	17:56	59   17:13 (Oerzen 3)   19:53	58   19:24 (Rep 9)   20:47	21:35
2	08:34	08:03	07:07	16:14 (Oerzen 2)   06:53	18:25 (Oerzen 1)   05:46	04:59
	16:12	17:03	17:58	59   17:13 (Oerzen 3)   19:55	59   19:24 (Rep 9)   20:48	21:36
3	08:34	08:02	07:04	16:14 (Oerzen 2)   06:50	18:25 (Oerzen 1)   05:44	04:58
	16:14	17:05	18:00	58   17:12 (Oerzen 3)   19:56	59   19:24 (Rep 9)   20:50	21:37
4	08:33	08:00	07:02	16:14 (Oerzen 2)   06:48	18:24 (Oerzen 1)   05:42	04:57
	16:15	17:07	18:01	57   17:11 (Oerzen 3)   19:58	59   19:23 (Rep 9)   20:52	21:39
5	08:33	07:58	07:00	16:15 (Oerzen 2)   06:46	18:24 (Oerzen 1)   05:40	04:56
	16:16	17:09	18:03	55   17:10 (Oerzen 3)   20:00	59   19:23 (Rep 9)   20:54	21:40
6	08:33	07:56	06:57	16:15 (Oerzen 2)   06:43	18:24 (Oerzen 1)   05:38	04:55
	16:17	17:11	18:05	53   17:08 (Oerzen 3)   20:02	58   19:22 (Rep 9)   20:55	21:41
7	08:32	07:54	06:55	16:16 (Oerzen 2)   06:41	18:23 (Oerzen 1)   05:36	04:55
	16:19	17:13	18:07	51   17:07 (Oerzen 3)   20:04	57   19:20 (Rep 9)   20:57	21:42
8	08:32	07:53	06:53	16:16 (Oerzen 2)   06:39	18:24 (Oerzen 1)   05:34	04:54
	16:20	17:15	18:09	44   17:03 (Oerzen 3)   20:05	68   19:36 (Rep 11)   20:59	21:43
9	08:31	07:51	06:50	16:18 (Oerzen 2)   06:36	18:24 (Oerzen 1)   05:32	04:54
	16:21	17:17	18:11	31   16:49 (Oerzen 2)   20:07	68   19:38 (Rep 11)   21:01	21:43
10	08:31	07:49	06:48	16:20 (Oerzen 2)   06:34	18:24 (Oerzen 1)   05:30	04:53
	16:23	17:19	18:13	27   16:47 (Oerzen 2)   20:09	59   19:39 (Rep 11)   21:02	21:44
11	08:30	07:47	06:46	16:21 (Oerzen 2)   06:32	18:24 (Oerzen 1)   05:28	04:53
	16:24	17:21	18:15	24   16:45 (Oerzen 2)   20:11	61   19:40 (Rep 11)   21:04	21:45
12	08:29	07:45	06:43	16:24 (Oerzen 2)   06:29	18:25 (Oerzen 1)   05:27	04:52
	16:26	17:23	18:16	18   16:42 (Oerzen 2)   20:13	61   19:41 (Rep 11)   21:06	21:46
13	08:28	07:43	06:41	16:28 (Oerzen 2)   06:27	18:26 (Oerzen 1)   05:25	04:52
	16:27	17:25	18:18	8   16:36 (Oerzen 2)   20:14	60   19:42 (Rep 11)   21:07	21:46
14	08:28	07:41	16:31 (Oerzen 2)   06:38	17:44 (Rep 10)   06:25	18:26 (Oerzen 1)   05:23	04:52
	16:29	17:27	11   16:42 (Oerzen 2)   18:20	7   17:51 (Rep 10)   20:16	59   19:41 (Rep 11)   21:09	21:47
15	08:27	07:39	16:26 (Oerzen 2)   06:36	17:41 (Rep 10)   06:22	18:28 (Oerzen 1)   05:22	04:52
	16:31	17:29	19   16:45 (Oerzen 2)   18:22	14   17:55 (Rep 10)   20:18	56   19:41 (Rep 11)   21:11	21:48
16	08:26	07:37	16:24 (Oerzen 2)   06:34	17:38 (Rep 10)   06:20	18:29 (Oerzen 1)   05:20	04:51
	16:32	17:31	23   16:47 (Oerzen 2)   18:24	18   17:56 (Rep 10)   20:20	53   19:41 (Rep 11)   21:12	21:48
17	08:25	07:35	16:22 (Oerzen 2)   06:31	17:37 (Rep 10)   06:18	18:31 (Oerzen 1)   05:18	04:51
	16:34	17:33	27   16:49 (Oerzen 2)   18:26	21   17:58 (Rep 10)   20:22	49   19:41 (Rep 11)   21:14	21:49
18	08:24	07:33	16:21 (Oerzen 2)   06:29	17:35 (Rep 10)   06:15	18:33 (Oerzen 1)   05:17	04:51
	16:36	17:35	30   16:51 (Oerzen 2)   18:27	23   17:58 (Rep 10)   20:23	43   19:40 (Rep 11)   21:15	21:49
19	08:23	07:31	16:19 (Oerzen 2)   06:26	17:34 (Rep 10)   06:13	18:39 (Oerzen 1)   05:15	04:51
	16:37	17:37	38   17:03 (Oerzen 3)   18:29	25   17:59 (Rep 10)   20:25	32   19:40 (Rep 11)   21:17	21:50
20	08:22	07:29	16:18 (Oerzen 2)   06:24	17:33 (Rep 10)   06:11	19:13 (Rep 11)   05:14	04:51
	16:39	17:39	48   17:07 (Oerzen 3)   18:31	26   17:59 (Rep 10)   20:27	26   19:39 (Rep 11)   21:19	21:50
21	08:21	07:26	16:17 (Oerzen 2)   06:22	17:33 (Rep 10)   06:09	19:14 (Rep 11)   05:12	04:52
	16:41	17:40	52   17:09 (Oerzen 3)   18:33	26   17:59 (Rep 10)   20:29	25   19:39 (Rep 11)   21:20	21:50
22	08:19	07:24	16:16 (Oerzen 2)   06:19	17:33 (Rep 10)   06:07	19:15 (Rep 11)   05:11	04:52
	16:43	17:42	55   17:11 (Oerzen 3)   18:35	26   17:59 (Rep 10)   20:30	23   19:38 (Rep 11)   21:22	21:50
23	08:18	07:22	16:16 (Oerzen 2)   06:17	17:32 (Rep 10)   06:04	19:16 (Rep 11)   05:10	04:52
	16:44	17:44	56   17:12 (Oerzen 3)   18:36	26   17:58 (Rep 10)   20:32	20   19:36 (Rep 11)   21:23	21:50
24	08:17	07:20	16:14 (Oerzen 2)   06:14	17:32 (Rep 10)   06:02	19:17 (Rep 11)   05:08	04:52
	16:46	17:46	58   17:12 (Oerzen 3)   18:38	26   17:58 (Rep 10)   20:34	18   19:35 (Rep 11)   21:24	21:51
25	08:15	07:18	16:14 (Oerzen 2)   06:12	17:32 (Rep 10)   06:00	19:19 (Rep 11)   05:07	04:53
	16:48	17:48	59   17:13 (Oerzen 3)   18:40	27   17:59 (Oerzen 1)   20:36	14   19:33 (Rep 11)   21:26	21:51
26	08:14	07:16	16:14 (Oerzen 2)   06:10	17:33 (Rep 10)   05:58	19:22 (Rep 11)   05:06	04:53
	16:50	17:50	59   17:13 (Oerzen 3)   18:42	28   18:01 (Oerzen 1)   20:38	8   19:30 (Rep 11)   21:27	21:51
27	08:13	07:13	16:14 (Oerzen 2)   06:07	17:32 (Oerzen 1)   05:56	05:05	04:53
	16:52	17:52	60   17:14 (Oerzen 3)   18:44	36   18:17 (Rep 9)   20:39	21:29	21:50
28	08:11	07:11	16:13 (Oerzen 2)   06:05	17:31 (Oerzen 1)   05:54	05:04	04:54
	16:54	17:54	60   17:13 (Oerzen 3)   18:45	43   18:19 (Rep 9)   20:41	21:30	21:50
29	08:10		07:02	18:30 (Oerzen 1)   05:52	05:02	04:55
	16:56		19:47	49   19:21 (Rep 9)   20:43	21:31	21:50
30	08:08		07:00	18:28 (Oerzen 1)   05:50	05:01	04:55
	16:58		19:49	55   19:23 (Rep 9)   20:45	21:33	21:50
31	08:06		06:58	18:27 (Oerzen 1)	05:00	
	17:00		19:51	57   19:24 (Rep 9)	21:34	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung		655	1077	1212		

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s20 - Oerzen, Westerheide 28

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	October	November	December
1	04:56 21:50	05:35 21:16	06:27 20:11	18:23 (Oerzen 1)   07:19 19:39 (Rep 11)   18:58	17:05 (Oerzen 2)   07:16 17:19 (Oerzen 2)   16:49	08:09 16:06
2	04:57 21:49	05:36 21:14	06:29 20:08	18:23 (Oerzen 1)   07:21 19:38 (Rep 11)   18:56	17:01 (Oerzen 2)   07:18 17:22 (Oerzen 2)   16:47	08:11 16:06
3	04:57 21:49	05:38 21:12	06:31 20:06	18:21 (Oerzen 1)   07:23 19:35 (Rep 11)   18:54	16:59 (Oerzen 2)   07:20 17:25 (Oerzen 2)   16:45	08:12 16:05
4	04:58 21:48	05:39 21:10	06:32 20:04	18:21 (Oerzen 1)   07:24 19:33 (Rep 11)   18:51	16:56 (Oerzen 2)   07:21 17:25 (Oerzen 2)   16:44	08:14 16:04
5	04:59 21:48	05:41 21:08	06:34 20:01	18:20 (Oerzen 1)   07:26 19:28 (Rep 11)   18:49	16:54 (Oerzen 2)   07:23 17:37 (Oerzen 3)   16:42	08:15 16:04
6	05:00 21:47	05:43 21:07	06:36 19:59	18:19 (Oerzen 1)   07:28 19:17 (Rep 9)   18:46	16:53 (Oerzen 2)   07:25 17:41 (Oerzen 3)   16:40	08:16 16:03
7	05:01 21:47	05:44 21:05	06:38 19:56	18:19 (Oerzen 1)   07:30 19:18 (Rep 9)   18:44	16:51 (Oerzen 2)   07:27 17:43 (Oerzen 3)   16:38	08:18 16:03
8	05:02 21:46	05:46 21:03	06:39 19:54	18:19 (Oerzen 1)   07:31 19:18 (Rep 9)   18:42	16:50 (Oerzen 2)   07:29 17:45 (Oerzen 3)   16:36	08:19 16:02
9	05:03 21:45	05:48 21:01	06:41 19:52	18:18 (Oerzen 1)   07:33 19:17 (Rep 9)   18:39	16:50 (Oerzen 2)   07:31 17:46 (Oerzen 3)   16:35	08:20 16:02
10	05:04 21:44	05:49 20:59	06:43 19:49	18:18 (Oerzen 1)   07:35 19:17 (Rep 9)   18:37	16:48 (Oerzen 2)   07:33 17:45 (Oerzen 3)   16:33	08:21 16:02
11	05:05 21:44	05:51 20:57	06:44 19:47	18:19 (Oerzen 1)   07:37 19:17 (Rep 9)   18:35	16:47 (Oerzen 2)   07:35 17:46 (Oerzen 3)   16:31	08:23 16:02
12	05:06 21:43	05:53 20:55	06:46 19:44	18:18 (Oerzen 1)   07:39 19:16 (Rep 9)   18:32	16:47 (Oerzen 2)   07:37 17:46 (Oerzen 3)   16:29	08:24 16:01
13	05:07 21:42	05:55 20:53	06:48 19:42	18:19 (Oerzen 1)   07:40 19:14 (Rep 9)   18:30	16:47 (Oerzen 2)   07:38 17:46 (Oerzen 3)   16:28	08:25 16:01
14	05:08 21:41	05:56 20:51	06:50 19:40	18:20 (Oerzen 1)   07:42 19:12 (Rep 9)   18:28	16:46 (Oerzen 2)   07:40 17:46 (Oerzen 3)   16:26	08:26 16:01
15	05:10 21:40	05:58 20:49	06:51 19:37	18:20 (Oerzen 1)   07:44 19:09 (Rep 9)   18:25	16:46 (Oerzen 2)   07:42 17:46 (Oerzen 3)   16:25	08:27 16:01
16	05:11 21:39	06:00 20:46	06:53 19:35	18:21 (Oerzen 1)   07:46 19:07 (Rep 9)   18:23	16:46 (Oerzen 2)   07:44 17:45 (Oerzen 3)   16:23	08:28 16:01
17	05:12 21:38	06:01 20:44	19:28 (Rep 11)   06:55 19:37 (Rep 11)   19:32	18:21 (Rep 10)   07:48 18:50 (Oerzen 1)   18:21	16:47 (Oerzen 2)   07:46 17:45 (Oerzen 3)   16:22	08:28 16:02
18	05:14 21:36	06:03 20:42	19:24 (Rep 11)   06:56 19:39 (Rep 11)   19:30	18:20 (Rep 10)   07:50 18:47 (Oerzen 1)   18:19	16:47 (Oerzen 2)   07:48 17:44 (Oerzen 3)   16:20	08:29 16:02
19	05:15 21:35	06:05 20:40	19:22 (Rep 11)   06:58 19:41 (Rep 11)   19:27	18:19 (Rep 10)   07:51 18:44 (Rep 10)   18:16	16:47 (Oerzen 2)   07:49 17:43 (Oerzen 3)   16:19	08:30 16:02
20	05:16 21:34	06:07 20:38	19:21 (Rep 11)   07:00 19:42 (Rep 11)   19:25	18:18 (Rep 10)   07:53 18:45 (Rep 10)   18:14	16:48 (Oerzen 2)   07:51 17:41 (Oerzen 3)   16:18	08:31 16:02
21	05:18 21:33	06:08 20:36	19:19 (Rep 11)   07:02 19:42 (Rep 11)   19:23	18:18 (Rep 10)   07:55 18:45 (Rep 10)   18:12	16:47 (Oerzen 2)   07:53 17:39 (Oerzen 3)   16:16	08:31 16:03
22	05:19 21:31	06:10 20:33	19:19 (Rep 11)   07:03 19:43 (Rep 11)   19:20	18:17 (Rep 10)   07:57 18:44 (Rep 10)   18:10	16:48 (Oerzen 2)   07:55 17:36 (Oerzen 3)   16:15	08:32 16:03
23	05:21 21:30	06:12 20:31	19:17 (Rep 11)   07:05 19:43 (Rep 11)   19:18	18:17 (Rep 10)   07:59 18:43 (Rep 10)   18:08	16:49 (Oerzen 2)   07:56 17:22 (Oerzen 2)   16:14	08:32 16:04
24	05:22 21:28	06:13 20:29	18:41 (Oerzen 1)   07:07 19:44 (Rep 11)   19:15	18:18 (Rep 10)   08:01 18:43 (Rep 10)   18:06	16:50 (Oerzen 2)   07:58 17:20 (Oerzen 2)   16:13	08:33 16:04
25	05:24 21:27	06:15 20:27	18:37 (Oerzen 1)   07:09 19:44 (Rep 11)   19:13	18:17 (Rep 10)   07:03 18:41 (Rep 10)   17:03	15:52 (Oerzen 2)   08:00 16:18 (Oerzen 2)   16:12	08:33 16:05
26	05:25 21:25	06:17 20:24	18:33 (Oerzen 1)   07:10 19:43 (Rep 11)   19:10	18:18 (Rep 10)   07:04 18:40 (Rep 10)   17:01	15:54 (Oerzen 2)   08:01 16:16 (Oerzen 2)   16:11	08:33 16:06
27	05:27 21:24	06:19 20:22	18:31 (Oerzen 1)   07:12 19:43 (Rep 11)   19:08	18:19 (Rep 10)   07:06 18:39 (Rep 10)   16:59	15:56 (Oerzen 2)   08:03 16:14 (Oerzen 2)   16:10	08:34 16:06
28	05:28 21:22	06:20 20:20	18:29 (Oerzen 1)   07:14 19:43 (Rep 11)   19:06	18:21 (Rep 10)   07:08 18:37 (Rep 10)   16:57	16:01 (Oerzen 2)   08:05 16:10 (Oerzen 2)   16:09	08:34 16:07
29	05:30 21:21	06:22 20:18	18:27 (Oerzen 1)   07:16 19:42 (Rep 11)   19:03	18:22 (Rep 10)   07:10 18:33 (Rep 10)   16:55	08:06 16:08	08:34 16:08
30	05:31 21:19	06:24 20:15	18:26 (Oerzen 1)   07:17 19:41 (Rep 11)   19:01	07:12 16:53	08:08 16:07	08:34 16:09
31	05:33 21:17	06:26 20:13	18:25 (Oerzen 1)   19:41 (Rep 11)	07:14 16:51	08:34 16:10	08:34 16:10
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung		555	1219	1210		

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s21 - Oerzen, Zum Hasel 5

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai		Juni
1	08:34	08:05	07:09	06:55	05:48		05:00 20:22 (Oerzen 4)
	16:11	17:02	17:56	19:53	20:47		21:35 9 20:31 (Oerzen 4)
2	08:34	08:03	07:07	06:53	05:46		04:59 20:24 (Oerzen 4)
	16:13	17:03	17:58	19:55	20:48		21:36 6 20:30 (Oerzen 4)
3	08:34	08:01	07:04	06:50	05:44		04:58
	16:14	17:05	18:00	19:56	20:50		21:37
4	08:33	08:00	07:02	06:48	05:42		04:57
	16:15	17:07	18:01	19:58	20:52		21:38
5	08:33	07:58	07:00	06:46	05:40		04:56
	16:16	17:09	18:03	20:00	20:54		21:40
6	08:33	07:56	06:57	06:43	05:38		04:56
	16:17	17:11	18:05	20:02	20:55		21:41
7	08:32	07:54	06:55	06:41	05:36	20:22 (Oerzen 4)	04:55
	16:19	17:13	18:07	20:04	20:57	5 20:27 (Oerzen 4)	21:42
8	08:32	07:53	06:53	06:39	05:34	20:19 (Oerzen 4)	04:54
	16:20	17:15	18:09	20:05	20:59	9 20:28 (Oerzen 4)	21:42
9	08:31	07:51	06:50	06:36	05:32	20:17 (Oerzen 4)	04:54
	16:22	17:17	18:11	20:07	21:00	13 20:30 (Oerzen 4)	21:43
10	08:31	07:49	06:48	06:34	05:30	20:17 (Oerzen 4)	04:53
	16:23	17:19	18:13	20:09	21:02	15 20:32 (Oerzen 4)	21:44
11	08:30	07:47	06:46	06:32	05:29	20:15 (Oerzen 4)	04:53
	16:24	17:21	18:15	20:11	21:04	18 20:33 (Oerzen 4)	21:45
12	08:29	07:45	06:43	06:29	05:27	20:15 (Oerzen 4)	04:53
	16:26	17:23	18:16	20:13	21:06	20 20:35 (Oerzen 4)	21:46
13	08:28	07:43	06:41	06:27	05:25	20:14 (Oerzen 4)	04:52
	16:28	17:25	18:18	20:14	21:07	22 20:36 (Oerzen 4)	21:46
14	08:28	07:41	06:38	06:25	05:23	20:13 (Oerzen 4)	04:52
	16:29	17:27	18:20	20:16	21:09	23 20:36 (Oerzen 4)	21:47
15	08:27	07:39	06:36	06:22	05:22	20:14 (Oerzen 4)	04:52
	16:31	17:29	18:22	20:18	21:11	23 20:37 (Oerzen 4)	21:48
16	08:26	07:37	06:34	06:20	05:20	20:13 (Oerzen 4)	04:52
	16:32	17:31	18:24	20:20	21:12	24 20:37 (Oerzen 4)	21:48
17	08:25	07:35	06:31	06:18	05:19	20:13 (Oerzen 4)	04:52
	16:34	17:33	18:26	20:22	21:14	24 20:37 (Oerzen 4)	21:49
18	08:24	07:33	06:29	06:16	05:17	20:14 (Oerzen 4)	04:51
	16:36	17:35	18:27	20:23	21:15	24 20:38 (Oerzen 4)	21:49
19	08:23	07:31	06:27	06:13	05:15	20:13 (Oerzen 4)	04:51
	16:37	17:37	18:29	20:25	21:17	24 20:37 (Oerzen 4)	21:49
20	08:22	07:29	06:24	06:11	05:14	20:14 (Oerzen 4)	04:52
	16:39	17:39	18:31	20:27	21:18	23 20:37 (Oerzen 4)	21:50
21	08:20	07:26	06:22	06:09	05:13	20:14 (Oerzen 4)	04:52
	16:41	17:40	18:33	20:29	21:20	23 20:37 (Oerzen 4)	21:50
22	08:19	07:24	06:19	06:07	05:11	20:14 (Oerzen 4)	04:52
	16:43	17:42	18:35	20:30	21:21	22 20:36 (Oerzen 4)	21:50
23	08:18	07:22	06:17	06:04	05:10	20:14 (Oerzen 4)	04:52
	16:45	17:44	18:36	20:32	21:23	22 20:36 (Oerzen 4)	21:50
24	08:17	07:20	06:14	06:02	05:09	20:15 (Oerzen 4)	04:52
	16:46	17:46	18:38	20:34	21:24	21 20:36 (Oerzen 4)	21:50
25	08:15	07:18	06:12	06:00	05:07	20:16 (Oerzen 4)	04:53
	16:48	17:48	18:40	20:36	21:26	20 20:36 (Oerzen 4)	21:51
26	08:14	07:16	06:10	05:58	05:06	20:16 (Oerzen 4)	04:53
	16:50	17:50	18:42	20:38	21:27	20 20:36 (Oerzen 4)	21:51
27	08:13	07:13	06:07	05:56	05:05	20:17 (Oerzen 4)	04:54
	16:52	17:52	18:44	20:39	21:29	18 20:35 (Oerzen 4)	21:50
28	08:11	07:11	06:05	05:54	05:04	20:18 (Oerzen 4)	04:54
	16:54	17:54	18:46	20:41	21:30	17 20:35 (Oerzen 4)	21:50
29	08:10		07:02	05:52	05:03	20:19 (Oerzen 4)	04:55
	16:56		19:47	20:43	21:31	15 20:34 (Oerzen 4)	21:50
30	08:08		07:00	05:50	05:02	20:19 (Oerzen 4)	04:55
	16:58		19:49	20:45	21:33	14 20:33 (Oerzen 4)	21:50
31	08:06		06:58		05:01	20:20 (Oerzen 4)	
	17:00		19:51		21:34	12 20:32 (Oerzen 4)	
Sonnenscheinstunden	253	275	367	419	491		506
astr.max.mögl.Beschattung					471		15

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s21 - Oerzen, Zum Hasel 5

### Annahmen für Schattenwurfberechnung

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

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

Juli		August		September		Oktober		November		Dezember	
1	04:56	05:35	20:26 (Oerzen 4)	06:27	07:19	07:16	08:09				
	21:50	21:16	19 20:45 (Oerzen 4)	20:11	18:58	16:49	16:06				
2	04:57	05:36	20:26 (Oerzen 4)	06:29	07:21	07:18	08:11				
	21:49	21:14	17 20:43 (Oerzen 4)	20:08	18:56	16:47	16:06				
3	04:57	05:38	20:27 (Oerzen 4)	06:31	07:23	07:20	08:12				
	21:49	21:12	15 20:42 (Oerzen 4)	20:06	18:54	16:45	16:05				
4	04:58	05:39	20:28 (Oerzen 4)	06:32	07:24	07:21	08:14				
	21:48	21:10	11 20:39 (Oerzen 4)	20:04	18:51	16:44	16:04				
5	04:59	05:41	20:30 (Oerzen 4)	06:34	07:26	07:23	08:15				
	21:48	21:08	8 20:38 (Oerzen 4)	20:01	18:49	16:42	16:04				
6	05:00	05:43	20:33 (Oerzen 4)	06:36	07:28	07:25	08:16				
	21:47	21:07	3 20:36 (Oerzen 4)	19:59	18:46	16:40	16:03				
7	05:01	05:44		06:38	07:30	07:27	08:18				
	21:47	21:05		19:56	18:44	16:38	16:03				
8	05:02	05:46		06:39	07:31	07:29	08:19				
	21:46	21:03		19:54	18:42	16:36	16:02				
9	05:03	05:48		06:41	07:33	07:31	08:20				
	21:45	21:01		19:52	18:39	16:35	16:02				
10	05:04	20:33 (Oerzen 4)	05:50	06:43	07:35	07:33	08:21				
	21:44	3 20:36 (Oerzen 4)	20:59	19:49	18:37	16:33	16:02				
11	05:05	20:31 (Oerzen 4)	05:51	06:44	07:37	07:35	08:23				
	21:44	7 20:38 (Oerzen 4)	20:57	19:47	18:35	16:31	16:02				
12	05:06	20:29 (Oerzen 4)	05:53	06:46	07:39	07:36	08:24				
	21:43	11 20:40 (Oerzen 4)	20:55	19:44	18:32	16:30	16:01				
13	05:07	20:28 (Oerzen 4)	05:55	06:48	07:40	07:38	08:25				
	21:42	13 20:41 (Oerzen 4)	20:53	19:42	18:30	16:28	16:01				
14	05:09	20:27 (Oerzen 4)	05:56	06:50	07:42	07:40	08:26				
	21:41	15 20:42 (Oerzen 4)	20:51	19:40	18:28	16:26	16:01				
15	05:10	20:27 (Oerzen 4)	05:58	06:51	07:44	07:42	08:27				
	21:40	16 20:43 (Oerzen 4)	20:49	19:37	18:26	16:25	16:01				
16	05:11	20:27 (Oerzen 4)	06:00	06:53	07:46	07:44	08:27				
	21:39	17 20:44 (Oerzen 4)	20:46	19:35	18:23	16:23	16:01				
17	05:12	20:26 (Oerzen 4)	06:01	06:55	07:48	07:46	08:28				
	21:37	19 20:45 (Oerzen 4)	20:44	19:32	18:21	16:22	16:02				
18	05:14	20:25 (Oerzen 4)	06:03	06:56	07:50	07:47	08:29				
	21:36	20 20:45 (Oerzen 4)	20:42	19:30	18:19	16:21	16:02				
19	05:15	20:25 (Oerzen 4)	06:05	06:58	07:51	07:49	08:30				
	21:35	20 20:45 (Oerzen 4)	20:40	19:27	18:17	16:19	16:02				
20	05:16	20:25 (Oerzen 4)	06:07	07:00	07:53	07:51	08:30				
	21:34	22 20:47 (Oerzen 4)	20:38	19:25	18:14	16:18	16:02				
21	05:18	20:25 (Oerzen 4)	06:08	07:02	07:55	07:53	08:31				
	21:33	22 20:47 (Oerzen 4)	20:36	19:23	18:12	16:17	16:03				
22	05:19	20:24 (Oerzen 4)	06:10	07:03	07:57	07:55	08:32				
	21:31	23 20:47 (Oerzen 4)	20:33	19:20	18:10	16:15	16:03				
23	05:21	20:24 (Oerzen 4)	06:12	07:05	07:59	07:56	08:32				
	21:30	24 20:48 (Oerzen 4)	20:31	19:18	18:08	16:14	16:04				
24	05:22	20:24 (Oerzen 4)	06:13	07:07	08:01	07:58	08:33				
	21:28	24 20:48 (Oerzen 4)	20:29	19:15	18:06	16:13	16:04				
25	05:24	20:23 (Oerzen 4)	06:15	07:09	07:03	08:00	08:33				
	21:27	24 20:47 (Oerzen 4)	20:27	19:13	17:04	16:12	16:05				
26	05:25	20:24 (Oerzen 4)	06:17	07:10	07:04	08:01	08:33				
	21:25	24 20:48 (Oerzen 4)	20:24	19:10	17:01	16:11	16:06				
27	05:27	20:24 (Oerzen 4)	06:19	07:12	07:06	08:03	08:33				
	21:24	23 20:47 (Oerzen 4)	20:22	19:08	16:59	16:10	16:07				
28	05:28	20:24 (Oerzen 4)	06:20	07:14	07:08	08:05	08:34				
	21:22	24 20:48 (Oerzen 4)	20:20	19:06	16:57	16:09	16:07				
29	05:30	20:24 (Oerzen 4)	06:22	07:16	07:10	08:06	08:34				
	21:21	23 20:47 (Oerzen 4)	20:18	19:03	16:55	16:08	16:08				
30	05:31	20:25 (Oerzen 4)	06:24	07:17	07:12	08:08	08:34				
	21:19	22 20:47 (Oerzen 4)	20:15	19:01	16:53	16:07	16:09				
31	05:33	20:25 (Oerzen 4)	06:26		07:14		08:34				
	21:17	21 20:46 (Oerzen 4)	20:13		16:51		16:10				
	Sonnenscheinstunden	509	458	382	329	262	237				
	astr.max.mögl.Beschattung	417	73								

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
	Sonnenuntergang (SS:MM)			

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s22 - Oerzen, Zum Hasel 10

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April		Mai		Juni			
1	08:34 16:11	08:05 17:01	07:09 17:56	06:55 19:53		05:48 20:47	25	19:45 (Oerzen 3) 20:10 (Oerzen 3)	05:00 21:35	25	20:25 (Rep 10) 20:50 (Rep 10)
2	08:34 16:13	08:03 17:03	07:06 17:58	06:53 19:55		05:46 20:48	27	19:44 (Oerzen 3) 20:11 (Oerzen 3)	04:59 21:36	24	20:26 (Rep 10) 20:50 (Rep 10)
3	08:34 16:14	08:01 17:05	07:04 18:00	06:50 19:56		05:44 20:50	28	19:43 (Oerzen 3) 20:11 (Oerzen 3)	04:58 21:37	24	20:26 (Rep 10) 20:50 (Rep 10)
4	08:33 16:15	08:00 17:07	07:02 18:01	06:48 19:58		05:42 20:52	28	19:43 (Oerzen 3) 20:11 (Oerzen 3)	04:57 21:38	24	20:26 (Rep 10) 20:50 (Rep 10)
5	08:33 16:16	07:58 17:09	07:00 18:03	06:46 20:00		05:40 20:54	28	19:42 (Oerzen 3) 20:10 (Oerzen 3)	04:56 21:40	23	20:27 (Rep 10) 20:50 (Rep 10)
6	08:33 16:17	07:56 17:11	06:57 18:05	06:43 20:02		05:38 20:55	28	19:43 (Oerzen 3) 20:11 (Oerzen 3)	04:56 21:41	23	20:27 (Rep 10) 20:50 (Rep 10)
7	08:32 16:19	07:54 17:13	06:55 18:07	06:41 20:04		05:36 20:57	28	19:43 (Oerzen 3) 20:11 (Oerzen 3)	04:55 21:42	22	20:28 (Rep 10) 20:50 (Rep 10)
8	08:32 16:20	07:53 17:15	06:53 18:09	06:39 20:05		05:34 20:59	27	19:43 (Oerzen 3) 20:10 (Oerzen 3)	04:54 21:42	22	20:28 (Rep 10) 20:50 (Rep 10)
9	08:31 16:21	07:51 17:17	06:50 18:11	06:36 20:07		05:32 21:00	27	19:43 (Oerzen 3) 20:10 (Oerzen 3)	04:54 21:43	21	20:29 (Rep 10) 20:50 (Rep 10)
10	08:31 16:23	07:49 17:19	06:48 18:13	06:34 20:09		05:30 21:02	26	19:44 (Oerzen 3) 20:10 (Oerzen 3)	04:53 21:44	22	20:28 (Rep 10) 20:50 (Rep 10)
11	08:30 16:24	07:47 17:21	06:46 18:15	06:32 20:11		05:29 21:04	25	19:44 (Oerzen 3) 20:09 (Oerzen 3)	04:53 21:45	26	20:29 (Rep 10) 20:55 (Oerzen 2)
12	08:29 16:26	07:45 17:23	06:43 18:16	06:29 20:13		05:27 21:06	24	19:44 (Oerzen 3) 20:08 (Oerzen 3)	04:52 21:46	27	20:30 (Rep 10) 20:57 (Oerzen 2)
13	08:28 16:27	07:43 17:25	06:41 18:18	06:27 20:14		05:25 21:07	23	19:45 (Oerzen 3) 20:08 (Oerzen 3)	04:52 21:46	28	20:30 (Rep 10) 20:58 (Oerzen 2)
14	08:28 16:29	07:41 17:27	06:38 18:20	06:25 20:16		05:23 21:09	22	19:45 (Oerzen 3) 20:07 (Oerzen 3)	04:52 21:47	28	20:30 (Rep 10) 20:58 (Oerzen 2)
15	08:27 16:31	07:39 17:29	06:36 18:22	06:22 20:18		05:22 21:11	25	19:47 (Oerzen 3) 20:39 (Rep 10)	04:52 21:48	29	20:30 (Rep 10) 20:59 (Oerzen 2)
16	08:26 16:32	07:37 17:31	06:34 18:24	06:20 20:20		05:20 21:12	28	19:47 (Oerzen 3) 20:40 (Rep 10)	04:52 21:48	29	20:31 (Rep 10) 21:00 (Oerzen 2)
17	08:25 16:34	07:35 17:33	06:31 18:26	06:18 20:21		05:19 21:14	28	19:49 (Oerzen 3) 20:42 (Rep 10)	04:51 21:49	29	20:31 (Rep 10) 21:00 (Oerzen 2)
18	08:24 16:36	07:33 17:35	06:29 18:27	06:16 20:23		05:17 21:15	26	19:52 (Oerzen 3) 20:44 (Rep 10)	04:51 21:49	30	20:31 (Rep 10) 21:01 (Oerzen 2)
19	08:23 16:37	07:31 17:37	06:26 18:29	06:13 20:25		05:15 21:17	21	19:55 (Oerzen 3) 20:45 (Rep 10)	04:51 21:49	30	20:31 (Rep 10) 21:01 (Oerzen 2)
20	08:22 16:39	07:29 17:39	06:24 18:31	06:11 20:27		05:14 21:18	20	20:26 (Rep 10) 20:46 (Rep 10)	04:52 21:50	29	20:33 (Rep 10) 21:02 (Oerzen 2)
21	08:20 16:41	07:26 17:40	06:22 18:33	06:09 20:29		05:13 21:20	22	20:26 (Rep 10) 20:48 (Rep 10)	04:52 21:50	29	20:33 (Rep 10) 21:02 (Oerzen 2)
22	08:19 16:43	07:24 17:42	06:19 18:35	06:07 20:30		05:11 21:22	22	20:25 (Rep 10) 20:47 (Rep 10)	04:52 21:50	29	20:33 (Rep 10) 21:02 (Oerzen 2)
23	08:18 16:45	07:22 17:44	06:17 18:36	06:04 20:32		05:10 21:23	23	20:25 (Rep 10) 20:48 (Rep 10)	04:52 21:50	29	20:33 (Rep 10) 21:02 (Oerzen 2)
24	08:17 16:46	07:20 17:46	06:14 18:38	06:02 20:34		05:08 21:24	23	20:25 (Rep 10) 20:48 (Rep 10)	04:52 21:50	30	20:33 (Rep 10) 21:03 (Oerzen 2)
25	08:15 16:48	07:18 17:48	06:12 18:40	06:00 20:36	7	19:55 (Oerzen 3) 20:02 (Oerzen 3)	05:07 21:26	20:25 (Rep 10) 20:49 (Rep 10)	04:53 21:51	30	20:33 (Rep 10) 21:03 (Oerzen 2)
26	08:14 16:50	07:16 17:50	06:10 18:42	05:58 20:38	14	19:51 (Oerzen 3) 20:05 (Oerzen 3)	05:06 21:27	20:25 (Rep 10) 20:49 (Rep 10)	04:53 21:51	29	20:33 (Rep 10) 21:02 (Oerzen 2)
27	08:13 16:52	07:13 17:52	06:07 18:44	05:56 20:39	18	19:49 (Oerzen 3) 20:07 (Oerzen 3)	05:05 21:29	20:25 (Rep 10) 20:49 (Rep 10)	04:54 21:50	29	20:33 (Rep 10) 21:02 (Oerzen 2)
28	08:11 16:54	07:11 17:54	06:05 18:45	05:54 20:41	20	19:48 (Oerzen 3) 20:08 (Oerzen 3)	05:04 21:30	20:25 (Rep 10) 20:50 (Rep 10)	04:54 21:50	28	20:33 (Rep 10) 21:01 (Oerzen 2)
29	08:10 16:56		07:02 19:47	05:52 20:43	23	19:46 (Oerzen 3) 20:09 (Oerzen 3)	05:03 21:31	20:25 (Rep 10) 20:50 (Rep 10)	04:55 21:50	28	20:33 (Rep 10) 21:01 (Oerzen 2)
30	08:08 16:58		07:00 19:49	05:50 20:45	25	19:45 (Oerzen 3) 20:10 (Oerzen 3)	05:01 21:33	20:25 (Rep 10) 20:50 (Rep 10)	04:55 21:50	27	20:34 (Rep 10) 21:01 (Oerzen 2)
31	08:06 17:00		06:58 19:51				05:00 21:34	20:25 (Rep 10) 20:50 (Rep 10)			
Sonnenscheinstunden	253	275	367	419		491		506			
astr.max.mögl.Beschattung				107		776		803			

**Tabellen-Layout: Die Daten für jeden Tag 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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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s22 - Oerzen, Zum Hasel 10

### Annahmen für Schattenwurfberechnung

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

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

Juli		August		September		Oktober		November		Dezember	
1	04:56	20:33 (Rep 10)	05:35	19:55 (Oerzen 3)	06:27	07:19	07:16	08:09			
	21:50	27	21:00 (Oerzen 2)	21:16	25	20:20 (Oerzen 3)	20:11	18:58	16:49	16:06	
2	04:57	20:34 (Rep 10)	05:36	19:54 (Oerzen 3)	06:29	07:21	07:18	08:11			
	21:49	24	20:58 (Oerzen 2)	21:14	26	20:20 (Oerzen 3)	20:08	18:56	16:47	16:06	
3	04:57	20:34 (Rep 10)	05:38	19:54 (Oerzen 3)	06:31	07:23	07:20	08:12			
	21:49	21	20:55 (Rep 10)	21:12	26	20:20 (Oerzen 3)	20:06	18:54	16:45	16:05	
4	04:58	20:33 (Rep 10)	05:39	19:53 (Oerzen 3)	06:32	07:24	07:21	08:14			
	21:48	22	20:55 (Rep 10)	21:10	27	20:20 (Oerzen 3)	20:04	18:51	16:44	16:04	
5	04:59	20:33 (Rep 10)	05:41	19:53 (Oerzen 3)	06:34	07:26	07:23	08:15			
	21:48	23	20:56 (Rep 10)	21:08	28	20:21 (Oerzen 3)	20:01	18:49	16:42	16:04	
6	05:00	20:33 (Rep 10)	05:43	19:52 (Oerzen 3)	06:36	07:28	07:25	08:16			
	21:47	23	20:56 (Rep 10)	21:07	28	20:20 (Oerzen 3)	19:59	18:46	16:40	16:03	
7	05:01	20:33 (Rep 10)	05:44	19:53 (Oerzen 3)	06:38	07:30	07:27	08:18			
	21:47	24	20:57 (Rep 10)	21:05	28	20:21 (Oerzen 3)	19:56	18:44	16:38	16:03	
8	05:02	20:34 (Rep 10)	05:46	19:52 (Oerzen 3)	06:39	07:31	07:29	08:19			
	21:46	23	20:57 (Rep 10)	21:03	28	20:20 (Oerzen 3)	19:54	18:42	16:36	16:02	
9	05:03	20:34 (Rep 10)	05:48	19:52 (Oerzen 3)	06:41	07:33	07:31	08:20			
	21:45	23	20:57 (Rep 10)	21:01	28	20:20 (Oerzen 3)	19:52	18:39	16:35	16:02	
10	05:04	20:34 (Rep 10)	05:49	19:52 (Oerzen 3)	06:43	07:35	07:33	08:21			
	21:44	24	20:58 (Rep 10)	20:59	27	20:19 (Oerzen 3)	19:49	18:37	16:33	16:02	
11	05:05	20:34 (Rep 10)	05:51	19:52 (Oerzen 3)	06:44	07:37	07:35	08:23			
	21:44	24	20:58 (Rep 10)	20:57	27	20:19 (Oerzen 3)	19:47	18:35	16:31	16:02	
12	05:06	20:34 (Rep 10)	05:53	19:53 (Oerzen 3)	06:46	07:39	07:36	08:24			
	21:43	24	20:58 (Rep 10)	20:55	26	20:19 (Oerzen 3)	19:44	18:32	16:30	16:01	
13	05:07	20:34 (Rep 10)	05:55	19:53 (Oerzen 3)	06:48	07:40	07:38	08:25			
	21:42	24	20:58 (Rep 10)	20:53	24	20:17 (Oerzen 3)	19:42	18:30	16:28	16:01	
14	05:08	20:34 (Rep 10)	05:56	19:54 (Oerzen 3)	06:50	07:42	07:40	08:26			
	21:41	24	20:58 (Rep 10)	20:51	23	20:17 (Oerzen 3)	19:40	18:28	16:26	16:01	
15	05:10	20:34 (Rep 10)	05:58	19:55 (Oerzen 3)	06:51	07:44	07:42	08:27			
	21:40	24	20:58 (Rep 10)	20:49	20	20:15 (Oerzen 3)	19:37	18:25	16:25	16:01	
16	05:11	20:33 (Rep 10)	06:00	19:56 (Oerzen 3)	06:53	07:46	07:44	08:27			
	21:39	25	20:58 (Rep 10)	20:46	17	20:13 (Oerzen 3)	19:35	18:23	16:23	16:01	
17	05:12	20:34 (Rep 10)	06:01	19:59 (Oerzen 3)	06:55	07:48	07:46	08:28			
	21:37	25	20:59 (Rep 10)	20:44	12	20:11 (Oerzen 3)	19:32	18:21	16:22	16:02	
18	05:14	20:34 (Rep 10)	06:03	20:01 (Oerzen 3)	06:56	07:50	07:47	08:29			
	21:36	25	20:59 (Rep 10)	20:42	6	20:07 (Oerzen 3)	19:30	18:19	16:20	16:02	
19	05:15	20:34 (Rep 10)	06:05		06:58	07:51	07:49	08:30			
	21:35	24	20:58 (Rep 10)	20:40		19:27	18:16	16:19	16:02		
20	05:16	20:34 (Rep 10)	06:07		07:00	07:53	07:51	08:30			
	21:34	24	20:58 (Rep 10)	20:38		19:25	18:14	16:18	16:02		
21	05:18	20:36 (Rep 10)	06:08		07:02	07:55	07:53	08:31			
	21:33	22	20:58 (Rep 10)	20:36		19:23	18:12	16:17	16:03		
22	05:19	20:36 (Rep 10)	06:10		07:03	07:57	07:55	08:32			
	21:31	22	20:58 (Rep 10)	20:33		19:20	18:10	16:15	16:03		
23	05:21	20:36 (Rep 10)	06:12		07:05	07:59	07:56	08:32			
	21:30	21	20:57 (Rep 10)	20:31		19:18	18:08	16:14	16:04		
24	05:22	20:37 (Rep 10)	06:13		07:07	08:01	07:58	08:33			
	21:28	19	20:56 (Rep 10)	20:29		19:15	18:06	16:13	16:04		
25	05:24	20:03 (Oerzen 3)	06:15		07:09	07:03	08:00	08:33			
	21:27	23	20:54 (Rep 10)	20:27		19:13	17:04	16:12	16:05		
26	05:25	20:01 (Oerzen 3)	06:17		07:10	07:04	08:01	08:33			
	21:25	27	20:54 (Rep 10)	20:24		19:10	17:01	16:11	16:06		
27	05:27	19:59 (Oerzen 3)	06:19		07:12	07:06	08:03	08:33			
	21:24	28	20:52 (Rep 10)	20:22		19:08	16:59	16:10	16:06		
28	05:28	19:58 (Oerzen 3)	06:20		07:14	07:08	08:05	08:34			
	21:22	28	20:51 (Rep 10)	20:20		19:06	16:57	16:09	16:07		
29	05:30	19:57 (Oerzen 3)	06:22		07:16	07:10	08:06	08:34			
	21:21	24	20:49 (Rep 10)	20:18		19:03	16:55	16:08	16:08		
30	05:31	19:56 (Oerzen 3)	06:24		07:17	07:12	08:08	08:34			
	21:19	22	20:18 (Oerzen 3)	20:15		19:01	16:53	16:07	16:09		
31	05:33	19:55 (Oerzen 3)	06:26			07:14		08:34			
	21:17	24	20:19 (Oerzen 3)	20:13			16:51		16:10		
Sonnenscheinstunden	509		458		382	329	262	237			
astr.max.mögl.Beschattung	737		426								

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
	Sonnenuntergang (SS:MM)			

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s23 - Oerzen, Mühlenweg 10

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März		April		Mai	Juni	
1	08:34	08:05	07:09		17:13 (Oerzen 2)	06:55	18:51 (Oerzen 1)	05:48	04:59
	16:11	17:01	17:56	16	17:29 (Oerzen 3)	19:53	19:18 (Oerzen 1)	20:47	21:35
2	08:34	08:03	07:06		17:10 (Oerzen 2)	06:53	18:50 (Oerzen 1)	05:45	04:59
	16:12	17:03	17:58	21	17:31 (Oerzen 3)	19:54	19:18 (Oerzen 1)	20:48	21:36
3	08:34	08:01	07:04		17:07 (Oerzen 2)	06:50	18:50 (Oerzen 1)	05:43	04:58
	16:14	17:05	18:00	26	17:33 (Oerzen 3)	19:56	19:18 (Oerzen 1)	20:50	21:37
4	08:33	08:00	07:02		17:06 (Oerzen 2)	06:48	18:49 (Oerzen 1)	05:42	04:57
	16:15	17:07	18:01	28	17:34 (Oerzen 3)	19:58	19:18 (Oerzen 1)	20:52	21:38
5	08:33	07:58	07:00		17:04 (Oerzen 2)	06:46	18:49 (Oerzen 1)	05:40	04:56
	16:16	17:09	18:03	30	17:34 (Oerzen 3)	20:00	19:18 (Oerzen 1)	20:54	21:40
6	08:33	07:56	06:57		17:04 (Oerzen 2)	06:43	18:49 (Oerzen 1)	05:38	04:55
	16:17	17:11	18:05	31	17:35 (Oerzen 3)	20:02	19:17 (Oerzen 1)	20:55	21:41
7	08:32	07:54	06:55		17:03 (Oerzen 2)	06:41	18:49 (Oerzen 1)	05:36	04:55
	16:19	17:13	18:07	32	17:35 (Oerzen 3)	20:03	19:16 (Oerzen 1)	20:57	21:42
8	08:32	07:53	06:53		17:02 (Oerzen 2)	06:39	18:50 (Oerzen 1)	05:34	04:54
	16:20	17:15	18:09	32	17:34 (Oerzen 3)	20:05	19:16 (Oerzen 1)	20:59	21:42
9	08:31	07:51	06:50		17:02 (Oerzen 2)	06:36	18:50 (Oerzen 1)	05:32	04:54
	16:21	17:17	18:11	32	17:34 (Oerzen 3)	20:07	19:15 (Oerzen 1)	21:00	21:43
10	08:31	07:49	06:48		17:02 (Oerzen 2)	06:34	18:50 (Oerzen 1)	05:30	04:53
	16:23	17:19	18:13	32	17:34 (Oerzen 3)	20:09	19:13 (Oerzen 1)	21:02	21:44
11	08:30	07:47	06:46		17:01 (Oerzen 2)	06:32	18:52 (Oerzen 1)	05:28	04:53
	16:24	17:21	18:14	31	17:32 (Oerzen 3)	20:11	19:11 (Oerzen 1)	21:04	21:45
12	08:29	07:45	06:43		17:02 (Oerzen 2)	06:29	18:54 (Oerzen 1)	05:27	04:52
	16:26	17:23	18:16	29	17:31 (Oerzen 3)	20:12	19:10 (Oerzen 1)	21:06	21:46
13	08:28	07:43	06:41		17:01 (Oerzen 2)	06:27	18:56 (Oerzen 1)	05:25	04:52
	16:27	17:25	18:18	29	17:30 (Oerzen 3)	20:14	19:06 (Oerzen 1)	21:07	21:46
14	08:28	07:41	06:38		17:02 (Oerzen 2)	06:25		05:23	04:52
	16:29	17:27	18:20	27	17:29 (Oerzen 3)	20:16		21:09	21:47
15	08:27	07:39	06:36		17:02 (Oerzen 2)	06:22		05:22	04:52
	16:31	17:29	18:22	25	17:27 (Oerzen 3)	20:18		21:11	21:48
16	08:26	07:37	06:34		17:03 (Oerzen 2)	06:20		05:20	04:51
	16:32	17:31	18:24	23	17:26 (Oerzen 3)	20:20		21:12	21:48
17	08:25	07:35	06:31		17:05 (Oerzen 2)	06:18		05:18	04:51
	16:34	17:33	18:26	20	17:25 (Oerzen 3)	20:21		21:14	21:49
18	08:24	07:33	06:29		17:07 (Oerzen 2)	06:15		05:17	04:51
	16:36	17:35	18:27	15	17:22 (Oerzen 3)	20:23		21:15	21:49
19	08:23	07:31	06:26		17:10 (Oerzen 2)	06:13		05:15	04:51
	16:37	17:37	18:29	9	17:19 (Oerzen 3)	20:25		21:17	21:49
20	08:22	07:29	06:24			06:11		05:14	04:51
	16:39	17:38	18:31			20:27		21:18	21:50
21	08:20	07:26	06:22			06:09		05:12	04:52
	16:41	17:40	18:33			20:29		21:20	21:50
22	08:19	07:24	06:19			06:07		05:11	04:52
	16:43	17:42	18:35			20:30		21:22	21:50
23	08:18	07:22	06:17			06:04		05:10	04:52
	16:44	17:44	18:36			20:32		21:23	21:50
24	08:17	07:20	06:14			06:02		05:08	04:52
	16:46	17:46	18:38			20:34		21:24	21:51
25	08:15	07:18	06:12			06:00		05:07	04:53
	16:48	17:48	18:40			20:36		21:26	21:51
26	08:14	07:15	06:10		18:04 (Oerzen 1)	05:58		05:06	04:53
	16:50	17:50	18:42	5	18:09 (Oerzen 1)	20:38		21:27	21:51
27	08:13	07:13	06:07		17:59 (Oerzen 1)	05:56		05:05	04:53
	16:52	17:52	18:44	14	18:13 (Oerzen 1)	20:39		21:29	21:50
28	08:11	07:11	06:05		17:57 (Oerzen 1)	05:54		05:04	04:54
	16:54	17:54	18:45	18	18:15 (Oerzen 1)	20:41		21:30	21:50
29	08:10		07:02		18:55 (Oerzen 1)	05:52		05:02	04:55
	16:56		19:47	22	19:17 (Oerzen 1)	20:43		21:31	21:50
30	08:08		07:00		18:53 (Oerzen 1)	05:50		05:01	04:55
	16:58		19:49	24	19:17 (Oerzen 1)	20:45		21:33	21:50
31	08:06		06:58		18:52 (Oerzen 1)			05:00	
	16:59		19:51	26	19:18 (Oerzen 1)			21:34	
Sonnenscheinstunden	253	275	367		419			491	506
astr.max.mögl.Beschattung			597		315				

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
	Sonnenuntergang (SS:MM)			

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s23 - Oerzen, Mühlenweg 10

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember		
1	04:56 21:50	05:34 21:16	06:27 20:11	18:51 (Oerzen 1) 19:10 (Oerzen 1)	07:19 18:58	17:41 (Oerzen 2) 18:10 (Oerzen 2)	07:16 16:49	08:09 16:06
2	04:57 21:49	05:36 21:14	06:29 20:08	18:49 (Oerzen 1) 19:12 (Oerzen 1)	07:21 18:56	17:40 (Oerzen 2) 18:10 (Oerzen 3)	07:18 16:47	08:11 16:06
3	04:57 21:49	05:38 21:12	06:31 20:06	18:47 (Oerzen 1) 19:12 (Oerzen 1)	07:23 18:53	17:40 (Oerzen 2) 18:11 (Oerzen 3)	07:20 16:45	08:12 16:05
4	04:58 21:48	05:39 21:10	06:32 20:03	18:47 (Oerzen 1) 19:13 (Oerzen 1)	07:24 18:51	17:39 (Oerzen 2) 18:11 (Oerzen 3)	07:21 16:43	08:14 16:04
5	04:59 21:48	05:41 21:08	06:34 20:01	18:46 (Oerzen 1) 19:13 (Oerzen 1)	07:26 18:49	17:39 (Oerzen 2) 18:11 (Oerzen 3)	07:23 16:42	08:15 16:04
6	05:00 21:47	05:43 21:07	06:36 19:59	18:45 (Oerzen 1) 19:13 (Oerzen 1)	07:28 18:46	17:39 (Oerzen 2) 18:11 (Oerzen 3)	07:25 16:40	08:16 16:03
7	05:01 21:47	05:44 21:05	06:38 19:56	18:44 (Oerzen 1) 19:13 (Oerzen 1)	07:30 18:44	17:39 (Oerzen 2) 18:11 (Oerzen 3)	07:27 16:38	08:18 16:03
8	05:02 21:46	05:46 21:03	06:39 19:54	18:44 (Oerzen 1) 19:13 (Oerzen 1)	07:31 18:42	17:40 (Oerzen 2) 18:11 (Oerzen 3)	07:29 16:36	08:19 16:02
9	05:03 21:45	05:48 21:01	06:41 19:52	18:43 (Oerzen 1) 19:12 (Oerzen 1)	07:33 18:39	17:41 (Oerzen 2) 18:10 (Oerzen 3)	07:31 16:34	08:20 16:02
10	05:04 21:44	05:49 20:59	06:43 19:49	18:43 (Oerzen 1) 19:11 (Oerzen 1)	07:35 18:37	17:41 (Oerzen 2) 18:08 (Oerzen 3)	07:33 16:33	08:21 16:02
11	05:05 21:44	05:51 20:57	06:44 19:47	18:44 (Oerzen 1) 19:11 (Oerzen 1)	07:37 18:35	17:42 (Oerzen 2) 18:06 (Oerzen 3)	07:35 16:31	08:23 16:01
12	05:06 21:43	05:53 20:55	06:46 19:44	18:43 (Oerzen 1) 19:09 (Oerzen 1)	07:39 18:32	17:44 (Oerzen 2) 18:03 (Oerzen 3)	07:36 16:29	08:24 16:01
13	05:07 21:42	05:55 20:53	06:48 19:42	18:44 (Oerzen 1) 19:08 (Oerzen 1)	07:40 18:30	17:48 (Oerzen 2) 18:01 (Oerzen 3)	07:38 16:28	08:25 16:01
14	05:08 21:41	05:56 20:51	06:50 19:39	18:45 (Oerzen 1) 19:07 (Oerzen 1)	07:42 18:28	17:42 (Oerzen 2)	07:40 16:26	08:26 16:01
15	05:10 21:40	05:58 20:49	06:51 19:37	18:46 (Oerzen 1) 19:05 (Oerzen 1)	07:44 18:25	17:44 (Oerzen 2)	07:42 16:25	08:27 16:01
16	05:11 21:39	06:00 20:46	06:53 19:35	18:48 (Oerzen 1) 19:02 (Oerzen 1)	07:46 18:23	17:44 (Oerzen 2)	07:44 16:23	08:27 16:01
17	05:12 21:38	06:01 20:44	06:55 19:32	18:51 (Oerzen 1) 18:59 (Oerzen 1)	07:48 18:21	17:44 (Oerzen 2)	07:46 16:22	08:28 16:01
18	05:14 21:36	06:03 20:42	06:56 19:30	18:59 (Oerzen 1)	07:50 18:19	17:44 (Oerzen 2)	07:48 16:20	08:29 16:02
19	05:15 21:35	06:05 20:40	06:58 19:27	18:58 (Oerzen 1)	07:51 18:16	17:44 (Oerzen 2)	07:49 16:19	08:30 16:02
20	05:16 21:34	06:07 20:38	07:00 19:25	18:57 (Oerzen 1)	07:53 18:14	17:44 (Oerzen 2)	07:51 16:18	08:30 16:02
21	05:18 21:33	06:08 20:36	07:02 19:22	18:56 (Oerzen 2)	07:55 18:12	17:44 (Oerzen 2)	07:53 16:16	08:31 16:03
22	05:19 21:31	06:10 20:33	07:03 19:20	18:55 (Oerzen 2)	07:57 18:10	17:44 (Oerzen 2)	07:55 16:15	08:32 16:03
23	05:21 21:30	06:12 20:31	07:05 19:18	18:54 (Oerzen 2)	07:59 18:08	17:44 (Oerzen 2)	07:56 16:14	08:32 16:04
24	05:22 21:28	06:13 20:29	07:07 19:15	17:56 (Oerzen 2) 18:00 (Oerzen 2)	08:01 18:06	17:44 (Oerzen 2)	07:58 16:13	08:33 16:04
25	05:24 21:27	06:15 20:27	07:09 19:13	17:50 (Oerzen 2) 18:04 (Oerzen 2)	07:03 17:03	17:44 (Oerzen 2)	08:00 16:12	08:33 16:05
26	05:25 21:25	06:17 20:24	07:10 19:10	17:48 (Oerzen 2)	07:04 17:01	17:44 (Oerzen 2)	08:01 16:11	08:33 16:06
27	05:27 21:24	06:19 20:22	07:12 19:08	17:46 (Oerzen 2)	07:06 16:59	17:44 (Oerzen 2)	08:03 16:10	08:34 16:06
28	05:28 21:22	06:20 20:20	07:14 19:06	17:44 (Oerzen 2) 18:09 (Oerzen 2)	07:08 16:57	17:44 (Oerzen 2)	08:05 16:09	08:34 16:07
29	05:30 21:21	06:22 20:18	07:15 19:03	17:42 (Oerzen 2) 18:09 (Oerzen 2)	07:10 16:55	17:44 (Oerzen 2)	08:06 16:08	08:34 16:08
30	05:31 21:19	06:24 20:15	07:17 19:01	17:41 (Oerzen 2) 18:09 (Oerzen 2)	07:12 16:53	17:44 (Oerzen 2)	08:08 16:07	08:34 16:09
31	05:33 21:17	06:25 20:13	07:18 19:00	18:54 (Oerzen 1) 19:10 (Oerzen 1)	07:14 16:51	17:44 (Oerzen 2)	08:09 16:06	08:34 16:10
Sonnenscheinstunden	509	458	382	329	360	261	237	
astr.max.mögl.Beschattung		27	541					

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s24 - Oerzen, Mühlenweg 18

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34 16:11	08:05 17:01	07:09 17:56	16:54 (Oerzen 2) 17:27 (Oerzen 3)	06:55 19:53	18:41 (Oerzen 1) 20:47
2	08:34 16:12	08:03 17:03	07:06 17:58	16:53 (Oerzen 2) 17:28 (Oerzen 3)	06:53 19:54	18:41 (Oerzen 1) 20:48
3	08:34 16:14	08:01 17:05	07:04 18:00	16:52 (Oerzen 2) 17:28 (Oerzen 3)	06:50 19:56	18:41 (Oerzen 1) 20:50
4	08:33 16:15	08:00 17:07	07:02 18:01	16:52 (Oerzen 2) 17:28 (Oerzen 3)	06:48 19:58	18:41 (Oerzen 1) 20:52
5	08:33 16:16	07:58 17:09	07:00 18:03	16:51 (Oerzen 2) 17:29 (Oerzen 3)	06:46 20:00	18:41 (Oerzen 1) 20:54
6	08:33 16:17	07:56 17:11	06:57 18:05	16:51 (Oerzen 2) 17:28 (Oerzen 3)	06:43 20:02	18:42 (Oerzen 1) 20:55
7	08:32 16:19	07:54 17:13	06:55 18:07	16:51 (Oerzen 2) 17:27 (Oerzen 3)	06:41 20:03	18:42 (Oerzen 1) 20:57
8	08:32 16:20	07:53 17:15	06:53 18:09	16:50 (Oerzen 2) 17:26 (Oerzen 3)	06:39 20:05	18:43 (Oerzen 1) 20:59
9	08:31 16:21	07:51 17:17	06:50 18:11	16:51 (Oerzen 2) 17:25 (Oerzen 3)	06:36 20:07	18:44 (Oerzen 1) 21:01
10	08:31 16:23	07:49 17:19	06:48 18:13	16:51 (Oerzen 2) 17:23 (Oerzen 3)	06:34 20:09	18:45 (Oerzen 1) 21:02
11	08:30 16:24	07:47 17:21	06:46 18:14	16:51 (Oerzen 2) 17:20 (Oerzen 3)	06:32 20:11	18:48 (Oerzen 1) 21:04
12	08:29 16:26	07:45 17:23	06:43 18:16	16:52 (Oerzen 2) 17:18 (Oerzen 2)	06:29 20:13	19:16 (Rep 11) 21:06
13	08:28 16:27	07:43 17:25	06:41 18:18	16:53 (Oerzen 2) 17:16 (Oerzen 2)	06:27 20:14	19:15 (Rep 11) 21:07
14	08:28 16:29	07:41 17:27	06:38 18:20	16:55 (Oerzen 2) 17:15 (Oerzen 2)	06:25 20:16	19:16 (Rep 11) 21:09
15	08:27 16:31	07:39 17:29	06:36 18:22	16:56 (Oerzen 2) 17:11 (Oerzen 2)	06:22 20:18	19:16 (Rep 11) 21:11
16	08:26 16:32	07:37 17:31	06:34 18:24	17:01 (Oerzen 2) 17:58 (Rep 10)	06:20 20:20	19:17 (Rep 11) 21:12
17	08:25 16:34	07:35 17:33	06:31 18:26	17:49 (Rep 10) 18:00 (Rep 10)	06:18 20:21	19:19 (Rep 11) 21:14
18	08:24 16:36	07:33 17:35	06:29 18:27	17:47 (Rep 10) 18:01 (Rep 10)	06:15 20:23	19:19 (Rep 11) 21:15
19	08:23 16:37	07:31 17:37	06:26 18:29	17:46 (Rep 10) 18:03 (Rep 10)	06:13 20:25	19:23 (Rep 11) 21:17
20	08:22 16:39	07:29 17:38	06:24 18:31	17:44 (Rep 10) 18:04 (Rep 10)	06:11 20:27	19:27 (Rep 11) 21:18
21	08:20 16:41	07:26 17:40	06:22 18:33	17:44 (Rep 10) 18:05 (Rep 10)	06:09 20:29	19:27 (Rep 11) 21:20
22	08:19 16:43	07:24 17:42	06:19 18:35	17:44 (Rep 10) 18:05 (Rep 10)	06:07 20:30	19:27 (Rep 11) 21:22
23	08:18 16:46	07:22 17:44	06:17 18:36	17:43 (Rep 10) 18:04 (Rep 10)	06:04 20:32	19:27 (Rep 11) 21:23
24	08:17 16:45	07:20 17:46	06:14 18:38	17:43 (Rep 10) 18:05 (Oerzen 1)	06:02 20:34	19:27 (Rep 11) 21:24
25	08:15 16:48	07:18 17:48	06:12 17:43 (Rep 10)	17:43 (Rep 10) 18:07 (Oerzen 1)	06:00 20:36	19:27 (Rep 11) 21:26
26	08:14 16:50	07:16 17:50	06:10 17:23 (Oerzen 3)	17:44 (Rep 10) 18:09 (Oerzen 1)	05:58 20:38	19:27 (Rep 11) 21:27
27	08:13 16:52	07:13 17:52	06:07 17:25 (Oerzen 3)	17:44 (Rep 10) 18:10 (Oerzen 1)	05:56 20:39	19:27 (Rep 11) 21:29
28	08:11 16:54	07:11 17:54	06:05 17:26 (Oerzen 3)	17:45 (Oerzen 1) 18:11 (Oerzen 1)	05:54 20:41	19:27 (Rep 11) 21:30
29	08:10 16:56		07:02 19:47	18:44 (Oerzen 1) 19:12 (Oerzen 1)	05:52 20:43	19:27 (Rep 11) 21:31
30	08:08 16:58		07:00 19:49	18:43 (Oerzen 1) 19:11 (Oerzen 1)	05:50 20:45	19:27 (Rep 11) 21:33
31	08:06 16:59		06:58 19:51	18:42 (Oerzen 1) 19:12 (Oerzen 1)		19:27 (Rep 11) 21:34
Sonnenscheinstunden	253	275	367	419	530	491
astr.max.mögl.Beschattung		96	812			506

**Tabellen-Layout: Die Daten für jeden Tag 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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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s24 - Oerzen, Mühlenweg 18

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember	
1	04:56	05:34	06:27	18:47 (Oerzen 1)   07:19	17:32 (Oerzen 2)   07:16	08:09	
	21:50	21:16	20:11	19:37 (Rep 11)   18:58	17:57 (Oerzen 2)   16:49	16:06	
2	04:57	05:36	06:29	18:44 (Oerzen 1)   07:21	17:31 (Oerzen 2)   07:18	08:11	
	21:49	21:14	20:08	19:37 (Rep 11)   18:56	17:57 (Oerzen 3)   16:47	16:06	
3	04:57	05:38	06:31	18:41 (Oerzen 1)   07:23	17:30 (Oerzen 2)   07:20	08:12	
	21:49	21:12	20:06	19:36 (Rep 11)   18:54	18:00 (Oerzen 3)   16:45	16:05	
4	04:58	05:39	06:32	18:40 (Oerzen 1)   07:24	17:28 (Oerzen 2)   07:21	08:14	
	21:48	21:10	20:04	19:35 (Rep 11)   18:51	18:01 (Oerzen 3)   16:43	16:04	
5	04:59	05:41	06:34	18:39 (Oerzen 1)   07:26	17:27 (Oerzen 2)   07:23	08:15	
	21:48	21:08	20:01	19:34 (Rep 11)   18:49	18:02 (Oerzen 3)   16:42	16:04	
6	05:00	05:43	06:36	18:37 (Oerzen 1)   07:28	17:27 (Oerzen 2)   07:25	08:16	
	21:47	21:07	19:59	19:31 (Rep 11)   18:46	18:03 (Oerzen 3)   16:40	16:03	
7	05:01	05:44	06:38	18:36 (Oerzen 1)   07:30	17:27 (Oerzen 2)   07:27	08:18	
	21:47	21:05	19:56	19:29 (Rep 11)   18:44	18:03 (Oerzen 3)   16:38	16:03	
8	05:02	05:46	06:39	18:36 (Oerzen 1)   07:31	17:27 (Oerzen 2)   07:29	08:19	
	21:46	21:03	19:54	19:05 (Oerzen 1)   18:42	18:04 (Oerzen 3)   16:36	16:02	
9	05:03	05:48	06:41	18:35 (Oerzen 1)   07:33	17:27 (Oerzen 2)   07:31	08:20	
	21:45	21:01	19:52	19:04 (Oerzen 1)   18:39	18:04 (Oerzen 3)   16:34	16:02	
10	05:04	05:49	06:43	18:34 (Oerzen 1)   07:35	17:26 (Oerzen 2)   07:33	08:21	
	21:44	20:59	19:49	19:05 (Oerzen 1)   18:37	18:02 (Oerzen 3)   16:33	16:02	
11	05:05	05:51	06:44	18:34 (Oerzen 1)   07:37	17:26 (Oerzen 2)   07:35	08:23	
	21:44	20:57	19:47	19:04 (Oerzen 1)   18:35	18:02 (Oerzen 3)   16:31	16:01	
12	05:06	05:53	06:46	18:34 (Oerzen 1)   07:39	17:27 (Oerzen 2)   07:36	08:24	
	21:43	20:55	19:44	19:03 (Oerzen 1)   18:32	18:01 (Oerzen 3)   16:29	16:01	
13	05:07	05:55	06:48	18:34 (Oerzen 1)   07:40	17:28 (Oerzen 2)   07:38	08:25	
	21:42	20:53	19:42	19:03 (Oerzen 1)   18:30	18:00 (Oerzen 3)   16:28	16:01	
14	05:08	05:56	06:50	18:34 (Oerzen 1)   07:42	17:29 (Oerzen 2)   07:40	08:26	
	21:41	20:51	19:39	19:02 (Oerzen 1)   18:28	17:59 (Oerzen 3)   16:26	16:01	
15	05:10	05:58	06:51	18:34 (Oerzen 1)   07:44	17:30 (Oerzen 2)   07:42	08:27	
	21:40	20:49	19:37	19:00 (Oerzen 1)   18:25	17:57 (Oerzen 3)   16:25	16:01	
16	05:11	06:00	06:53	18:34 (Rep 10)   07:46	17:32 (Oerzen 2)   07:44	08:28	
	21:39	20:46	19:35	18:59 (Oerzen 1)   18:23	17:53 (Oerzen 3)   16:23	16:01	
17	05:12	06:01	06:55	18:32 (Rep 10)   07:48	17:35 (Oerzen 2)   07:46	08:28	
	21:38	20:44	19:32	18:58 (Oerzen 1)   18:21	17:45 (Oerzen 2)   16:22	16:01	
18	05:14	06:03	06:56	18:30 (Rep 10)   07:50		07:48	08:29
	21:36	20:42	19:30	18:55 (Oerzen 1)   18:19		16:20	16:02
19	05:15	06:05	06:58	18:30 (Rep 10)   07:51		07:49	08:30
	21:35	20:40	19:27	18:53 (Oerzen 1)   18:16		16:19	16:02
20	05:16	06:07	07:00	18:29 (Rep 10)   07:53		07:51	08:30
	21:34	20:38	19:25	18:51 (Rep 10)   18:14		16:18	16:02
21	05:18	06:08	07:02	18:29 (Rep 10)   07:55		07:53	08:31
	21:33	20:36	19:22	18:51 (Rep 10)   18:12		16:16	16:03
22	05:19	06:10	07:03	18:28 (Rep 10)   07:57		07:55	08:32
	21:31	20:33	19:20	18:49 (Rep 10)   18:10		16:15	16:03
23	05:21	06:12	07:05	18:29 (Rep 10)   07:59		07:56	08:32
	21:30	20:31	19:18	18:49 (Rep 10)   18:08		16:14	16:04
24	05:22	06:13	19:26 (Rep 11)   07:07	18:29 (Rep 10)   08:01		07:58	08:33
	21:28	20:29	19:32 (Rep 11)   19:15	18:48 (Rep 10)   18:06		16:13	16:04
25	05:24	06:15	19:23 (Rep 11)   07:09	18:29 (Rep 10)   07:03		08:00	08:33
	21:27	20:27	19:35 (Rep 11)   19:13	18:44 (Rep 10)   17:03		16:12	16:05
26	05:25	06:17	19:20 (Rep 11)   07:10	18:30 (Rep 10)   07:04		08:01	08:33
	21:25	20:24	19:36 (Rep 11)   19:10	18:42 (Rep 10)   17:01		16:11	16:06
27	05:27	06:19	19:19 (Rep 11)   07:12	18:33 (Rep 10)   07:06		08:03	08:34
	21:24	20:22	19:37 (Rep 11)   19:08	18:40 (Rep 10)   16:59		16:10	16:06
28	05:28	06:20	19:18 (Rep 11)   07:14	17:39 (Oerzen 2)   07:08		08:05	08:34
	21:22	20:20	19:38 (Rep 11)   19:06	17:52 (Oerzen 2)   16:57		16:09	16:07
29	05:30	06:22	19:17 (Rep 11)   07:16	17:35 (Oerzen 2)   07:10		08:06	08:34
	21:21	20:18	19:38 (Rep 11)   19:03	17:54 (Oerzen 2)   16:55		16:08	16:08
30	05:31	06:24	19:16 (Rep 11)   07:17	17:33 (Oerzen 2)   07:12		08:08	08:34
	21:19	20:15	19:38 (Rep 11)   19:01	17:55 (Oerzen 2)   16:53		16:07	16:09
31	05:33	06:25	19:16 (Rep 11)	07:14			08:34
	21:17	20:13	19:38 (Rep 11)	16:51			16:10
Sonnenscheinstunden	509	458	382	329	261	237	
astr.max.mögl.Beschattung		137	803	521			

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s25 - Südergellersen, Auf dem Brink 6

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22
	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	08:25	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10		07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s26 - Südergellersen, Auf dem Brink 7

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22
	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	08:25	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10		07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s27 - Südergellersen, Birkenweg 7

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25	08:17
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22
	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26	07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	08:28
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	08:25	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10		07:03	05:52	05:02	04:55	05:30	06:22	07:16	07:10	08:06	08:34
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s28 - Südergellersen, Forstweg 4

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember			
1	08:34	09:59 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10		
16:11	10:09 (Oerzen 1)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06			
2	08:34	10:01 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11		
16:13	8	10:09 (Oerzen 1)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06		
3	08:34	10:03 (Oerzen 1)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12		
16:14	5	10:08 (Oerzen 1)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05		
4	08:34		08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14		
16:15		17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04			
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15			
16:16		17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04			
6	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17			
16:17		17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03			
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18			
16:19		17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38	16:03			
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19			
16:20		17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02			
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	09:52 (Oerzen 1)		
16:21		17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	4	09:56 (Oerzen 1)	
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22	09:50 (Oerzen 1)		
16:23		17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	8	09:58 (Oerzen 1)	
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23	09:49 (Oerzen 1)		
16:24		17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	10	09:59 (Oerzen 1)	
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	09:50 (Oerzen 1)		
16:26		17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	11	10:01 (Oerzen 1)	
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	09:49 (Oerzen 1)		
16:27		17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	13	10:02 (Oerzen 1)	
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	09:49 (Oerzen 1)		
16:29		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	14	10:03 (Oerzen 1)	
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	09:49 (Oerzen 1)		
16:31		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	15	10:04 (Oerzen 1)	
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	09:49 (Oerzen 1)		
16:32		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	15	10:04 (Oerzen 1)	
17	08:25	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29	09:49 (Oerzen 1)		
16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	16	10:05 (Oerzen 1)	
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	09:50 (Oerzen 1)		
16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	16	10:06 (Oerzen 1)	
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	09:50 (Oerzen 1)		
16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	17	10:07 (Oerzen 1)	
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	09:50 (Oerzen 1)		
16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	17	10:07 (Oerzen 1)	
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	09:51 (Oerzen 1)		
16:41		17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03	17	10:08 (Oerzen 1)	
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	09:51 (Oerzen 1)		
16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	17	10:08 (Oerzen 1)	
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	09:52 (Oerzen 1)		
16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	17	10:09 (Oerzen 1)	
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33	09:52 (Oerzen 1)		
16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	17	10:09 (Oerzen 1)	
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33	09:52 (Oerzen 1)		
16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05	17	10:09 (Oerzen 1)	
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33	09:54 (Oerzen 1)		
16:50		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06	16	10:10 (Oerzen 1)	
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34	09:54 (Oerzen 1)		
16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06	16	10:10 (Oerzen 1)	
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34	09:55 (Oerzen 1)		
16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07	15	10:10 (Oerzen 1)	
29	08:10		07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34	09:56 (Oerzen 1)		
16:56			19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08	14	10:10 (Oerzen 1)	
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34	09:57 (Oerzen 1)		
16:58			19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09	13	10:10 (Oerzen 1)	
31	08:07			06:58		05:00		05:33		07:14		08:34	09:58 (Oerzen 1)		
17:00				19:51		21:34		21:17		20:13		16:51	16:10	12	10:10 (Oerzen 1)
Sonnenscheinstunden	253														
astr.max.mögl.Beschattung		23	275	367	419	491	506	509	458	382	329	261	237	327	

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s29 - Südergellersen, Forstweg 8

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:34	09:48 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	
16	16:11	10:04 (Oerzen 1)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	
2	08:34	09:49 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	
15	16:13	10:04 (Oerzen 1)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	
3	08:34	09:51 (Oerzen 1)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:13	
13	16:14	10:04 (Oerzen 1)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	
4	08:34	09:51 (Oerzen 1)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	
13	16:15	10:04 (Oerzen 1)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	
5	08:33	09:53 (Oerzen 1)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	
10	16:16	10:03 (Oerzen 1)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	
6	08:33	09:55 (Oerzen 1)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	
7	16:17	10:02 (Oerzen 1)	17:11	18:05	20:02	20:56	21:41	21:48	21:07	19:59	18:46	16:40	16:03	
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	09:41 (Oerzen 1)	
16	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38	16:03	9 09:40 (Oerzen 1)	
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	9 09:40 (Oerzen 1)	
16	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	12 09:40 (Oerzen 1)	
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	9 09:39 (Oerzen 1)	
16	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	13 09:52 (Oerzen 1)	
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22	9 09:38 (Oerzen 1)	
16	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	15 09:53 (Oerzen 1)	
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23	9 09:38 (Oerzen 1)	
16	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	16 09:54 (Oerzen 1)	
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	9 09:39 (Oerzen 1)	
16	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	17 09:56 (Oerzen 1)	
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	9 09:39 (Oerzen 1)	
16	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	18 09:57 (Oerzen 1)	
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	9 09:39 (Oerzen 1)	
16	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	18 09:57 (Oerzen 1)	
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	9 09:39 (Oerzen 1)	
16	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	25 10:48 (Rep 11)	
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	9 09:39 (Oerzen 1)	
16	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	27 10:49 (Rep 11)	
17	08:25	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29	9 09:39 (Oerzen 1)	
16	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:45	19:32	18:21	16:22	16:02	29 10:50 (Rep 11)	
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	9 09:40 (Oerzen 1)	
16	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	30 10:51 (Rep 11)	
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	9 09:41 (Oerzen 1)	
16	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	31 10:53 (Rep 11)	
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	9 09:40 (Oerzen 1)	
16	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	32 10:53 (Rep 11)	
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	9 09:41 (Oerzen 1)	
16	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03	32 10:54 (Rep 11)	
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	9 09:41 (Oerzen 1)	
16	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	32 10:54 (Rep 11)	
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	9 09:42 (Oerzen 1)	
16	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	32 10:55 (Rep 11)	
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33	9 09:42 (Oerzen 1)	
16	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	32 10:55 (Rep 11)	
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33	9 09:43 (Oerzen 1)	
16	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05	30 10:54 (Rep 11)	
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33	9 09:44 (Oerzen 1)	
16	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06	30 10:55 (Rep 11)	
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34	9 09:45 (Oerzen 1)	
16	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06	28 10:55 (Rep 11)	
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34	9 09:45 (Oerzen 1)	
16	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07	25 10:54 (Rep 11)	
29	08:10	07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	07:06	08:06	08:34	9 09:46 (Oerzen 1)	
16	16:56	17:56	18:48	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08	21 10:53 (Rep 11)	
30	08:08	07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34	9 09:47 (Oerzen 1)		
16	16:58	17:58	18:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09	18 10:05 (Oerzen 1)	
31	08:07	06:58	05:50	05:00	05:00	05:33	06:26	07:19	07:14	08:09	08:34	9 09:48 (Oerzen 1)		
17	17:00	19:51	21:34	21:34	21:34	21:17	20:13	16:51	16:51	16:51	16:10	16:10	17 10:05 (Oerzen 1)	
Sonnenscheinstunden		253												
astr.max.mögl.Beschattung		74	275	367	419	491	506	509	458	382	329	261	237	596

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s30 - Südergellersen, Forstweg 11

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	09:34 (Oerzen 1) 10:49 (Rep 11)	07:09 17:02	06:55 17:56	05:48 19:53	05:00 20:47	04:56 21:35	05:35 21:50	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:13	09:35 (Oerzen 1) 10:49 (Rep 11)	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:58 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	08:11 16:47
3	08:34 16:14	09:36 (Oerzen 1) 10:49 (Rep 11)	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	08:13 16:45
4	08:34 16:15	09:36 (Oerzen 1) 10:48 (Rep 11)	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	08:14 16:44
5	08:33 16:16	09:38 (Oerzen 1) 10:48 (Rep 11)	07:58 17:09	07:00 18:03	06:46 20:00	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	08:15 16:42
6	08:33 16:17	09:38 (Oerzen 1) 10:47 (Rep 11)	07:56 17:11	06:57 18:05	06:43 20:02	05:38 20:56	04:56 21:41	05:00 21:48	05:43 21:07	06:36 19:59	07:28 18:46	08:17 16:40
7	08:32 16:19	09:39 (Oerzen 1) 10:45 (Rep 11)	07:55 17:13	06:55 18:07	06:41 20:04	05:36 20:57	04:55 21:42	05:01 21:05	05:44 19:57	06:38 18:44	07:30 16:38	08:18 16:03
8	08:32 16:20	09:40 (Oerzen 1) 10:44 (Rep 11)	07:53 17:15	06:53 18:09	06:39 20:05	05:34 20:59	04:54 21:43	05:02 21:03	05:46 19:54	06:39 18:42	07:32 16:36	08:19 16:02
9	08:31 16:21	09:41 (Oerzen 1) 10:41 (Rep 11)	07:51 17:17	06:50 18:11	06:36 20:07	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	08:20 16:35
10	08:31 16:23	09:42 (Oerzen 1) 10:43 (Rep 11)	07:49 17:19	06:48 18:13	06:34 20:09	05:30 21:02	04:53 21:44	05:04 21:45	05:50 20:59	06:43 19:49	07:35 18:37	08:22 16:33
11	08:30 16:24	09:43 (Oerzen 1) 10:43 (Rep 11)	07:47 17:21	06:46 18:15	06:32 20:11	05:29 21:04	04:53 21:45	05:05 21:44	05:51 20:57	06:45 19:47	07:37 18:35	08:23 16:31
12	08:29 16:26	09:46 (Oerzen 1) 10:43 (Rep 11)	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	08:24 16:30
13	08:29 16:27	09:49 (Oerzen 1) 10:44 (Rep 11)	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	08:25 16:28
14	08:28 16:29	09:54 (Oerzen 1) 10:41 (Rep 11)	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	08:26 16:26
15	08:27 16:31	09:59 (Oerzen 1) 10:39 (Rep 11)	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	08:27 16:25
16	08:26 16:32	10:04 (Oerzen 1) 10:36 (Rep 11)	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	08:28 16:23
17	08:25 16:34	10:05 (Oerzen 1) 10:37 (Rep 11)	07:35 17:33	06:31 18:26	06:18 20:22	05:19 21:14	04:51 21:49	05:12 21:38	06:01 20:45	06:55 19:32	07:48 18:21	08:29 16:22
18	08:24 16:36	10:06 (Oerzen 1) 10:39 (Rep 11)	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	08:30 16:21
19	08:23 16:37	10:07 (Oerzen 1) 10:41 (Rep 11)	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	08:31 16:19
20	08:22 16:39	10:08 (Oerzen 1) 10:43 (Rep 11)	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	08:32 16:18
21	08:21 16:41	10:09 (Oerzen 1) 10:44 (Rep 11)	07:27 17:41	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	08:33 16:17
22	08:19 16:43	10:10 (Oerzen 1) 10:45 (Rep 11)	07:24 17:43	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	08:34 16:15
23	08:18 16:45	10:11 (Oerzen 1) 10:46 (Rep 11)	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	08:35 16:14
24	08:17 16:46	10:12 (Oerzen 1) 10:47 (Rep 11)	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:14 20:29	07:07 19:15	08:01 18:06	08:36 16:13
25	08:16 16:48	10:13 (Oerzen 1) 10:48 (Rep 11)	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	08:03 17:04	08:37 16:12
26	08:14 16:50	10:14 (Oerzen 1) 10:49 (Rep 11)	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:28	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	08:05 17:01	08:38 16:11
27	08:13 16:52	10:15 (Oerzen 1) 10:50 (Rep 11)	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	08:06 16:59	08:39 16:10
28	08:11 16:54	10:16 (Oerzen 1) 10:51 (Rep 11)	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	08:08 16:57	08:40 16:09
29	08:10 16:56	10:17 (Oerzen 1) 10:52 (Rep 11)	07:09 17:56	06:03 18:47	05:52 20:43	05:03 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	08:06 16:55	08:41 16:08
30	08:08 16:58	10:18 (Oerzen 1) 10:53 (Rep 11)	07:07 17:57	06:01 18:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	08:08 16:53	08:42 16:07
31	08:07 17:00	10:19 (Oerzen 1) 10:54 (Rep 11)	06:58 17:51	05:59 18:51	05:00 21:34	05:00 21:34	05:33 21:17	06:26 20:13	07:14 19:01	08:09 16:51	08:10 16:51	08:43 16:10
Sonnenscheinstunden	253		275		419	491	506	509	458	382	329	261
astr.max.mögl.Beschattung	353										15	1317

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s31 - Südergellersen, Forstweg 16

### Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinfallrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember			
1	08:34	09:34 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	09:28 (Oerzen 1)	
16:11	35	10:40 (Rep 11)	17:02	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	5	09:33 (Oerzen 1)
2	08:34	09:35 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	09:27 (Oerzen 1)	
16:13	33	10:40 (Rep 11)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	9	09:36 (Oerzen 1)
3	08:34	09:36 (Oerzen 1)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:13	09:26 (Oerzen 1)	
16:14	30	10:39 (Rep 11)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	12	09:38 (Oerzen 1)
4	08:34	09:37 (Oerzen 1)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	09:25 (Oerzen 1)	
16:15	25	10:38 (Rep 11)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	14	09:39 (Oerzen 1)
5	08:33	09:38 (Oerzen 1)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	09:25 (Oerzen 1)	
16:16	18	09:56 (Oerzen 1)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	16	09:41 (Oerzen 1)
6	08:33	09:38 (Oerzen 1)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	09:25 (Oerzen 1)	
16:17	17	09:55 (Oerzen 1)	17:11	18:05	20:02	20:56	21:41	21:48	21:07	19:59	18:46	16:40	16:03	16	09:41 (Oerzen 1)
7	08:32	09:40 (Oerzen 1)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	09:24 (Oerzen 1)	
16:19	16	09:56 (Oerzen 1)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38	16:03	18	09:42 (Oerzen 1)
8	08:32	09:41 (Oerzen 1)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	09:25 (Oerzen 1)	
16:20	14	09:55 (Oerzen 1)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	24	10:25 (Rep 11)
9	08:31	09:42 (Oerzen 1)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	09:24 (Oerzen 1)	
16:21	12	09:54 (Oerzen 1)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	30	10:27 (Rep 11)
10	08:31	09:44 (Oerzen 1)	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22	09:24 (Oerzen 1)	
16:23	9	09:53 (Oerzen 1)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	33	10:29 (Rep 11)
11	08:30	09:46 (Oerzen 1)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23	09:24 (Oerzen 1)	
16:24	5	09:51 (Oerzen 1)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	35	10:30 (Rep 11)
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	09:25 (Oerzen 1)		
16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	37	10:32 (Rep 11)		
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	09:26 (Oerzen 1)		
16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	38	10:33 (Rep 11)		
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	09:26 (Oerzen 1)		
16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	40	10:34 (Rep 11)		
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	09:26 (Oerzen 1)		
16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	41	10:35 (Rep 11)		
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	09:26 (Oerzen 1)		
16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	42	10:35 (Rep 11)		
17	08:25	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29	09:26 (Oerzen 1)		
16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:45	19:32	18:21	16:22	16:02	43	10:36 (Rep 11)		
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	09:27 (Oerzen 1)		
16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:21	16:02	43	10:37 (Rep 11)		
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	09:28 (Oerzen 1)		
16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	43	10:38 (Rep 11)		
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	09:27 (Oerzen 1)		
16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	43	10:37 (Rep 11)		
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	09:28 (Oerzen 1)		
16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03	43	10:38 (Rep 11)		
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	09:28 (Oerzen 1)		
16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	43	10:38 (Rep 11)		
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	09:29 (Oerzen 1)		
16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	43	10:39 (Rep 11)		
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33	09:30 (Oerzen 1)		
16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	43	10:40 (Rep 11)		
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33	09:30 (Oerzen 1)		
16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05	43	10:40 (Rep 11)		
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33	09:31 (Oerzen 1)		
16:50	17:50	18:42	20:38	21:28	21:51	21:26	20:25	19:10	18:01	16:11	16:06	43	10:41 (Rep 11)		
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34	09:32 (Oerzen 1)		
16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06	42	10:41 (Rep 11)		
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34	09:32 (Oerzen 1)		
16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:10	16:07	41	10:41 (Rep 11)		
29	08:10	07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34	09:33 (Oerzen 1)			
16:56	19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	17:00	16:08	16:08	39	10:41 (Rep 11)		
30	08:08	07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34	09:33 (Oerzen 1)			
16:58	19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	17:00	16:07	16:09	39	10:41 (Rep 11)		
31	08:07	06:58	05:49	05:00	05:00	05:33	06:26	07:14	07:14	08:04	08:34	09:34 (Oerzen 1)			
17:00	19:51	20:47	21:34	21:51	21:17	20:13	19:00	18:00	17:00	16:00	16:10	37	10:41 (Rep 11)		
Sonnenscheinstunden	253														
astr.max.mögl.Beschattung	214	275	367	419	491	506	509	458	382	329	261	237	1038		

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s32 - Südergellersen, Forstweg 17

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	09:28 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16
2	16:11	10:39 (Rep 11)	17:02	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49
3	08:34	09:29 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18
4	16:13	10:39 (Rep 11)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47
5	08:34	09:30 (Oerzen 1)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20
6	16:14	10:39 (Rep 11)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45
7	08:34	09:30 (Oerzen 1)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22
8	16:15	10:39 (Rep 11)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44
9	08:33	09:31 (Oerzen 1)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23
10	16:16	10:39 (Rep 11)	17:09	18:03	19:59	20:54	21:40	21:48	21:09	20:01	18:49	16:42
11	08:33	09:31 (Oerzen 1)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25
12	16:17	10:38 (Rep 11)	17:11	18:05	19:52	20:56	21:41	21:48	21:07	19:59	18:46	16:40
13	08:32	09:33 (Oerzen 1)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27
14	16:19	10:38 (Rep 11)	17:13	18:07	19:54	20:57	21:42	21:47	21:05	19:57	18:44	16:38
15	08:32	09:33 (Oerzen 1)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29
16	16:20	10:37 (Rep 11)	17:15	18:09	19:55	20:59	21:43	21:46	21:03	19:54	18:42	16:36
17	08:31	09:34 (Oerzen 1)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31
18	16:21	10:35 (Rep 11)	17:17	18:11	19:57	21:01	21:44	21:45	21:01	19:52	18:39	16:35
19	08:31	09:35 (Oerzen 1)	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33
20	16:23	10:31 (Rep 11)	17:19	18:13	19:59	21:02	21:44	21:45	20:59	19:49	18:37	16:33
21	08:30	09:36 (Oerzen 1)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35
22	16:24	10:35 (Oerzen 1)	17:21	18:15	19:51	21:04	21:45	21:44	20:57	19:47	18:35	16:31
23	08:29	09:38 (Oerzen 1)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37
24	16:26	10:32 (Oerzen 1)	17:23	18:16	19:54	21:06	21:46	21:43	20:55	19:44	18:32	16:30
25	08:29	09:40 (Oerzen 1)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39
26	16:27	10:35 (Oerzen 1)	17:25	18:18	19:54	21:07	21:47	21:42	20:53	19:42	18:30	16:28
27	08:28	09:42 (Oerzen 1)	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40
28	16:29	10:35 (Oerzen 1)	17:27	18:20	19:56	21:09	21:47	21:41	20:51	19:40	18:28	16:26
29	08:27	09:43 (Oerzen 1)	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42
30	16:31	10:31 (Rep 11)	17:29	18:22	19:58	21:11	21:48	21:40	20:49	19:37	18:26	16:25
31	08:26	09:44 (Oerzen 1)	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44
1	16:32	10:31 (Rep 11)	17:31	18:24	19:59	21:12	21:48	21:39	20:47	19:35	18:23	16:23
2	08:25	09:45 (Oerzen 1)	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46
3	16:34	10:30 (Rep 11)	17:33	18:26	19:59	21:14	21:49	21:38	20:45	19:32	18:21	16:22
4	08:24	09:46 (Oerzen 1)	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48
5	16:36	10:30 (Rep 11)	17:35	18:27	19:59	21:16	21:49	21:37	20:42	19:30	18:19	16:21
6	08:23	09:47 (Oerzen 1)	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49
7	16:37	10:29 (Rep 11)	17:37	18:29	19:59	21:17	21:50	21:35	20:40	19:27	18:17	16:19
8	08:22	09:48 (Oerzen 1)	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51
9	16:39	10:28 (Rep 11)	17:39	18:31	19:59	21:19	21:50	21:34	20:38	19:25	18:14	16:18
10	08:21	09:49 (Oerzen 1)	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53
11	16:41	10:27 (Rep 11)	17:41	18:33	19:59	21:20	21:50	21:33	20:36	19:23	18:12	16:17
12	08:19	09:50 (Oerzen 1)	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55
13	16:43	10:26 (Rep 11)	17:42	18:35	19:59	21:22	21:50	21:31	20:34	19:20	18:10	16:15
14	08:18	09:51 (Oerzen 1)	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57
15	16:45	10:25 (Rep 11)	17:44	18:37	19:59	21:23	21:51	21:30	20:31	19:18	18:08	16:14
16	08:17	09:52 (Oerzen 1)	07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58
17	16:46	10:24 (Rep 11)	17:46	18:38	19:59	21:25	21:51	21:29	20:29	19:15	18:06	16:13
18	08:16	09:53 (Oerzen 1)	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00
19	16:48	10:23 (Rep 11)	17:48	18:40	19:59	21:26	21:51	21:27	20:27	19:13	18:04	16:12
20	08:14	09:54 (Oerzen 1)	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02
21	16:50	10:22 (Rep 11)	17:50	18:42	19:59	21:28	21:51	21:26	20:25	19:10	18:01	16:11
22	08:13	09:55 (Oerzen 1)	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03
23	16:52	10:21 (Rep 11)	17:52	18:44	19:59	21:29	21:51	21:24	20:22	19:08	18:00	16:10
24	08:11	09:56 (Oerzen 1)	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05
25	16:54	10:20 (Rep 11)	17:54	18:46	19:59	21:30	21:51	21:22	20:20	19:06	18:00	16:09
26	08:10	09:57 (Oerzen 1)	07:03	05:52	05:43	04:55	05:30	06:22	07:16	08:10	09:04	09:01
27	16:56	10:19 (Rep 11)	17:56	18:48	19:59	21:32	21:50	21:21	20:18	19:03	18:00	16:08
28	08:08	09:58 (Oerzen 1)	07:00	05:50	05:41	04:55	05:31	06:24	07:17	08:11	09:05	09:02
29	16:58	10:18 (Rep 11)	17:58	18:49	19:59	21:33	21:50	21:19	20:15	19:01	18:00	16:07
30	08:07	09:59 (Oerzen 1)	06:58	05:51	05:42	04:56	05:33	06:26	07:19	08:13	09:07	09:04
31	17:00	10:17 (Rep 11)	17:51	18:41	19:59	21:34	21:50	21:17	20:13	19:00	18:00	16:51
Sonnenscheinstunden	253		275	367	419	491	506	509	458	382	329	261
astr.max.mögl.Beschattung	428										33	1402

**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		

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s33 - Südergellersen, Gewerbegebiet

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni												
1	08:34	10:27 (Oerzen 2)	08:05	07:09	10:16 (Oerzen 1)	06:55	17:28 (Rep 11)	05:48	16:51 (Rep 11)	05:00	17:05 (Rep 11)							
	16:11	130	15:18 (Oerzen 4)	17:01	135	16:20 (B 02)	17:56	184	17:14 (Rep 8)	19:53	77	19:27 (B 01)	20:47	102	18:33 (Rep 11)	21:35	84	18:29 (Rep 11)
2	08:34	10:28 (Oerzen 2)	08:03	07:07	10:36 (Oerzen 1)	07:07	10:16 (Oerzen 1)	06:53	10:16 (Oerzen 1)	06:53	10:16 (Oerzen 1)	06:53	17:24 (Rep 11)	05:46	16:50 (Rep 11)	04:59	17:06 (Rep 11)	
	16:13	130	15:19 (Oerzen 4)	17:03	141	16:20 (B 02)	17:58	183	17:14 (Rep 8)	19:55	81	19:27 (B 01)	20:48	103	18:33 (Rep 11)	21:36	83	18:29 (Rep 11)
3	08:34	10:28 (Oerzen 2)	08:02	07:04	10:35 (Oerzen 1)	07:04	10:15 (Oerzen 1)	06:51	10:15 (Oerzen 1)	06:51	10:15 (Oerzen 1)	06:51	17:21 (Rep 11)	05:44	16:50 (Rep 11)	04:58	17:07 (Rep 11)	
	16:14	131	15:19 (Oerzen 4)	17:05	144	16:20 (B 02)	18:00	181	17:14 (Rep 8)	19:56	85	19:28 (B 01)	20:50	103	18:33 (Rep 11)	21:38	82	18:29 (Rep 11)
4	08:33	10:29 (Oerzen 2)	08:00	07:02	10:34 (Oerzen 1)	07:02	10:15 (Oerzen 1)	06:48	10:15 (Oerzen 1)	06:48	10:15 (Oerzen 1)	06:48	17:17 (Rep 11)	05:42	16:50 (Rep 11)	04:57	17:07 (Rep 11)	
	16:15	131	15:20 (Oerzen 4)	17:07	155	16:37 (Rep 5)	18:02	177	17:14 (Rep 8)	19:58	89	19:28 (B 01)	20:52	102	18:32 (Rep 11)	21:39	81	18:28 (Rep 11)
5	08:33	10:29 (Oerzen 2)	07:58	07:00	10:33 (Oerzen 1)	07:00	10:16 (Oerzen 1)	06:46	10:16 (Oerzen 1)	06:46	10:16 (Oerzen 1)	06:46	17:15 (Rep 11)	05:40	16:50 (Rep 11)	04:56	17:08 (Rep 11)	
	16:16	132	15:21 (Oerzen 4)	17:09	163	16:39 (Rep 5)	18:03	172	17:15 (Rep 8)	20:00	93	19:28 (B 01)	20:54	102	18:32 (Rep 11)	21:40	81	18:29 (Rep 11)
6	08:33	10:29 (Oerzen 2)	07:56	07:02	10:32 (Oerzen 1)	06:57	10:15 (Oerzen 1)	06:43	10:15 (Oerzen 1)	06:43	10:15 (Oerzen 1)	06:43	17:13 (Rep 11)	05:38	16:51 (Rep 11)	04:56	17:08 (Rep 11)	
	16:17	134	15:22 (Oerzen 4)	17:11	169	16:41 (Rep 5)	18:05	167	17:14 (Rep 8)	20:02	99	19:29 (B 01)	20:55	102	18:33 (Rep 11)	21:41	80	18:28 (Rep 11)
7	08:32	10:29 (Oerzen 2)	07:55	07:01	10:31 (Oerzen 1)	06:55	10:15 (Oerzen 1)	06:41	10:15 (Oerzen 1)	06:41	10:15 (Oerzen 1)	06:41	17:10 (Rep 11)	05:36	16:51 (Rep 11)	04:55	17:10 (Rep 11)	
	16:19	133	15:22 (Oerzen 4)	17:13	172	16:43 (B 03)	18:07	158	17:14 (Rep 8)	20:04	103	19:28 (B 01)	20:57	102	18:33 (Rep 11)	21:42	79	18:29 (Rep 11)
8	08:32	10:30 (Oerzen 2)	07:53	07:03	10:29 (Oerzen 1)	06:53	10:15 (Oerzen 1)	06:39	10:15 (Oerzen 1)	06:39	10:15 (Oerzen 1)	06:39	17:08 (Rep 11)	05:34	16:51 (Rep 11)	04:54	17:10 (Rep 11)	
	16:20	133	15:23 (Oerzen 4)	17:15	176	16:45 (B 03)	18:09	146	17:15 (Rep 8)	20:05	107	19:28 (B 01)	20:59	101	18:32 (Rep 11)	21:43	78	18:28 (Rep 11)
9	08:31	10:30 (Oerzen 2)	07:51	07:05	10:28 (Oerzen 1)	06:50	10:15 (Oerzen 1)	06:36	10:15 (Oerzen 1)	06:36	10:15 (Oerzen 1)	06:36	17:07 (Rep 11)	05:32	16:51 (Rep 11)	04:54	17:11 (Rep 11)	
	16:21	132	15:23 (Oerzen 4)	17:17	178	16:47 (B 03)	18:11	138	17:18 (Rep 8)	20:07	109	19:28 (B 01)	21:01	101	18:32 (Rep 11)	21:43	78	18:29 (Rep 11)
10	08:31	10:31 (Oerzen 2)	07:49	07:08	10:28 (Oerzen 1)	06:48	10:15 (Oerzen 1)	06:34	10:15 (Oerzen 1)	06:34	10:15 (Oerzen 1)	06:34	17:04 (Rep 11)	05:30	16:52 (Rep 11)	04:53	17:11 (Rep 11)	
	16:23	132	15:24 (Oerzen 4)	17:19	173	16:49 (B 03)	18:13	139	17:21 (Rep 8)	20:09	113	19:27 (B 01)	21:02	100	18:32 (Rep 11)	21:44	77	18:28 (Rep 11)
11	08:30	10:31 (Oerzen 2)	07:47	07:10	10:27 (Oerzen 1)	06:46	10:15 (Oerzen 1)	06:32	10:15 (Oerzen 1)	06:32	10:15 (Oerzen 1)	06:32	17:03 (Rep 11)	05:29	16:52 (Rep 11)	04:53	17:11 (Rep 11)	
	16:24	133	15:24 (Oerzen 4)	17:21	174	16:48 (B 03)	18:15	139	17:22 (Rep 8)	20:11	114	19:27 (B 01)	21:04	100	18:32 (Rep 11)	21:45	77	18:28 (Rep 11)
12	08:29	10:31 (Oerzen 2)	07:45	07:13	10:26 (Oerzen 1)	06:43	10:15 (Oerzen 1)	06:29	10:15 (Oerzen 1)	06:29	10:15 (Oerzen 1)	06:29	17:02 (Rep 11)	05:27	16:53 (Rep 11)	04:52	17:12 (Rep 11)	
	16:26	132	15:24 (Oerzen 4)	17:23	176	16:47 (B 03)	18:16	138	17:23 (Rep 8)	20:13	115	19:26 (B 01)	21:06	99	18:32 (Rep 11)	21:46	77	18:29 (Rep 11)
13	08:29	10:32 (Oerzen 2)	07:43	07:15	10:25 (Oerzen 1)	06:41	10:15 (Oerzen 1)	06:27	10:15 (Oerzen 1)	06:27	10:15 (Oerzen 1)	06:27	17:01 (Rep 11)	05:25	16:54 (Rep 11)	04:52	17:13 (Rep 11)	
	16:27	131	15:25 (Oerzen 4)	17:25	177	16:45 (Rep 5)	18:18	137	17:24 (Rep 8)	20:14	115	19:25 (B 01)	21:07	98	18:32 (Rep 11)	21:47	76	18:29 (Rep 11)
14	08:28	10:32 (Oerzen 2)	07:41	07:17	10:25 (Oerzen 1)	06:39	10:16 (Oerzen 1)	06:25	10:16 (Oerzen 1)	06:25	10:16 (Oerzen 1)	06:25	16:59 (Rep 11)	05:23	16:54 (Rep 11)	04:52	17:12 (Rep 11)	
	16:29	132	15:25 (Oerzen 4)	17:27	178	16:45 (Rep 5)	18:20	138	17:25 (Rep 8)	20:16	116	19:24 (B 01)	21:09	97	18:31 (Rep 11)	21:47	76	18:28 (Rep 11)
15	08:27	10:32 (Oerzen 2)	07:39	07:19	10:23 (Oerzen 1)	06:36	10:17 (Oerzen 1)	06:22	10:17 (Oerzen 1)	06:22	10:17 (Oerzen 1)	06:22	16:58 (Rep 11)	05:22	16:55 (Rep 11)	04:52	17:13 (Rep 11)	
	16:31	131	15:26 (Oerzen 4)	17:29	179	16:44 (Rep 5)	18:22	138	17:26 (Rep 8)	20:18	116	19:23 (B 01)	21:11	97	18:32 (Rep 11)	21:48	75	18:28 (Rep 11)
16	08:26	10:33 (Oerzen 2)	07:37	07:21	10:22 (Oerzen 1)	06:34	10:16 (Oerzen 1)	06:20	10:16 (Oerzen 1)	06:20	10:16 (Oerzen 1)	06:20	16:57 (Rep 11)	05:20	16:55 (Rep 11)	04:52	17:13 (Rep 11)	
	16:32	129	15:26 (Oerzen 4)	17:31	181	16:44 (Rep 5)	18:24	138	17:26 (Rep 8)	20:20	115	19:21 (B 01)	21:12	96	18:31 (Rep 11)	21:48	76	18:29 (Rep 11)
17	08:25	10:34 (Oerzen 2)	07:35	07:23	10:22 (Oerzen 1)	06:31	10:17 (Oerzen 1)	06:18	10:17 (Oerzen 1)	06:18	10:17 (Oerzen 1)	06:18	16:57 (Rep 11)	05:19	16:56 (Rep 11)	04:51	17:14 (Rep 11)	
	16:34	127	15:26 (Oerzen 4)	17:33	179	16:43 (Rep 5)	18:26	137	17:27 (Rep 8)	20:22	113	19:20 (B 01)	21:14	95	18:31 (Rep 11)	21:49	75	18:29 (Rep 11)
18	08:24	10:34 (Oerzen 2)	07:33	07:25	10:21 (Oerzen 1)	06:29	10:17 (Oerzen 1)	06:16	10:17 (Oerzen 1)	06:16	10:17 (Oerzen 1)	06:16	16:55 (Rep 11)	05:17	16:56 (Rep 11)	04:51	17:14 (Rep 11)	
	16:36	126	15:27 (Oerzen 4)	17:35	179	16:42 (Rep 5)	18:27	136	17:27 (Rep 8)	20:23	109	19:16 (B 01)	21:15	95	18:31 (Rep 11)	21:49	75	18:29 (Rep 11)
19	08:23	10:35 (Oerzen 2)	07:31	07:27	10:21 (Oerzen 1)	06:27	10:18 (Oerzen 1)	06:13	10:18 (Oerzen 1)	06:13	10:18 (Oerzen 1)	06:13	16:54 (Rep 11)	05:15	16:56 (Rep 11)	04:51	17:14 (Rep 11)	
	16:37	124	15:27 (Oerzen 4)	17:37	176	16:41 (Rep 5)	18:29	134	17:27 (Rep 8)	20:25	105	19:13 (B 01)	21:17	95	18:31 (Rep 11)	21:50	75	18:29 (Rep 11)
20	08:22	10:35 (Oerzen 2)	07:29	07:29	10:21 (Oerzen 1)	06:24	10:19 (Oerzen 1)	06:11	10:19 (Oerzen 1)	06:11	10:19 (Oerzen 1)	06:11	16:54 (Rep 11)	05:14	16:57 (Rep 11)	04:52	17:15 (Rep 11)	
	16:39	120	15:26 (Oerzen 4)	17:39	173	16:39 (Rep 5)	18:31	131	17:27 (Rep 8)	20:27	97	18:31 (Rep 11)	21:19	94	18:31 (Rep 11)	21:50	75	18:30 (Rep 11)
21	08:21	10:36 (Oerzen 2)	07:27	07:31	10:19 (Oerzen 1)	06:22	10:20 (Oerzen 1)	06:09	10:20 (Oerzen 1)	06:09	10:20 (Oerzen 1)	06:09	16:53 (Rep 11)	05:13	16:58 (Rep 11)	04:52	17:16 (Rep 11)	
	16:41	121	16:08 (B 02)	17:41	162	15:44 (Rep 10)	18:33	128	17:27 (Rep 8)	20:29	98	18:31 (Rep 11)	21:20	93	18:31 (Rep 11)	21:50	74	18:30 (Rep 11)
22	08:19	10:36 (Oerzen 2)	07:24	07:33	10:19 (Oerzen 1)	06:19	10:22 (Oerzen 1)	06:07	10:22 (Oerzen 1)	06:07	10:22 (Oerzen 1)	06:07	16:53 (Rep 11)	05:11	16:58 (Rep 11)	04:52	17:15 (Rep 11)	
	16:43	124	16:09 (B 02)	17:42	162	15:43 (Rep 10)	18:35	124	17:27 (Rep 8)	20:31	98	18:31 (Rep 11)	21:22	92	18:30 (Rep 11)	21:50	75	18:30 (Rep 11)
23	08:18	10:37 (Oerzen 2)	07:22	07:35	10:19 (Oerzen 1)	06:17	10:23 (Oerzen 1)	06:04	10:23 (Oerzen 1)	06:04	10:23 (Oerzen 1)	06:04	16:52 (Rep 11)	05:10	16:59 (Rep 11)	04:52	17:15 (Rep 11)	
	16:45	125	16:11 (B 02)	17:44	172	17:05 (Rep 8)	18:37	121	17:27 (Rep 8)	20:32	100	18:32 (Rep 11)	21:23	91	18:30 (Rep 11)	21:51	75	18:30 (Rep 11)
24	08:17	10:37 (Oerzen 2)	07:20	07:38	10:18 (Oerzen 1)	06:15	10:24 (Oerzen 1)	06:02	10:24 (Oerzen 1)	06:02	10:24 (Oerzen 1)	06:02	16:52 (Rep 11)	05:08	17:00 (Rep 11)	04:52	17:16 (Rep 11)	
	16:46	126	16:13 (B 02)	17:46	179	17:08 (Rep 8)	18:38	117	17:27 (Rep 8)	20:34	100	18:32 (Rep 11)	21:25	90	18:30 (Rep 11)	21:51	75	18:31 (Rep 11)
25	08:15	10:38 (Oerzen 2)	07:18	07:40	10:17 (Oerzen 1)	06:12	10:25 (Oerzen 1)	06:00	10:25 (Oerzen 1)	06:00	10:25 (Oerzen 1)	06:00	16:52 (Rep 11)	05:07	17:01 (Rep 11)	04:53	17:16 (Rep 11)	
	16:48	130	16:16 (B 02)	17:48	181	17:09 (Rep 8)	18:40	110	17:26 (Rep 8)	20:36	100	18:32 (Rep 11)	21:26	89	18:30 (Rep 11)	21:51	75	18:31 (Rep 11)
26	08:14	10:39 (Oerzen 2)	07:16	07:42	10:17 (Oerzen 1)	06:10	10:26 (Oerzen 1)	05:58	10:26 (Oerzen 1)	05:58	10:26 (Oerzen 1)	05:58	16:51 (Rep 11)	05:06	17:01 (Rep 11)	04:53	17:16 (Rep 11)	
	16:50	129	16:17 (B 02)	17:50	185	17:11 (Rep 8)	18:42	102	17:25 (Rep 8)	20:38	102	18:33 (Rep 11)	21:27	89	18:30 (Rep 11)	21:51	75	18:31 (Rep 11)
27	08:13	10:40 (Oerzen 2)	07:13	07:44	10:17 (Oerzen 1)	06:07	10:27 (Oerzen 1)	05:56	10:27 (Oerzen 1)	05:56	10:27 (Oerzen 1)	05:56	16:51 (Rep 11)	05:05	17:02 (Rep 11)	04:54	17:16 (Rep 11)	
	16:52	128	16:18 (B 02)	17:52	186	17:13 (Rep 8)	18:44	94	17:25 (Rep 8)	20:40	102	18:33 (Rep 11)	21:29	88	18:30 (Rep 11)	21:51	75	18:31 (Rep 11)
28	08:11	10:41 (Oerzen 2)	07:11	07:46	10:16 (Oerzen 1)	06:05	10:28 (Oerzen 1)	05:54	10:28 (Oerzen 1)	05:54	10:28 (Oerzen 1)	05:54	16:51 (Rep 11)	05:04	17:03 (Rep 1			

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s33 - Südergellersen, Gewerbegebiet

### Annahmen für Schattenwurfberechnung

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

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

	Jul	August	September	Oktober	November	Dezember		
1	04:56	17:16 (Rep 11)   05:35	17:04 (Rep 11)   06:27	17:02 (Rep 11)   07:19	10:55 (Oerzen 1)   07:16	09:57 (Oerzen 1)   08:09	10:13 (Oerzen 2)	
2	21:50	77 18:33 (Rep 11)   21:16	99 18:43 (Rep 11)   20:11	114 19:26 (B 01)   18:58	138 18:03 (Rep 9)   16:49	172 16:19 (B 03)   16:06	132 15:06 (Oerzen 2)	
3	04:57	17:16 (Rep 11)   05:36	17:03 (Rep 11)   06:29	17:03 (Rep 11)   07:21	10:54 (Oerzen 1)   07:18	09:58 (Oerzen 1)   08:11	10:14 (Oerzen 2)	
4	21:49	77 18:33 (Rep 11)   21:14	99 18:42 (Rep 11)   20:08	113 19:26 (B 01)   18:56	138 18:01 (Rep 9)   16:47	178 16:17 (B 03)   16:06	134 15:07 (Oerzen 2)	
5	04:57	17:16 (Rep 11)   05:38	17:03 (Rep 11)   06:31	17:05 (Rep 11)   07:23	10:53 (Oerzen 1)   07:20	09:59 (Oerzen 1)   08:12	10:14 (Oerzen 2)	
6	21:49	78 18:34 (Rep 11)   21:12	100 18:43 (Rep 11)   20:06	109 19:26 (B 01)   18:54	139 17:59 (Rep 9)   16:45	176 16:15 (B 03)   16:05	132 15:06 (Oerzen 2)	
7	04:58	17:15 (Rep 11)   05:39	17:02 (Rep 11)   06:32	17:05 (Rep 11)   07:24	10:52 (Oerzen 1)   07:22	10:00 (Oerzen 1)   08:14	10:14 (Oerzen 2)	
8	21:48	78 18:33 (Rep 11)   21:10	100 18:42 (Rep 11)   20:04	107 19:25 (B 01)   18:51	139 17:56 (Rep 9)   16:44	173 16:13 (B 03)   16:04	134 15:07 (Oerzen 2)	
9	04:59	17:15 (Rep 11)   05:41	17:02 (Rep 11)   06:34	17:07 (Rep 11)   07:26	10:52 (Oerzen 1)   07:23	10:02 (Oerzen 1)   08:15	10:14 (Oerzen 2)	
10	21:48	79 18:34 (Rep 11)   21:08	101 18:43 (Rep 11)   20:01	103 19:25 (B 01)   18:49	137 17:53 (Rep 9)   16:42	168 16:11 (B 03)   16:04	134 15:07 (Oerzen 2)	
11	05:00	17:15 (Rep 11)   05:43	17:01 (Rep 11)   06:36	17:08 (Rep 11)   07:28	10:51 (Oerzen 1)   07:25	10:03 (Oerzen 1)   08:17	10:15 (Oerzen 2)	
12	21:47	80 18:35 (Rep 11)   21:07	101 18:42 (Rep 11)   19:59	99 19:24 (B 01)   18:46	153 17:50 (Rep 9)   16:40	160 16:08 (Rep 5)   16:03	133 15:08 (Oerzen 2)	
13	05:01	17:15 (Rep 11)   05:44	17:01 (Rep 11)   06:38	17:10 (Rep 11)   07:30	10:51 (Oerzen 1)   07:27	10:04 (Oerzen 1)   08:18	10:16 (Oerzen 2)	
14	21:47	80 18:35 (Rep 11)   21:05	101 18:42 (Rep 11)   19:56	94 19:23 (B 01)   18:44	164 17:50 (Rep 8)   16:38	154 16:06 (Rep 5)   16:03	131 15:07 (Oerzen 2)	
15	05:02	17:15 (Rep 11)   05:46	17:00 (Rep 11)   06:39	17:12 (Rep 11)   07:32	10:51 (Oerzen 1)   07:29	10:05 (Oerzen 1)   08:19	10:17 (Oerzen 2)	
16	21:46	81 18:36 (Rep 11)   21:03	102 18:42 (Rep 11)   19:54	89 19:23 (B 01)   18:42	170 17:50 (Rep 8)   16:36	144 15:50 (B 02)   16:02	131 15:08 (Oerzen 2)	
17	05:03	17:14 (Rep 11)   05:48	17:00 (Rep 11)   06:41	17:14 (Rep 11)   07:33	10:51 (Oerzen 1)   07:31	10:07 (Oerzen 1)   08:20	10:17 (Oerzen 2)	
18	21:45	82 18:36 (Rep 11)   21:01	102 18:42 (Rep 11)   19:52	85 19:21 (B 01)   18:39	174 17:50 (Rep 8)   16:35	139 15:51 (B 02)   16:02	131 15:08 (Oerzen 2)	
19	05:04	17:14 (Rep 11)   05:50	17:00 (Rep 11)   06:43	17:16 (Rep 11)   07:35	10:49 (Oerzen 1)   07:33	10:08 (Oerzen 1)   08:22	10:17 (Oerzen 2)	
20	21:45	82 18:36 (Rep 11)   20:59	102 18:42 (Rep 11)   19:49	82 19:20 (B 01)   18:37	179 17:48 (Rep 8)   16:33	136 15:51 (B 02)   16:02	130 15:08 (Oerzen 2)	
21	05:05	17:14 (Rep 11)   05:51	16:59 (Rep 11)   06:44	17:20 (Rep 11)   07:37	10:49 (Oerzen 1)   07:35	10:10 (Oerzen 1)   08:23	10:18 (Oerzen 2)	
22	21:44	83 18:37 (Rep 11)   20:57	102 18:41 (Rep 11)   19:47	77 19:19 (B 01)   18:35	183 17:48 (Rep 8)   16:31	130 15:51 (B 02)   16:02	130 15:08 (Oerzen 2)	
23	05:06	17:13 (Rep 11)   05:53	16:59 (Rep 11)   06:46	17:23 (Rep 11)   07:39	10:49 (Oerzen 1)   07:37	10:12 (Oerzen 1)   08:24	10:18 (Oerzen 2)	
24	21:43	84 18:37 (Rep 11)   20:55	102 18:41 (Rep 11)   19:44	70 19:16 (B 01)   18:32	184 17:47 (Rep 8)   16:30	124 15:51 (B 02)   16:01	128 15:08 (Oerzen 2)	
25	05:07	17:13 (Rep 11)   05:55	16:58 (Rep 11)   06:48	17:28 (Rep 9)   07:41	10:49 (Oerzen 1)   07:38	10:13 (Oerzen 1)   08:25	10:19 (Oerzen 2)	
26	21:42	84 18:37 (Rep 11)   20:53	102 18:40 (Rep 11)   19:42	62 19:14 (B 01)   18:30	185 17:46 (Rep 8)   16:28	119 15:50 (B 02)   16:01	130 15:10 (Oerzen 2)	
27	05:08	17:12 (Rep 11)   05:56	16:58 (Rep 11)   06:50	11:33 (Oerzen 1)   07:42	10:49 (Oerzen 1)   07:40	10:12 (Oerzen 1)   08:26	10:20 (Oerzen 2)	
28	21:41	86 18:38 (Rep 11)   20:51	102 18:40 (Rep 11)   19:40	74 19:11 (B 01)   18:28	185 17:45 (Rep 8)   16:26	127 15:50 (B 02)   16:01	129 15:10 (Oerzen 2)	
29	05:10	17:12 (Rep 11)   05:58	16:59 (Rep 11)   06:51	11:24 (Oerzen 1)   07:44	10:49 (Oerzen 1)   07:42	10:12 (Oerzen 1)   08:27	10:19 (Oerzen 2)	
30	21:40	86 18:38 (Rep 11)   20:49	101 18:40 (Rep 11)   19:37	81 18:13 (Rep 9)   17:46	184 17:44 (Rep 8)   16:25	128 15:50 (B 02)   16:01	129 15:09 (Oerzen 2)	
31	05:11	17:11 (Rep 11)   06:00	16:58 (Rep 11)   06:53	11:20 (Oerzen 1)   07:46	10:49 (Oerzen 1)   07:44	10:11 (Oerzen 1)   08:28	10:20 (Oerzen 2)	
32	21:39	87 18:38 (Rep 11)   20:47	101 18:39 (Rep 11)   19:35	93 18:14 (Rep 9)   18:23	184 17:43 (Rep 8)   16:23	129 15:49 (B 02)   16:01	128 15:10 (Oerzen 2)	
33	05:12	17:11 (Rep 11)   06:01	16:58 (Rep 11)   06:55	11:17 (Oerzen 1)   07:48	10:50 (Oerzen 1)   07:46	10:11 (Oerzen 1)   08:28	10:21 (Oerzen 2)	
34	21:38	88 18:39 (Rep 11)   20:44	101 18:39 (Rep 11)   19:32	101 18:14 (Rep 9)   18:21	180 17:41 (Rep 8)   16:22	130 15:49 (B 02)   16:02	128 15:10 (Oerzen 2)	
35	05:14	17:10 (Rep 11)   06:03	16:57 (Rep 11)   06:57	11:14 (Oerzen 1)   07:50	10:50 (Oerzen 1)   07:48	10:11 (Oerzen 1)   08:29	10:22 (Oerzen 2)	
36	21:36	89 18:39 (Rep 11)   20:42	101 18:38 (Rep 11)   19:30	109 18:14 (Rep 9)   18:19	176 17:38 (Rep 8)   16:20	126 15:47 (B 02)   16:02	126 15:11 (Oerzen 2)	
37	05:15	17:10 (Rep 11)   06:05	16:58 (Rep 11)   06:58	11:11 (Oerzen 1)   07:51	10:50 (Oerzen 1)   07:49	10:11 (Oerzen 1)   08:30	10:22 (Oerzen 2)	
38	21:35	89 18:39 (Rep 11)   20:40	100 18:38 (Rep 11)   19:27	114 18:13 (Rep 9)   18:17	169 17:34 (Rep 8)   16:19	125 15:45 (B 02)   16:02	127 15:12 (Oerzen 2)	
39	05:16	17:10 (Rep 11)   06:07	16:58 (Rep 11)   07:00	11:09 (Oerzen 1)   07:53	10:50 (Oerzen 1)   07:51	10:11 (Oerzen 1)   08:31	10:22 (Oerzen 2)	
40	21:34	91 18:41 (Rep 11)   20:38	99 18:37 (Rep 11)   19:25	119 18:13 (Rep 9)   18:14	162 16:15 (Rep 10)   16:18	124 15:44 (B 02)   16:02	127 15:11 (Oerzen 2)	
41	05:18	17:09 (Rep 11)   06:08	16:58 (Rep 11)   07:02	11:07 (Oerzen 1)   07:55	10:51 (Oerzen 1)   07:53	10:11 (Oerzen 1)   08:31	10:23 (Oerzen 2)	
42	21:33	92 18:41 (Rep 11)   20:36	98 18:36 (Rep 11)   19:23	124 18:13 (Rep 9)   18:12	167 17:07 (Rep 5)   16:17	121 15:43 (B 02)   16:03	128 15:12 (Oerzen 2)	
43	05:19	17:08 (Rep 11)   06:10	16:58 (Rep 11)   07:03	11:05 (Oerzen 1)   07:57	10:51 (Oerzen 1)   07:55	10:11 (Oerzen 1)   08:32	10:23 (Oerzen 2)	
44	21:31	92 18:40 (Rep 11)   20:34	98 18:36 (Rep 11)   19:20	127 18:12 (Rep 9)   18:10	174 17:10 (Rep 5)   16:15	120 15:02 (Oerzen 2)   16:03	128 15:12 (Oerzen 2)	
45	05:21	17:08 (Rep 11)   06:12	16:58 (Rep 11)   07:05	11:04 (Oerzen 1)   07:59	10:51 (Oerzen 1)   07:56	10:11 (Oerzen 1)   08:32	10:24 (Oerzen 2)	
46	21:30	93 18:41 (Rep 11)   20:31	96 18:34 (Rep 11)   19:18	129 18:11 (Rep 9)   18:08	177 17:12 (Rep 5)   16:14	123 15:03 (Oerzen 2)   16:04	128 15:13 (Oerzen 2)	
47	05:22	17:08 (Rep 11)   06:13	16:58 (Rep 11)   07:07	11:02 (Oerzen 1)   08:01	10:52 (Oerzen 1)   07:58	10:11 (Oerzen 1)   08:33	10:24 (Oerzen 2)	
48	21:28	93 18:41 (Rep 11)   20:29	105 19:17 (B 01)   19:15	133 18:11 (Rep 9)   18:06	179 17:13 (Rep 5)   16:13	126 15:04 (Oerzen 2)   16:04	126 15:13 (Oerzen 2)	
49	05:24	17:07 (Rep 11)   06:15	16:59 (Rep 11)   07:09	11:01 (Oerzen 1)   07:03	09:52 (Oerzen 1)   08:00	10:12 (Oerzen 1)   08:33	10:24 (Oerzen 2)	
50	21:27	94 18:41 (Rep 11)   20:27	111 19:21 (B 01)   19:13	135 18:10 (Rep 9)   17:04	181 16:14 (Rep 5)   16:12	127 15:04 (Oerzen 2)   16:05	127 15:14 (Oerzen 2)	
51	05:25	17:07 (Rep 11)   06:17	16:58 (Rep 11)   07:10	10:59 (Oerzen 1)   07:05	09:53 (Oerzen 1)   08:02	10:12 (Oerzen 1)   08:33	10:25 (Oerzen 2)	
52	21:25	95 18:42 (Rep 11)   20:25	114 19:22 (B 01)   19:10	137 18:09 (Rep 9)   17:01	180 16:14 (Rep 5)   16:11	128 15:05 (Oerzen 2)   16:06	126 15:14 (Oerzen 2)	
53	05:27	17:06 (Rep 11)   06:19	16:59 (Rep 11)   07:12	10:58 (Oerzen 1)   07:06	09:54 (Oerzen 1)   08:03	10:11 (Oerzen 1)   08:34	10:26 (Oerzen 2)	
54	21:24	96 18:42 (Rep 11)   20:22	115 19:23 (B 01)   19:08	138 18:08 (Rep 9)   16:59	179 16:15 (Rep 5)   16:10	131 15:05 (Oerzen 2)   16:06	129 15:16 (Oerzen 2)	
55	05:28	17:06 (Rep 11)   06:20	17:00 (Rep 11)   07:14	10:58 (Oerzen 1)   07:08	09:54 (Oerzen 1)   08:05	10:12 (Oerzen 1)   08:34	10:26 (Oerzen 2)	
56	21:22	96 18:42 (Rep 11)   20:20	116 19:25 (B 01)   19:06	137 18:07 (Rep 9)   16:57	179 16:15 (Rep 5)   16:09	131 15:05 (Oerzen 2)   16:07	128 15:16 (Oerzen 2)	
57	05:30	17:05 (Rep 11)   06:22	17:00 (Rep 11)   07:16	10:57 (Oerzen 1)   07:10	09:55 (Oerzen 1)   08:06	10:13 (Oerzen 1)   08:34	10:27 (Oerzen 2)	
58	21:21	97 18:42 (Rep 11)   20:18	116 19:25 (B 01)   19:03	138 18:06 (Rep 9)   16:55	176 16:15 (Rep 5)   16:08	131 15:06 (Oerzen 2)   16:08	129 15:17 (Oerzen 2)	
59	05:31	17:05 (Rep 11)   06:24	17:01 (Rep 11)   07:17	10:55 (Oerzen 1)   07:12	09:56 (Oerzen 1)   08:08	10:13 (Oerzen 1)   08:34	10:27 (Oerzen 2)	
60	21:19	98 18:43 (Rep 11)   20:15	115 19:25 (B 01)   19:01	138 18:04 (Rep 9)   16:53	176 16:17 (B 03)   16:07	132 15:06 (Oerzen 2)   16:09	128 15:17 (Oerzen 2)	
61	05:33	17:04 (Rep 11)   06:26	17:02 (Rep 11)   07:19	10:54 (Oerzen 1)   07:14	09:56 (Oerzen 1)   08:08	10:13 (Oerzen 1)   08:34	10:27 (Oerzen 2)	
62	21:17	98 18:42 (Rep 11)   20:13	115 19:26 (B 01)   19:01	138 18:04 (Rep 9)   16:51	176 16:18 (B 03)   16:07	132 15:06 (Oerzen 2)   16:10	130 15:17 (Oerzen 2)	
63	Sonnenscheinstunden	509	458	382	329	261	237	4010
64	astr.max.mögl.Beschattung	2705	3217	3231	5267	4132	4010	

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
	Sonnenuntergang (SS:MM)			



## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s35 - Südergellersen, Heidberg 3

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:34	09:48 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10
16:11	10	09:58 (Oerzen 1)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	09:49 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
16:13	9	09:58 (Oerzen 1)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	09:51 (Oerzen 1)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:13
16:14	7	09:58 (Oerzen 1)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	09:54 (Oerzen 1)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
16:15	1	09:55 (Oerzen 1)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	08:15
16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	16:04	
6	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	08:17
16:17	17:11	18:05	20:02	20:56	21:41	21:48	21:07	19:59	18:46	16:40	16:03	16:03	
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	08:18
16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38	16:03	16:03	
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	08:19
16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	16:02	
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	08:20
16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	16:02	6 09:40 (Oerzen 1)
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22	08:22
16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	16:02	9 09:47 (Oerzen 1)
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23	08:23
16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	16:02	10 09:48 (Oerzen 1)
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	08:24
16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	16:01	12 09:50 (Oerzen 1)
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	08:25
16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	16:01	13 09:51 (Oerzen 1)
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	08:26
16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	16:01	14 09:52 (Oerzen 1)
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	08:27
16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	16:01	15 09:53 (Oerzen 1)
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	08:28
16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	16:01	15 09:53 (Oerzen 1)
17	08:25	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29	08:29
16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:45	19:32	18:21	16:22	16:02	16:02	16 09:54 (Oerzen 1)
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	08:29
16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:21	16:02	16:02	16 09:55 (Oerzen 1)
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	08:30
16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	16:02	17 09:56 (Oerzen 1)
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	08:31
16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	16:02	17 09:56 (Oerzen 1)
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	08:31
16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03	16:03	17 09:57 (Oerzen 1)
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	08:32
16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	16:03	17 09:57 (Oerzen 1)
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	08:32
16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	16:04	17 09:58 (Oerzen 1)
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33	08:33
16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	16:04	17 09:58 (Oerzen 1)
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33	08:33
16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05	16:05	16 09:58 (Oerzen 1)
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33	08:33
16:50	17:50	18:42	20:38	21:28	21:51	21:26	20:25	19:10	17:01	16:11	16:06	16:06	16 09:59 (Oerzen 1)
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34	08:34
16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06	16:06	15 09:59 (Oerzen 1)
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34	08:34
16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07	16:07	15 09:59 (Oerzen 1)
29	08:10	07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34	08:34	08:34
16:56	19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08	16:08	16:08	14 09:59 (Oerzen 1)
30	08:08	07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34	08:34	08:34
16:58	19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09	16:09	16:09	13 09:59 (Oerzen 1)
31	08:07	06:58	05:50	05:00	05:33	06:26	07:14	07:14	07:14	08:10	08:34	08:34	08:34
17:00	19:51	20:47	21:34	21:50	21:17	20:13	16:51	16:51	16:51	16:10	16:10	16:10	12 09:59 (Oerzen 1)
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237	329
astr.max.mögl.Beschattung	27												

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s36 - Südergellersen, Heiligenthaler Weg 2

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:34	14:40 (Rep 8)	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10	14:55 (B 01)
	16:11	35 15:34 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	25 15:20 (B 01)
2	08:34	14:42 (Rep 8)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	14:55 (B 01)
	16:12	32 15:35 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	26 15:21 (B 01)
3	08:34	14:45 (Rep 8)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12	14:56 (B 01)
	16:14	28 15:36 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	26 15:22 (B 01)
4	08:33	15:09 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	14:56 (B 01)
	16:15	27 15:36 (B 01)	17:07	18:01	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	26 15:22 (B 01)
5	08:33	15:10 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	14:56 (B 01)
	16:16	27 15:37 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	27 15:23 (B 01)
6	08:33	15:10 (B 01)	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25	08:17	14:56 (B 01)
	16:17	27 15:37 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	27 15:23 (B 01)
7	08:32	15:10 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	14:56 (B 01)
	16:19	27 15:37 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	27 15:23 (B 01)
8	08:32	15:11 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	14:57 (B 01)
	16:20	27 15:38 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	27 15:24 (B 01)
9	08:31	15:12 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	14:34 (Rep 8)
	16:21	26 15:38 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	27 15:24 (B 01)
10	08:31	15:12 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22	14:31 (Rep 8)
	16:23	26 15:38 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	32 15:24 (B 01)
11	08:30	15:12 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23	14:30 (Rep 8)
	16:24	26 15:38 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	35 15:24 (B 01)
12	08:29	15:13 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	14:31 (Rep 8)
	16:26	25 15:38 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	35 15:25 (B 01)
13	08:29	15:14 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38	08:25	14:30 (Rep 8)
	16:27	24 15:38 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	37 15:25 (B 01)
14	08:28	15:14 (B 01)	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	14:30 (Rep 8)
	16:29	24 15:38 (B 01)	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	38 15:25 (B 01)
15	08:27	15:15 (B 01)	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	14:30 (Rep 8)
	16:31	23 15:38 (B 01)	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	38 15:25 (B 01)
16	08:26	15:16 (B 01)	07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	08:28	14:32 (Rep 9)
	16:32	23 15:39 (B 01)	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	41 15:24 (B 01)
17	08:25	15:17 (B 01)	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:28	14:31 (Rep 9)
	16:34	21 15:38 (B 01)	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	44 15:24 (B 01)
18	08:24	15:18 (B 01)	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	14:32 (Rep 9)
	16:36	20 15:38 (B 01)	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	44 15:25 (B 01)
19	08:23	15:20 (B 01)	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	14:32 (Rep 9)
	16:37	18 15:38 (B 01)	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	45 15:25 (B 01)
20	08:22	15:21 (B 01)	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	14:59 (B 01)	08:31
	16:39	16 15:37 (B 01)	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	10 15:09 (B 01)	16:02
21	08:21	15:23 (B 01)	07:27	06:22	06:09	05:12	04:52	05:18	06:08	07:02	07:55	07:53	14:58 (B 01)	08:31
	16:41	13 15:36 (B 01)	17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	13 15:11 (B 01)	16:03
22	08:19	15:24 (B 01)	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	14:57 (B 01)	08:32
	16:43	10 15:34 (B 01)	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16 15:13 (B 01)	16:03
23	08:18	15:25 (B 01)	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:56	14:56 (B 01)	08:32
	16:45	17 15:38 (B 01)	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	18 15:14 (B 01)	16:04
24	08:17	15:26 (B 01)	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	14:55 (B 01)	08:33
	16:46	17 15:38 (B 01)	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	20 15:15 (B 01)	16:04
25	08:16	15:27 (B 01)	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	14:55 (B 01)	08:33
	16:48	17 15:38 (B 01)	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	22 15:17 (B 01)	16:05
26	08:14	15:28 (B 01)	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	14:55 (B 01)	08:33
	16:50	17 15:38 (B 01)	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	23 15:18 (B 01)	16:06
27	08:13	15:29 (B 01)	07:13	06:07	05:56	05:05	04:53	05:27	06:19	07:12	07:06	08:03	14:55 (B 01)	08:34
	16:52	17 15:38 (B 01)	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	24 15:19 (B 01)	16:06
28	08:11	15:30 (B 01)	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	14:54 (B 01)	08:34
	16:54	17 15:38 (B 01)	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:09	24 15:18 (B 01)	16:07
29	08:10	15:31 (B 01)	07:10	06:05	05:52	05:02	04:55	05:30	06:22	07:16	07:10	08:06	14:55 (B 01)	08:34
	16:56	17 15:38 (B 01)	17:56	18:48	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:08	24 15:19 (B 01)	16:08
30	08:08	15:32 (B 01)	07:08	06:03	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	14:55 (B 01)	08:34
	16:58	17 15:38 (B 01)	17:58	18:50	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:07	25 15:20 (B 01)	16:09
31	08:07	15:33 (B 01)	07:07	06:02	05:50	05:00	04:55	05:33	06:26	07:19	07:14	08:09	14:56 (B 01)	08:34
	17:00	17 15:38 (B 01)	17:59	18:51	20:46	21:34	21:51	21:17	20:13	19:00	18:00	16:07	25 15:20 (B 01)	16:09
Sonnenscheinstunden	253		275	367	419	491	506	509	458	382	329	261	219	1139
astr.max.mögl.Beschattung		525												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)	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
	Minuten mit Schatten	

Projekt:  
**Süderheide**

Lizenzierter Anwender:  
**SOWIWAS - Energie GmbH**  
Watenstedter Straße 11  
DE-38384 Gevensleben  
+49 0 53 54 / 99 06 - 235  
/ gutachten@sowiwas.de  
Berechnet:  
21.07.2025 15:59/4.1.287

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s37 - Südergellersen, Heiligenthaler Weg 3

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember				
1	08:34	14:56 (B 01)	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10	14:45 (B 01)		
1	16:11	26	15:22 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	20	15:05 (B 01)
2	08:34	14:57 (B 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	14:45 (B 01)		
2	16:12	25	15:22 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	21	15:06 (B 01)
3	08:34	14:58 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12	14:46 (B 01)		
3	16:14	25	15:23 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	21	15:07 (B 01)
4	08:33	14:58 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	14:45 (B 01)		
4	16:15	25	15:23 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	23	15:08 (B 01)
5	08:33	14:59 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	14:45 (B 01)		
5	16:16	24	15:23 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	24	15:09 (B 01)
6	08:33	14:59 (B 01)	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25	08:17	14:45 (B 01)		
6	16:17	24	15:23 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	24	15:09 (B 01)
7	08:32	14:59 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	14:45 (B 01)		
7	16:19	24	15:23 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	24	15:09 (B 01)
8	08:32	15:01 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	14:46 (B 01)		
8	16:20	23	15:24 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	25	15:11 (B 01)
9	08:31	15:01 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	14:46 (B 01)		
9	16:21	22	15:23 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	25	15:11 (B 01)
10	08:31	15:02 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22	14:46 (B 01)		
10	16:23	21	15:23 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	25	15:11 (B 01)
11	08:30	15:03 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23	14:46 (B 01)		
11	16:24	20	15:23 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	26	15:12 (B 01)
12	08:29	15:04 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	14:46 (B 01)		
12	16:26	18	15:22 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	26	15:13 (B 01)
13	08:29	15:06 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38	08:25	14:47 (B 01)		
13	16:27	17	15:23 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	27	15:14 (B 01)
14	08:28	15:07 (B 01)	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	14:46 (B 01)		
14	16:29	14	15:21 (B 01)	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	26	15:14 (B 01)
15	08:27	15:08 (B 01)	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	14:46 (B 01)		
15	16:31	12	15:20 (B 01)	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	27	15:15 (B 01)
16	08:26	15:11 (B 01)	07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	08:28	14:48 (B 01)		
16	16:32	7	15:18 (B 01)	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	26	15:14 (B 01)
17	08:25	15:13 (B 01)	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29	14:48 (B 01)		
17	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	16:02	27	15:15 (B 01)	
18	08:24	15:14 (B 01)	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	14:49 (B 01)		
18	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	16:02	27	15:16 (B 01)	
19	08:23	15:15 (B 01)	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	14:50 (B 01)		
19	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	16:02	26	15:16 (B 01)	
20	08:22	15:16 (B 01)	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	14:50 (B 01)		
20	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	16:02	26	15:16 (B 01)	
21	08:21	15:17 (B 01)	07:27	06:22	06:09	05:12	04:52	05:18	06:08	07:02	07:55	07:53	08:31	14:50 (B 01)		
21	16:41	17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03	16:03	27	15:17 (B 01)	
22	08:19	15:18 (B 01)	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	14:50 (B 01)		
22	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	16:03	27	15:17 (B 01)	
23	08:18	15:19 (B 01)	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:56	08:32	14:52 (B 01)		
23	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	16:04	26	15:18 (B 01)	
24	08:17	15:20 (B 01)	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33	14:52 (B 01)		
24	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	16:04	26	15:18 (B 01)	
25	08:16	15:21 (B 01)	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33	14:52 (B 01)		
25	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05	16:05	27	15:19 (B 01)	
26	08:14	15:22 (B 01)	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33	14:53 (B 01)		
26	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	7	14:57 (B 01)	16:06	27	15:20 (B 01)
27	08:13	15:23 (B 01)	07:13	06:07	05:56	05:05	04:53	05:27	06:19	07:12	07:06	08:03	08:34	14:54 (B 01)		
27	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	11	15:00 (B 01)	16:06	26	15:20 (B 01)
28	08:11	15:24 (B 01)	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34	14:54 (B 01)		
28	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:10	14	15:01 (B 01)	16:07	26	15:20 (B 01)
29	08:10	15:25 (B 01)	07:02	05:52	05:02	04:55	05:30	06:22	07:16	07:10	08:06	08:34	14:54 (B 01)			
29	16:56	17:56	18:48	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:10	17	15:03 (B 01)	16:08	27	15:21 (B 01)
30	08:08	15:26 (B 01)	07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34	14:55 (B 01)			
30	16:58	17:58	18:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:10	18	15:04 (B 01)	16:09	26	15:21 (B 01)
31	08:07	15:27 (B 01)	06:58	05:50	05:00	04:55	05:33	06:26	07:19	07:14	08:09	08:34	14:55 (B 01)			
31	17:00	18:00	19:51	21:34	21:50	21:17	20:13	19:06	18:00	17:00	16:00	16:10	16:10	26	15:21 (B 01)	
Sonnenscheinstunden	253		275	367	419	491	506	509	458	382	329	261	237			787
astr.max.mögl.Beschattung		327										67				

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s38 - Südergellersen, Heiligenthaler Weg 3c

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:34		07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10	
1	16:11	14:59 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	
2	08:34	15:24 (B 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	
2	16:12	15:25 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	
3	08:34	15:01 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	
4	16:14	15:25 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	
4	08:33	15:01 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	
5	16:15	15:25 (B 01)	17:07	18:01	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	
5	08:33	15:02 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	
6	16:16	15:26 (B 01)	17:09	18:03	19:59	20:54	21:40	21:48	21:09	20:01	18:49	16:42	
6	08:33	15:02 (B 01)	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25	
6	16:17	15:26 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	
7	08:32	15:02 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	
7	16:19	15:25 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	
8	08:32	15:04 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	
8	16:20	15:26 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	
9	08:31	15:04 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	
9	16:21	15:26 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	
10	08:31	15:05 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	
10	16:23	15:26 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	
11	08:30	15:06 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	
11	16:24	15:25 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	
12	08:29	15:07 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	
12	16:26	15:25 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	
13	08:29	15:09 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38	
13	16:27	15:26 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	
14	08:28	15:09 (B 01)	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	
14	16:29	15:24 (B 01)	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	
15	08:27	15:11 (B 01)	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	
15	16:31	15:23 (B 01)	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	
16	08:26	15:13 (B 01)	07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	
16	16:32	15:22 (B 01)	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	
17	08:25		07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	
17	16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	
18	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	
18	16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	
19	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	
19	16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	
20	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	
20	16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	
21	08:21		07:27	06:22	06:09	05:12	04:52	05:18	06:08	07:02	07:55	07:53	
21	16:41		17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	
22	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	
22	16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	
23	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:56	
23	16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	
24	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:06	08:01	07:58	
24	16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	
25	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	
25	16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	
26	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	
26	16:50		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	
27	08:13		07:13	06:07	05:56	05:05	04:53	05:27	06:19	07:12	07:06	08:03	
27	16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	
28	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	
28	16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	
29	08:10		07:02	05:52	05:02	04:55	05:30	06:22	07:16	07:10	08:06	08:06	
29	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	17	
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:08	
30	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	18	
31	08:07		06:58	05:50	05:00	04:54	05:33	06:26	07:19	07:14	08:09	08:09	
31	17:00		19:51	20:47	21:34	21:50	21:17	20:13	19:00	16:51	16:07	18	
Sonnenscheinstunden	253		275	367	419	491	506	509	458	382	329	261	70
astr.max.mögl.Beschattung		324											771

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s39 - Südergellersen, Heiligenthaler Weg 11

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember				
1	08:34		07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10	14:54 (B 01)			
1	16:11	25	15:31 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	22	15:16 (B 01)
2	08:34		08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	16:06	23	15:17 (B 01)
2	16:12	25	15:32 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	23	15:17 (B 01)
3	08:34		08:02	07:04	06:50	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12	16:05	23	15:18 (B 01)
3	16:14	25	15:33 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	23	15:18 (B 01)
4	08:33		08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	16:04	24	15:18 (B 01)
4	16:15	25	15:33 (B 01)	17:07	18:01	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	24	15:18 (B 01)
5	08:33		07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	16:03	24	15:19 (B 01)
5	16:16	25	15:34 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	24	15:19 (B 01)
6	08:33		07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25	08:17	16:03	25	15:20 (B 01)
6	16:17	24	15:33 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	25	15:20 (B 01)
7	08:32		07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	16:02	25	15:21 (B 01)
7	16:19	24	15:33 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	25	15:20 (B 01)
8	08:32		07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	16:02	25	15:21 (B 01)
8	16:20	24	15:34 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	25	15:21 (B 01)
9	08:31		07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	16:01	25	15:21 (B 01)
9	16:21	23	15:34 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	25	15:21 (B 01)
10	08:31		07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22	16:01	25	15:21 (B 01)
10	16:23	23	15:34 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	25	15:21 (B 01)
11	08:30		07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23	16:01	25	15:21 (B 01)
11	16:24	22	15:34 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	25	15:21 (B 01)
12	08:29		07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	16:01	25	15:21 (B 01)
12	16:26	22	15:34 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	25	15:23 (B 01)
13	08:29		07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38	08:25	16:01	25	15:23 (B 01)
13	16:27	21	15:34 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	25	15:23 (B 01)
14	08:28		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	16:01	25	15:23 (B 01)
14	16:29	20	15:34 (B 01)	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	25	15:24 (B 01)
15	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	16:01	25	15:24 (B 01)
15	16:31	19	15:34 (B 01)	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	25	15:24 (B 01)
16	08:26		07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	08:28	16:01	25	15:24 (B 01)
16	16:32	18	15:34 (B 01)	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	25	15:24 (B 01)
17	08:25		07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:28	16:01	25	15:24 (B 01)
17	16:34	15	15:33 (B 01)	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	25	15:24 (B 01)
18	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	16:02	25	15:24 (B 01)
18	16:36	14	15:33 (B 01)	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	25	15:25 (B 01)
19	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:51	07:49	08:30	16:02	25	15:25 (B 01)
19	16:37	9	15:31 (B 01)	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	24	15:25 (B 01)
20	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	16:02	24	15:25 (B 01)
20	16:39	3	15:28 (B 01)	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	24	15:25 (B 01)
21	08:21		07:27	06:22	06:09	05:12	04:52	05:18	06:08	07:02	07:55	07:53	08:31	16:02	24	15:25 (B 01)
21	16:41		17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03	24	15:26 (B 01)	
22	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	8:32	16:03	24	15:26 (B 01)
22	16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	24	15:26 (B 01)	
23	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:56	8:32	16:03	24	15:26 (B 01)
23	16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	24	15:27 (B 01)	
24	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	8:33	16:04	24	15:27 (B 01)
24	16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	24	15:27 (B 01)	
25	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	8:33	16:04	24	15:27 (B 01)
25	16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05	25	15:28 (B 01)	
26	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	8:33	16:05	25	15:28 (B 01)
26	16:50		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06	25	15:29 (B 01)	
27	08:13		07:13	06:07	05:56	05:05	04:53	05:27	06:19	07:12	07:06	08:03	8:34	16:05	25	15:29 (B 01)
27	16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06	24	15:29 (B 01)	
28	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	8:34	16:05	25	15:30 (B 01)
28	16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07	25	15:30 (B 01)	
29	08:10		07:10	06:05	05:52	05:02	04:55	05:30	06:22	07:16	07:10	08:06	8:34	16:05	25	15:30 (B 01)
29	16:56		17:56	18:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08	25	15:30 (B 01)	
30	08:08		07:08	06:03	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	8:34	16:05	25	15:31 (B 01)
30	16:58		17:58	18:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09	25	15:31 (B 01)	
31	08:07		07:07	06:02	05:50	05:00	04:55	05:33	06:26	07:19	07:14	08:09	8:34	16:05	25	15:31 (B 01)
31	17:00		18:00	19:51	21:34	23:17	21:17	20:13	19:06	16:51	16:05	16:10	16:10	24	15:30 (B 01)	
Sonnenscheinstunden	253		275	367	419	491	506	509	458	382	329	261	139		237	758
astr.max.mögl.Beschattung	406															

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s40 - Südergellersen, Im Alten Dorfe 2

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:34	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	
	16:13	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12	
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	
6	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	
	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22	
	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23	
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	10:03 (Oerzen 1)
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	5 10:08 (Oerzen 1)
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	10:02 (Oerzen 1)
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	8 10:10 (Oerzen 1)
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	10:02 (Oerzen 1)
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	9 10:11 (Oerzen 1)
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	10:01 (Oerzen 1)
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	11 10:12 (Oerzen 1)
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	10:01 (Oerzen 1)
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	11 10:12 (Oerzen 1)
17	08:25	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29	10:01 (Oerzen 1)
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	12 10:13 (Oerzen 1)
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	10:01 (Oerzen 1)
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	13 10:14 (Oerzen 1)
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	10:02 (Oerzen 1)
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	13 10:15 (Oerzen 1)
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	10:02 (Oerzen 1)
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	13 10:15 (Oerzen 1)
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	10:02 (Oerzen 1)
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03	14 10:16 (Oerzen 1)
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	10:02 (Oerzen 1)
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	14 10:16 (Oerzen 1)
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	10:03 (Oerzen 1)
	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	14 10:17 (Oerzen 1)
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33	10:04 (Oerzen 1)
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	13 10:17 (Oerzen 1)
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00	08:33	10:04 (Oerzen 1)
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05	13 10:17 (Oerzen 1)
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02	08:33	10:06 (Oerzen 1)
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	16:06	12 10:18 (Oerzen 1)
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03	08:34	10:06 (Oerzen 1)
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06	12 10:18 (Oerzen 1)
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05	08:34	10:07 (Oerzen 1)
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:09	16:07	11 10:18 (Oerzen 1)
29	08:10		07:03	05:52	05:03	04:55	05:30	06:22	07:16	08:10	08:06	08:34	10:08 (Oerzen 1)
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:08	16:08	10 10:18 (Oerzen 1)
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	08:08	08:34	10:09 (Oerzen 1)
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:07	16:09	9 10:18 (Oerzen 1)
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34	10:11 (Oerzen 1)
	17:00		19:51		21:34		21:17	20:13		16:51		16:10	6 10:17 (Oerzen 1)
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237	223
astr.max.mögl.Beschattung													

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s41 - Südergellersen, Im Alten Dorfe 3

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:13	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22
	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28
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	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03
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23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
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24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33
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25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10		07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s42 - Südergellersen, Im Alten Dorfe 4

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember			
1	08:34	10:16 (Oerzen 1)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	14:17 (B 01)	
16:11	45	14:47 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	6	14:23 (B 01)
2	08:34	10:19 (Oerzen 1)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	14:15 (B 01)	
16:13	36	14:47 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	11	14:26 (B 01)
3	08:34	14:23 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12	14:14 (B 01)	
16:14	24	14:47 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	15	14:29 (B 01)
4	08:33	14:23 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	14:13 (B 01)	
16:15	24	14:47 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	17	14:30 (B 01)
5	08:33	14:25 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	14:13 (B 01)	
16:16	22	14:47 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	19	14:32 (B 01)
6	08:33	14:26 (B 01)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	14:12 (B 01)	
16:17	20	14:46 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	20	14:32 (B 01)
7	08:32	14:26 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	14:11 (B 01)	
16:19	20	14:46 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	22	14:33 (B 01)
8	08:32	14:28 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	14:12 (B 01)	
16:20	18	14:46 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	23	14:35 (B 01)
9	08:31	14:30 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	14:11 (B 01)	
16:21	15	14:45 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	24	14:35 (B 01)
10	08:31	14:32 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22	10:08 (Oerzen 1)	
16:23	11	14:43 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	36	14:36 (B 01)
11	08:30	14:34 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23	10:07 (Oerzen 1)	
16:24	7	14:41 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	44	14:37 (B 01)
12	08:29		07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	10:07 (Oerzen 1)	
16:26		17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	16:01	49	14:38 (B 01)
13	08:29		07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25	10:07 (Oerzen 1)	
16:27		17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	16:01	53	14:39 (B 01)
14	08:28		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	10:06 (Oerzen 1)	
16:29		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	16:01	58	14:40 (B 01)
15	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	10:07 (Oerzen 1)	
16:31		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	16:01	59	14:40 (B 01)
16	08:26		07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	10:06 (Oerzen 1)	
16:32		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	16:01	61	14:40 (B 01)
17	08:25		07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29	10:06 (Oerzen 1)	
16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	16:02	64	14:41 (B 01)
18	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	10:07 (Oerzen 1)	
16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	16:02	64	14:42 (B 01)
19	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	10:07 (Oerzen 1)	
16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	16:02	65	14:42 (B 01)
20	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	10:07 (Oerzen 1)	
16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	16:02	66	14:42 (B 01)
21	08:21		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	10:08 (Oerzen 1)	
16:41		17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03	16:03	66	14:43 (B 01)
22	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	10:08 (Oerzen 1)	
16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	16:03	66	14:43 (B 01)
23	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	10:09 (Oerzen 1)	
16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	16:04	66	14:44 (B 01)
24	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33	10:09 (Oerzen 1)	
16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	16:04	65	14:44 (B 01)
25	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00	08:33	10:09 (Oerzen 1)	
16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05	16:05	66	14:45 (B 01)
26	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02	08:33	10:11 (Oerzen 1)	
16:50		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	16:06	16:06	64	14:46 (B 01)
27	08:13		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:03	08:34	10:11 (Oerzen 1)	
16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06	16:06	62	14:46 (B 01)
28	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05	08:34	10:12 (Oerzen 1)	
16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:09	16:07	16:07	61	14:46 (B 01)
29	08:10			07:03	05:52	05:03	04:55	05:30	06:22	07:16	08:10	08:06	08:34	10:13 (Oerzen 1)	
16:56			19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:08	16:08	16:08	58	14:46 (B 01)
30	08:08			07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	08:08	08:34	10:14 (Oerzen 1)	
16:58			19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:07	16:09	16:09	54	14:47 (B 01)
31	08:07					05:00		05:33		06:26		07:14	08:34	10:15 (Oerzen 1)	
17:00			19:51		21:34		21:17	20:13		16:51		16:10	16:10	52	14:47 (B 01)
Sonnenscheinstunden	253		275	367	419	491	506	509	458	382	329	261	237	1456	
astr.max.mögl.Beschattung	242														

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s43 - Südergellersen, Im Alten Dorfe 5

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	14:33 (B 01)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	08:10
2	16:11	14:39 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49
3	08:34		08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	08:11
4	16:12		17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47
5	08:34		08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	08:12
6	16:14		17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45
7	08:34		08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	08:14
8	16:15		17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44
9	08:33		07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	08:15
10	16:16		17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42
11	08:33		07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	08:17
12	16:17		17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40
13	08:32		07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	08:18
14	16:19		17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38
15	08:32		07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	08:19
16	16:20		17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36
17	08:31		07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	08:20
18	16:21		17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35
19	08:31		07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	08:22
20	16:23		17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33
21	08:30		07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	08:23
22	16:24		17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31
23	08:29		07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	08:24
24	16:26		17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30
25	08:29		07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	08:25
26	16:27		17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28
27	08:28		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	08:26
28	16:29		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26
29	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	08:27
30	16:31		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25
31	08:26		07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	08:28
1	16:32		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23
2	08:25		07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	08:29
3	16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22
4	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	08:29
5	16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20
6	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	08:30
7	16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19
8	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	08:31
9	16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18
10	08:21		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	08:31
11	16:41		17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17
12	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	08:32
13	16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15
14	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	08:32
15	16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14
16	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	08:33
17	16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13
18	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:33
19	16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12
20	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:33
21	16:50		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11
22	08:13		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	08:06	08:34
23	16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10
24	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:34
25	16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:07
26	08:10			07:03	05:52	05:03	04:55	05:30	06:22	07:16	08:10	08:34
27	16:56			19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:08
28	08:08			07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:12	08:34
29	16:58			19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:07
30	08:07			06:58		05:00		05:33	06:26		07:14	08:34
31	17:00			19:51		21:34		21:17	20:13		16:51	16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung	6											274

**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	



Projekt:  
**Süderheide**

Lizenzierter Anwender:  
**SOWIWAS - Energie GmbH**  
Watenstedter Straße 11  
DE-38384 Gevensleben  
+49 0 53 54 / 99 06 - 235  
/ gutachten@sowiwas.de  
Berechnet: 21.07.2025 15:59/4.1.287

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s45 - Südergellersen, Im Alten Dorfe 8

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34											
1	16:11	14:32 (B 01)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16
2	08:34	14:58 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49
2	16:12	14:33 (B 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18
3	08:34	14:58 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47
3	16:14	14:34 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20
4	08:33	14:58 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45
4	16:15	14:34 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22
5	08:33	14:58 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44
5	16:16	14:35 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23
6	08:33	14:58 (B 01)	17:09	18:03	19:59	20:54	21:40	21:48	21:09	20:01	18:49	16:42
6	16:17	14:36 (B 01)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25
7	08:32	14:58 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40
7	16:19	14:37 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27
8	08:32	14:57 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38
8	16:20	14:39 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29
9	08:31	14:58 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36
9	16:21	14:40 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31
10	08:31	14:57 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35
10	16:23	14:41 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33
11	08:30	14:56 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33
11	16:24	14:43 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35
12	08:29	14:55 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31
12	16:26	14:45 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37
13	08:29	14:53 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30
13	16:27	14:47 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39
14	08:28	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	16:29	14:41 (B 01)	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40
15	08:27	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	16:31	14:39 (B 01)	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42
16	08:26	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	16:32	14:43 (B 01)	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44
17	08:25	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	16:34	14:45 (B 01)	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46
18	08:24	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02
18	16:36	14:41 (B 01)	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48
19	08:23	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	16:37	14:43 (B 01)	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49
20	08:22	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	16:39	14:45 (B 01)	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51
21	08:21	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	16:41	14:47 (B 01)	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53
22	08:19	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03
22	16:43	14:49 (B 01)	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55
23	08:18	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	16:45	14:51 (B 01)	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57
24	08:17	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04
24	16:46	14:53 (B 01)	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58
25	08:16	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	16:48	14:55 (B 01)	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00
26	08:14	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05
26	16:50	14:57 (B 01)	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02
27	08:13	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	16:06
27	16:52	14:59 (B 01)	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03
28	08:11	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06
28	16:54	14:59 (B 01)	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05
29	08:10	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:09	16:07
29	16:56	15:01 (B 01)	07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34
30	08:08	19:47	20:43	21:32	21:50	21:21	20:18	19:03	18:00	17:00	16:08	16:08
30	16:58	15:03 (B 01)	07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	14:27 (B 01)
31	08:07	19:49	20:45	21:33	21:50	21:19	20:15	19:01	18:00	17:00	16:07	16:09
31	17:00	15:05 (B 01)	06:58	05:50	05:00	04:54	05:33	06:26	07:14	07:14	08:10	14:35 (B 01)
Sonnenscheinstunden	253		275	367	419	506	509	458	382	329	261	237
astr.max.mögl.Beschattung	235									8		784

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s46 - Südergellersen, Im Alten Dorfe 10A

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember			
1	08:34		07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	14:31 (B 01)		
	16:11	14:39 (B 01)	17:01	17:56	19:53	20:47	21:35	21:16	20:11	18:58	16:49	16:06	15 14:46 (B 01)		
2	08:34	14:40 (B 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	08:11	14:30 (B 01)		
	16:12	15:06 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	18 14:48 (B 01)	
3	08:34	14:41 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	08:12	14:30 (B 01)		
	16:14	15:06 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	19 14:49 (B 01)	
4	08:33	14:41 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	08:14	14:29 (B 01)		
	16:15	15:06 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	21 14:50 (B 01)	
5	08:33	14:43 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	08:15	14:30 (B 01)		
	16:16	15:06 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	22 14:52 (B 01)	
6	08:33	14:43 (B 01)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	08:17	14:29 (B 01)		
	16:17	15:06 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	23 14:52 (B 01)	
7	08:32	14:44 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	08:18	14:29 (B 01)		
	16:19	15:05 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	23 14:52 (B 01)	
8	08:32	14:45 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	08:19	14:29 (B 01)		
	16:20	15:06 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	25 14:54 (B 01)	
9	08:31	14:46 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	08:20	14:29 (B 01)		
	16:21	15:05 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	25 14:54 (B 01)	
10	08:31	14:47 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	08:22	14:29 (B 01)		
	16:23	15:05 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	26 14:55 (B 01)	
11	08:30	14:49 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	08:23	14:29 (B 01)		
	16:24	15:04 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	26 14:55 (B 01)	
12	08:29	14:50 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	08:24	14:30 (B 01)		
	16:26	15:03 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	27 14:57 (B 01)	
13	08:29	14:54 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	08:25	14:30 (B 01)		
	16:27	15:02 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	27 14:57 (B 01)	
14	08:28		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	08:26	14:31 (B 01)		
	16:29		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	27 14:58 (B 01)	
15	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	08:27	14:31 (B 01)		
	16:31		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	28 14:59 (B 01)	
16	08:26		07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	08:28	14:30 (B 01)		
	16:32		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	28 14:58 (B 01)	
17	08:25		07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	08:29	14:31 (B 01)		
	16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	28 14:59 (B 01)	
18	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	08:29	14:32 (B 01)		
	16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	28 15:00 (B 01)	
19	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	08:30	14:32 (B 01)		
	16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	29 15:01 (B 01)	
20	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	08:31	14:32 (B 01)		
	16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	29 15:01 (B 01)	
21	08:21		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	08:31	14:33 (B 01)		
	16:41		17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03	29 15:02 (B 01)	
22	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	08:32	14:33 (B 01)		
	16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	28 15:01 (B 01)	
23	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	08:32	14:34 (B 01)		
	16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	29 15:03 (B 01)	
24	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33	14:34 (B 01)	
	16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	29 15:03 (B 01)	
25	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33	14:35 (B 01)	
	16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05	28 15:03 (B 01)	
26	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33	14:36 (B 01)	
	16:50		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06	28 15:04 (B 01)	
27	08:13		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34	14:36 (B 01)	
	16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06	28 15:04 (B 01)	
28	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34	14:37 (B 01)	
	16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07	28 15:05 (B 01)	
29	08:10		07:02	05:52	05:03	04:55	05:30	06:22	07:16	08:10	08:06		08:34	14:37 (B 01)	
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	8	14:42 (B 01)	16:08	28 15:05 (B 01)
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08		14:32 (B 01)	08:34	14:38 (B 01)
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	13	14:45 (B 01)	16:09	27 15:05 (B 01)
31	08:07				06:58	05:00		05:33	06:26	07:14			08:34	14:39 (B 01)	
	17:00				19:51	21:34		21:17	20:13	16:51			16:10	27 15:06 (B 01)	
Sonnenscheinstunden	253		275		419		506		509	458	382	329	261		803
astr.max.mögl.Beschattung	263											21			

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s47 - Südergellersen, Kirchgellerser Straße 2

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
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	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25	08:17
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
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16	08:26	07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	08:28
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	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
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23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
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31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s48 - Südergellersen, Kirchgellerser Straße 3

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
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	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
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	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
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	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
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16	08:26	07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	08:28
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19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
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20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
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21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
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23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
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24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33
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27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34
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28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10		07:02	05:52	05:02	04:55	05:30	06:22	07:16	07:10	08:06	08:34
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**Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):**

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	Sonnenuntergang (SS:MM)	Minuten mit Schatten
		Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s49 - Südergellersen, Kirchgellerser Straße 6

### Annahmen für Schattenwurfberechnung

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

- Die Sonne scheint täglich von Sonnenauf- bis -untergang
- Die Rotorfläche steht immer senkrecht zur Sonneneinstrahlungsrichtung
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27	08:13	07:13	06:07	05:56	05:05	04:53	05:27	06:19	07:12	07:06	08:03	08:34
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31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s50 - Südergellersen, Kirchgellerser Straße 9

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
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	16:41	17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03
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24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33
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31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s51 - Südergellersen, Kirchgellerser Straße 10

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10
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	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
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21	08:21	07:27	06:22	06:09	05:12	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:53	05:27	06:19	07:12	07:06	08:03	08:34
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10		07:02	05:52	05:02	04:55	05:30	06:22	07:16	07:10	08:06	08:34
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s52 - Südergellersen, Kirchgellerser Straße 13

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25	08:17
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22
	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26	07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	08:28
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	08:25	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21	07:27	06:22	06:09	05:12	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:53	05:27	06:19	07:12	07:06	08:03	08:34
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10		07:02	05:52	05:02	04:55	05:30	06:22	07:16	07:10	08:06	08:34
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

Projekt:  
**Süderheide**

Lizenzierter Anwender:  
**SOWIWAS - Energie GmbH**  
Watenstedter Straße 11  
DE-38384 Gevensleben  
+49 0 53 54 / 99 06 - 235  
/ gutachten@sowiwas.de  
Berechnet:  
21.07.2025 15:59/4.1.287

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s53 - Südergellersen, Kirchgellerser Straße 15

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember				
1	08:34															
1	16:11	24	14:50 (B 01)	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10	14:41 (B 01)	
2	08:34		15:14 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	14	14:55 (B 01)
2	16:12	24	14:51 (B 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11		14:41 (B 01)
3	08:34		15:15 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	16	14:57 (B 01)
3	16:14	23	14:52 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12		14:41 (B 01)
4	08:33		15:15 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	18	14:59 (B 01)
4	16:15	23	14:52 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14		14:40 (B 01)
5	08:33		15:15 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	19	14:59 (B 01)
5	16:16	22	14:54 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15		14:41 (B 01)
6	08:33		15:16 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	20	15:01 (B 01)
6	16:17	21	14:54 (B 01)	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25	08:17		14:40 (B 01)
7	08:32		15:15 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	21	15:01 (B 01)
7	16:19	21	14:54 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18		14:40 (B 01)
8	08:32		15:15 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	22	15:02 (B 01)
8	16:20	19	14:56 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19		14:40 (B 01)
9	08:31		15:15 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	23	15:03 (B 01)
9	16:21	18	14:57 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20		14:40 (B 01)
10	08:31		15:15 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	24	15:04 (B 01)
10	16:23	16	14:58 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22		14:40 (B 01)
11	08:30		15:14 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	24	15:04 (B 01)
11	16:24	14	14:59 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23		14:40 (B 01)
12	08:29		15:13 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	24	15:04 (B 01)
12	16:26	11	15:01 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24		14:41 (B 01)
13	08:29		15:12 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	25	15:06 (B 01)
13	16:27	8	15:04 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38	08:25		14:42 (B 01)
14	08:28		15:12 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	24	15:06 (B 01)
14	16:29		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	07:40	08:26		14:42 (B 01)
15	08:27		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	16:01	25	15:07 (B 01)
15	16:31		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	07:42	08:27		14:42 (B 01)
16	08:26		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	16:01	26	15:08 (B 01)
16	16:32		07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	07:44	08:28		14:42 (B 01)
17	08:25		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	16:01	25	15:07 (B 01)
17	16:34		07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	07:46	08:29		14:42 (B 01)
18	08:24		17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	16:02	26	15:08 (B 01)
18	16:36		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	07:48	08:29		14:43 (B 01)
19	08:23		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	16:02	26	15:09 (B 01)
19	16:37		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	07:49	08:30		14:44 (B 01)
20	08:22		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	16:02	26	15:10 (B 01)
20	16:39		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	07:51	08:31		14:44 (B 01)
21	08:21		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	16:02	26	15:10 (B 01)
21	16:41		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	07:53	08:31		14:44 (B 01)
22	08:19		17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03	16:03	26	15:10 (B 01)
22	16:43		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	07:55	08:32		14:44 (B 01)
23	08:18		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	16:03	26	15:10 (B 01)
23	16:45		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:56	07:56	08:32		14:45 (B 01)
24	08:17		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	16:04	26	15:11 (B 01)
24	16:46		07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:06	08:01	07:58	07:58	08:33		14:46 (B 01)
25	08:16		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	16:04	26	15:12 (B 01)
25	16:48		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:00	08:33		14:46 (B 01)
26	08:14		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05	16:05	26	15:12 (B 01)
26	16:50		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:02	08:33		14:47 (B 01)
27	08:13		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06	16:06	26	15:13 (B 01)
27	16:52		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:03	08:34		14:48 (B 01)
28	08:11		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06	16:06	25	15:13 (B 01)
28	16:54		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:05	08:34		14:48 (B 01)
29	08:10		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07	16:07	26	15:14 (B 01)
29	16:56		07:02	05:52	05:02	04:55	05:30	06:22	07:16	07:10	08:06	8	14:44 (B 01)	08:34		14:49 (B 01)
30	08:08		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	8	14:52 (B 01)	16:08	25	15:14 (B 01)
30	16:58		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	11	14:43 (B 01)	08:34		14:49 (B 01)
31	08:07		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	11	14:54 (B 01)	16:09	25	15:14 (B 01)
31	17:00		06:58	05:50	05:00	04:54	05:33	06:26	07:19	07:14	08:09	11	14:54 (B 01)	08:34		14:49 (B 01)
Sonnenscheinstunden	253		19:51	19:51	419	491	506	509	458	382	329	261	19	16:10	25	15:14 (B 01)
astr.max.mögl.Beschattung	244		367	367	419	491	506	509	458	382	329	261	19	237		736

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s54 - Südergellersen, Kirchgellerser Straße 16

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember					
1	08:34		07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	14:41 (B 01)				
1	16:11	28	15:21 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	23	15:04 (B 01)	
2	08:34		08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	14:42 (B 01)			
2	16:12	28	15:21 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	24	15:06 (B 01)	
3	08:34		08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12	14:42 (B 01)			
4	16:14	28	15:22 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	25	15:07 (B 01)	
4	08:33		08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	14:41 (B 01)			
5	16:15	28	15:22 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	26	15:07 (B 01)	
5	08:33		07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	14:42 (B 01)			
5	16:16	28	15:23 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	26	15:08 (B 01)	
6	08:33		07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	14:42 (B 01)			
6	16:17	26	15:22 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	26	15:08 (B 01)	
7	08:32		07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	14:42 (B 01)			
7	16:19	26	15:22 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	27	15:09 (B 01)	
8	08:32		07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	14:42 (B 01)			
8	16:20	26	15:23 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	28	15:10 (B 01)	
9	08:31		07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	14:42 (B 01)			
9	16:21	25	15:23 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	28	15:10 (B 01)	
10	08:31		07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22	14:43 (B 01)			
10	16:23	25	15:23 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	27	15:10 (B 01)	
11	08:30		07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23	14:43 (B 01)			
11	16:24	23	15:22 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	28	15:11 (B 01)	
12	08:29		07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	14:44 (B 01)			
12	16:26	22	15:22 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	28	15:12 (B 01)	
13	08:29		07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38	08:25	14:44 (B 01)			
13	16:27	21	15:23 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	29	15:13 (B 01)	
14	08:28		07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	14:45 (B 01)			
14	16:29	19	15:21 (B 01)	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	28	15:13 (B 01)	
15	08:27		07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	14:45 (B 01)			
15	16:31	17	15:21 (B 01)	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	29	15:14 (B 01)	
16	08:26		07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	14:45 (B 01)			
16	16:32	15	15:20 (B 01)	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	28	15:13 (B 01)	
17	08:25		07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29	14:45 (B 01)			
17	16:34	12	15:19 (B 01)	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	29	15:14 (B 01)	
18	08:24		07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	14:46 (B 01)			
18	16:36	6	15:17 (B 01)	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	29	15:15 (B 01)	
19	08:23		07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	14:47 (B 01)			
19	16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	29	15:16 (B 01)		
20	08:22		07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	14:47 (B 01)			
20	16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	28	15:15 (B 01)		
21	08:21		07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	14:47 (B 01)			
21	16:41		17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03	29	15:16 (B 01)		
22	08:19		07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	14:47 (B 01)			
22	16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	29	15:16 (B 01)		
23	08:18		07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:56	08:32	14:48 (B 01)			
23	16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	29	15:17 (B 01)		
24	08:17		07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	14:48 (B 01)	08:33	14:49 (B 01)		
24	16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	6	14:54 (B 01)	16:04	28	15:17 (B 01)
25	08:16		07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	14:46 (B 01)	08:33	14:49 (B 01)		
25	16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	11	14:57 (B 01)	16:05	29	15:18 (B 01)
26	08:14		07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	14:44 (B 01)	08:33	14:50 (B 01)		
26	16:50		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	15	14:59 (B 01)	16:06	29	15:19 (B 01)
27	08:13		07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	14:44 (B 01)	08:34	14:50 (B 01)		
27	16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	17	15:01 (B 01)	16:06	29	15:19 (B 01)
28	08:11		07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	14:42 (B 01)	08:34	14:51 (B 01)		
28	16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	19	15:01 (B 01)	16:07	29	15:20 (B 01)
29	08:10		07:02	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	14:42 (B 01)	08:34	14:51 (B 01)			
29	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	21	15:03 (B 01)	16:08	29	15:20 (B 01)	
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	14:42 (B 01)	08:34	14:52 (B 01)			
30	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	22	15:04 (B 01)	16:09	28	15:20 (B 01)	
31	08:07		06:58	05:50	05:00	04:54	05:33	06:26	07:19	07:14	08:09	14:42 (B 01)	08:34	14:52 (B 01)			
31	17:00		19:51	20:47	21:34	21:51	21:17	20:13	19:01	16:51	16:05	22	15:04 (B 01)	16:10	28	15:20 (B 01)	
Sonnenscheinstunden	253		275	367	419	491	506	509	458	382	329	261	111		237	861	
astr.max.mögl.Beschattung		403															

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s55 - Südergellersen, Oerzer Str. 13A

### Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinfallrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni
1	08:34   16:11	88   13:12 (Rep 11)   08:05 15:14 (Rep 8)   17:01	21   16:06 (B 01)   07:09 17:56	06:55   19:53	05:48   20:47	04:59   21:35
2	08:34   16:12	87   13:13 (Rep 11)   08:03 15:14 (Rep 8)   17:03	19   16:05 (B 01)   07:04 17:58	06:51   19:55	05:44   20:48	04:58   21:36
3	08:34   16:14	86   13:14 (Rep 11)   08:02 15:15 (Rep 8)   17:05	15   16:04 (B 01)   07:00 18:00	06:48   19:56	05:42   20:50	04:57   21:38
4	08:33   16:15	85   13:14 (Rep 11)   08:00 15:15 (Rep 8)   17:07	11   16:02 (B 01)   07:02 18:01	06:46   19:58	05:40   20:52	04:56   21:39
5	08:33   16:16	83   13:16 (Rep 11)   07:58 15:16 (Rep 8)   17:09	07:00   18:03	06:43   20:00	05:38   20:54	04:55   21:40
6	08:33   16:17	81   13:16 (Rep 11)   07:56 15:16 (Rep 8)   17:11	06:57   18:05	06:43   20:02	05:38   20:55	04:55   21:41
7	08:32   16:19	77   13:17 (Rep 11)   07:55 15:15 (Rep 8)   17:13	06:55   18:07	06:41   20:04	05:36   20:57	04:55   21:42
8	08:32   16:20	77   13:19 (Rep 11)   07:53 15:44 (B 01)   17:15	06:53   18:09	06:39   20:05	05:34   20:59	04:54   21:43
9	08:31   16:21	75   13:20 (Rep 11)   07:51 15:46 (B 01)   17:17	06:50   18:11	06:36   20:07	05:32   21:01	04:54   21:44
10	08:31   16:23	74   13:21 (Rep 11)   07:49 15:47 (B 01)   17:19	06:48   18:13	06:34   20:09	05:30   21:02	04:53   21:44
11	08:30   16:24	72   13:23 (Rep 11)   07:47 15:49 (B 01)   17:21	06:46   18:15	06:32   20:11	05:29   21:04	04:53   21:45
12	08:29   16:26	66   13:25 (Rep 11)   07:45 15:50 (B 01)   17:23	06:43   18:16	06:29   20:13	05:27   21:06	04:52   21:46
13	08:29   16:27	60   13:28 (Rep 11)   07:43 15:52 (B 01)   17:25	06:41   18:18	06:27   20:14	05:25   21:07	04:52   21:47
14	08:28   16:29	50   14:27 (Rep 9)   07:41 15:54 (B 01)   17:27	06:39   18:20	06:25   20:16	05:23   21:09	04:52   21:47
15	08:27   16:31	46   14:29 (Rep 9)   07:39 15:56 (B 01)   17:29	06:36   18:22	06:22   20:18	05:22   21:11	04:52   21:48
16	08:26   16:32	40   14:32 (Rep 9)   07:37 15:58 (B 01)   17:31	06:34   18:24	06:20   20:20	05:20   21:12	04:51   21:48
17	08:25   16:34	29   15:04 (Rep 8)   07:35 16:00 (B 01)   17:33	06:31   18:26	06:18   20:22	05:18   21:14	04:51   21:49
18	08:24   16:36	23   15:39 (B 01)   07:33 16:02 (B 01)   17:35	06:29   18:27	06:16   20:23	05:17   21:16	04:51   21:49
19	08:23   16:37	24   16:02 (B 01)   07:31 15:40 (B 01)   17:37	06:27   18:29	06:13   20:25	05:15   21:17	04:51   21:50
20	08:22   16:39	26   16:04 (B 01)   07:29 15:39 (B 01)   17:39	06:24   18:31	06:11   20:27	05:14   21:19	04:51   21:50
21	08:21   16:41	27   15:40 (B 01)   07:27 16:07 (B 01)   17:40	06:22   18:33	06:09   20:29	05:13   21:20	04:52   21:50
22	08:19   16:43	28   15:39 (B 01)   07:24 16:07 (B 01)   17:42	06:19   18:35	06:07   20:31	05:11   21:22	04:52   21:50
23	08:18   16:45	28   16:02 (B 01)   07:22 16:08 (B 01)   17:44	06:17   18:37	06:04   20:32	05:10   21:23	04:52   21:51
24	08:17   16:46	28   15:40 (B 01)   07:20 16:08 (B 01)   17:46	06:15   18:38	06:02   20:34	05:08   21:25	04:52   21:51
25	08:15   16:48	28   15:40 (B 01)   07:18 16:08 (B 01)   17:48	06:12   18:40	06:00   20:36	05:07   21:26	04:53   21:51
26	08:14   16:50	28   15:40 (B 01)   07:16 16:08 (B 01)   17:50	06:10   18:42	05:58   20:38	05:06   21:27	04:53   21:51
27	08:13   16:52	27   15:41 (B 01)   07:13 16:08 (B 01)   17:52	06:07   18:44	05:56   20:40	05:05   21:29	04:54   21:51
28	08:11   16:54	26   15:42 (B 01)   07:11 16:08 (B 01)   17:54	06:05   18:46	05:54   20:41	05:04   21:30	04:54   21:51
29	08:10   16:56	25   15:42 (B 01)   16:07 (B 01)	07:02   19:47	05:52   20:43	05:02   21:31	04:55   21:50
30	08:08   16:58	25   15:43 (B 01)   16:08 (B 01)	07:00   19:49	05:50   20:45	05:01   21:33	04:55   21:50
31	08:07   17:00	23   15:44 (B 01)   16:07 (B 01)	06:58   19:51	 	05:00   21:34	 
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	1542	66				

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s55 - Südergellersen, Oerzer Str. 13A

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember
1	04:56	05:35	06:27	07:19	07:16	08:09
	21:50	21:16	20:11	18:58	16:49	16:06
2	04:57	05:36	06:29	07:21	07:18	71 15:31 (B 01)
	21:49	21:14	20:08	18:56	16:47	08:11
3	04:57	05:38	06:31	07:23	07:20	74 15:30 (B 01)
	21:49	21:12	20:06	18:54	16:45	08:12
4	04:58	05:39	06:32	07:24	07:22	75 15:30 (B 01)
	21:49	21:10	20:04	18:51	16:44	08:14
5	04:59	05:41	06:34	07:26	07:23	78 15:29 (B 01)
	21:48	21:09	20:01	18:49	16:42	08:15
6	05:00	05:43	06:36	07:28	07:25	77 15:01 (Rep 8)
	21:47	21:07	19:59	18:46	16:40	08:17
7	05:01	05:44	06:38	07:30	07:27	80 15:02 (Rep 8)
	21:47	21:05	19:56	18:44	16:38	16:03
8	05:02	05:46	06:39	07:32	07:29	82 15:02 (Rep 8)
	21:46	21:03	19:54	18:42	16:36	16:03
9	05:03	05:48	06:41	07:33	07:31	85 15:03 (Rep 8)
	21:45	21:01	19:52	18:39	16:35	16:02
10	05:04	05:49	06:43	07:35	07:33	86 15:03 (Rep 8)
	21:45	20:59	19:49	18:37	16:33	16:02
11	05:05	05:51	06:44	07:37	07:35	87 15:04 (Rep 8)
	21:44	20:57	19:47	18:35	16:31	16:02
12	05:06	05:53	06:46	07:39	07:37	88 15:04 (Rep 8)
	21:43	20:55	19:44	18:32	16:30	16:02
13	05:07	05:55	06:48	07:41	07:38	89 15:05 (Rep 8)
	21:42	20:53	19:42	18:30	16:28	16:01
14	05:08	05:56	06:50	07:42	07:40	91 15:06 (Rep 8)
	21:41	20:51	19:40	18:28	16:26	16:01
15	05:10	05:58	06:51	07:44	07:42	92 15:06 (Rep 8)
	21:40	20:49	19:37	18:26	16:25	16:01
16	05:11	06:00	06:53	07:46	07:44	92 15:07 (Rep 8)
	21:39	20:47	19:35	18:23	16:23	16:01
17	05:12	06:01	06:55	07:48	07:46	92 15:07 (Rep 8)
	21:38	20:44	19:32	18:21	16:22	16:02
18	05:14	06:03	06:57	07:50	07:48	94 15:07 (Rep 8)
	21:36	20:42	19:30	18:19	16:20	16:02
19	05:15	06:05	06:58	07:51	07:49	93 15:08 (Rep 8)
	21:35	20:40	19:27	18:17	16:19	16:02
20	05:16	06:07	07:00	07:53	07:51	93 13:05 (Rep 11)
	21:34	20:38	19:25	18:14	16:18	16:02
21	05:18	06:08	07:02	07:55	07:53	92 15:08 (Rep 8)
	21:33	20:36	19:23	18:12	16:16	16:03
22	05:19	06:10	07:03	07:57	07:55	93 13:05 (Rep 11)
	21:31	20:34	19:20	18:10	16:15	16:03
23	05:21	06:12	07:05	07:59	07:56	93 15:09 (Rep 8)
	21:30	20:31	19:18	18:08	16:14	16:04
24	05:22	06:13	07:07	08:01	07:58	93 15:10 (Rep 8)
	21:29	20:29	19:15	18:06	16:13	16:04
25	05:24	06:15	07:09	08:03	08:00	93 13:07 (Rep 11)
	21:27	20:27	19:13	17:04	16:12	16:05
26	05:25	06:17	07:10	08:05	08:02	94 15:11 (Rep 8)
	21:26	20:25	19:10	17:01	16:11	16:05
27	05:27	06:19	07:12	08:06	08:03	94 13:08 (Rep 11)
	21:24	20:22	19:08	16:59	16:10	16:06
28	05:28	06:20	07:14	08:07	08:05	92 15:12 (Rep 8)
	21:22	20:20	19:06	16:57	16:09	16:07
29	05:30	06:22	07:16	08:08	08:06	92 13:09 (Rep 11)
	21:21	20:18	19:03	16:55	16:08	16:08
30	05:31	06:24	07:17	08:09	08:08	92 15:13 (Rep 8)
	21:19	20:15	19:01	16:53	16:07	16:09
31	05:33	06:26		07:14		90 13:11 (Rep 11)
	21:17	20:13		16:51		16:10
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung					723	2725

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s56 - Südergellersen, Oerzer Str. 15

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34	13:35 (Rep 11)   08:05	16:03 (B 01)   07:09	06:55	05:48	04:59
	16:11	97 15:30 (Rep 8)   17:01	26 16:29 (B 01)   17:56	19:53	20:47	21:35
2	08:34	13:36 (Rep 11)   08:03	16:02 (B 01)   07:07	06:53	05:46	04:59
	16:12	96 15:30 (Rep 8)   17:03	27 16:29 (B 01)   17:58	19:55	20:48	21:36
3	08:34	13:37 (Rep 11)   08:02	16:03 (B 01)   07:04	06:50	05:44	04:58
	16:14	97 15:31 (Rep 8)   17:05	27 16:30 (B 01)   18:00	19:56	20:50	21:38
4	08:33	13:37 (Rep 11)   08:00	16:03 (B 01)   07:02	06:48	05:42	04:57
	16:15	96 15:31 (Rep 8)   17:07	27 16:30 (B 01)   18:01	19:58	20:52	21:39
5	08:33	13:38 (Rep 11)   07:58	16:04 (B 01)   07:00	06:46	05:40	04:56
	16:16	97 15:33 (Rep 8)   17:09	26 16:30 (B 01)   18:03	20:00	20:54	21:40
6	08:33	13:38 (Rep 11)   07:56	16:04 (B 01)   06:57	06:43	05:38	04:55
	16:17	97 15:33 (Rep 8)   17:11	26 16:30 (B 01)   18:05	20:02	20:55	21:41
7	08:32	13:39 (Rep 11)   07:55	16:04 (B 01)   06:55	06:41	05:36	04:55
	16:19	96 15:33 (Rep 8)   17:13	25 16:29 (B 01)   18:07	20:04	20:57	21:42
8	08:32	13:40 (Rep 11)   07:53	16:05 (B 01)   06:53	06:39	05:34	04:54
	16:20	96 15:34 (Rep 8)   17:15	24 16:29 (B 01)   18:09	20:05	20:59	21:43
9	08:31	13:40 (Rep 11)   07:51	16:06 (B 01)   06:50	06:36	05:32	04:54
	16:21	96 15:34 (Rep 8)   17:17	22 16:28 (B 01)   18:11	20:07	21:01	21:44
10	08:31	13:41 (Rep 11)   07:49	16:07 (B 01)   06:48	06:34	05:30	04:53
	16:23	95 15:35 (Rep 8)   17:19	20 16:27 (B 01)   18:13	20:09	21:02	21:44
11	08:30	13:41 (Rep 11)   07:47	16:09 (B 01)   06:46	06:32	05:29	04:53
	16:24	95 15:35 (Rep 8)   17:21	17 16:26 (B 01)   18:15	20:11	21:04	21:45
12	08:29	13:42 (Rep 11)   07:45	16:11 (B 01)   06:43	06:29	05:27	04:52
	16:26	94 15:35 (Rep 8)   17:23	13 16:24 (B 01)   18:16	20:13	21:06	21:46
13	08:29	13:43 (Rep 11)   07:43	16:14 (B 01)   06:41	06:27	05:25	04:52
	16:27	93 15:36 (Rep 8)   17:25	7 16:21 (B 01)   18:18	20:14	21:07	21:47
14	08:28	13:44 (Rep 11)   07:41	06:39	06:25	05:23	04:52
	16:29	90 15:36 (Rep 8)   17:27	18:20	20:16	21:09	21:47
15	08:27	13:45 (Rep 11)   07:39	06:36	06:22	05:22	04:52
	16:31	89 15:36 (Rep 8)   17:29	18:22	20:18	21:11	21:48
16	08:26	13:46 (Rep 11)   07:37	06:34	06:20	05:20	04:51
	16:32	88 15:37 (Rep 8)   17:31	18:24	20:20	21:12	21:48
17	08:25	13:47 (Rep 11)   07:35	06:31	06:18	05:18	04:51
	16:34	86 15:37 (Rep 8)   17:33	18:26	20:22	21:14	21:49
18	08:24	13:49 (Rep 11)   07:33	06:29	06:16	05:17	04:51
	16:36	83 15:37 (Rep 8)   17:35	18:27	20:23	21:16	21:49
19	08:23	13:50 (Rep 11)   07:31	06:27	06:13	05:15	04:51
	16:37	81 15:37 (Rep 8)   17:37	18:29	20:25	21:17	21:50
20	08:22	13:51 (Rep 11)   07:29	06:24	06:11	05:14	04:51
	16:39	77 15:36 (Rep 8)   17:39	18:31	20:27	21:19	21:50
21	08:21	13:53 (Rep 11)   07:27	06:22	06:09	05:12	04:52
	16:41	73 15:37 (Rep 8)   17:40	18:33	20:29	21:20	21:50
22	08:19	13:54 (Rep 11)   07:24	06:19	06:07	05:11	04:52
	16:43	65 15:35 (Rep 8)   17:42	18:35	20:31	21:22	21:50
23	08:18	13:57 (Rep 11)   07:22	06:17	06:04	05:10	04:52
	16:45	60 16:11 (B 01)   17:44	18:37	20:32	21:23	21:51
24	08:17	14:00 (Rep 11)   07:20	06:15	06:02	05:08	04:52
	16:46	54 16:14 (B 01)   17:46	18:38	20:34	21:25	21:51
25	08:15	14:55 (Rep 9)   07:18	06:12	06:00	05:07	04:53
	16:48	36 16:15 (B 01)   17:48	18:40	20:36	21:26	21:51
26	08:14	14:57 (Rep 9)   07:16	06:10	05:58	05:06	04:53
	16:50	24 16:17 (B 01)   17:50	18:42	20:38	21:27	21:51
27	08:13	16:05 (B 01)   07:13	06:07	05:56	05:05	04:54
	16:52	15 16:20 (B 01)   17:52	18:44	20:40	21:29	21:51
28	08:11	16:04 (B 01)   07:11	06:05	05:54	05:04	04:54
	16:54	18 16:22 (B 01)   17:54	18:46	20:41	21:30	21:50
29	08:10	16:03 (B 01)	07:02	05:52	05:02	04:55
	16:56	20 16:23 (B 01)	19:47	20:43	21:31	21:50
30	08:08	16:03 (B 01)	07:00	05:50	05:01	04:55
	16:58	23 16:26 (B 01)	19:49	20:45	21:33	21:50
31	08:07	16:03 (B 01)	06:58		05:00	
	17:00	25 16:28 (B 01)	19:51		21:34	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	2252	287				

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s56 - Südergellersen, Oerzer Str. 15

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember	
1	04:56	05:35	06:27	07:19	07:16	15:37 (B 01)   08:09   13:24 (Rep 11)	
	21:50	21:16	20:11	18:58	16:49	20 15:57 (B 01)   16:06   94 15:17 (Rep 8)	
2	04:57	05:36	06:29	07:21	07:18	15:35 (B 01)   08:11   13:24 (Rep 11)	
	21:49	21:14	20:08	18:56	16:47	23 15:58 (B 01)   16:06   95 15:18 (Rep 8)	
3	04:57	05:38	06:31	07:23	07:20	15:35 (B 01)   08:12   13:24 (Rep 11)	
	21:49	21:12	20:06	18:54	16:45	24 15:59 (B 01)   16:05   96 15:19 (Rep 8)	
4	04:58	05:39	06:32	07:24	07:22	15:34 (B 01)   08:14   13:24 (Rep 11)	
	21:49	21:10	20:04	18:51	16:44	25 15:59 (B 01)   16:04   96 15:18 (Rep 8)	
5	04:59	05:41	06:34	07:26	07:23	15:34 (B 01)   08:15   13:25 (Rep 11)	
	21:48	21:09	20:01	18:49	16:42	26 16:00 (B 01)   16:04   96 15:19 (Rep 8)	
6	05:00	05:43	06:36	07:28	07:25	15:33 (B 01)   08:17   13:25 (Rep 11)	
	21:47	21:07	19:59	18:46	16:40	27 16:00 (B 01)   16:03   96 15:19 (Rep 8)	
7	05:01	05:44	06:38	07:30	07:27	15:33 (B 01)   08:18   13:24 (Rep 11)	
	21:47	21:05	19:56	18:44	16:38	27 16:00 (B 01)   16:03   97 15:19 (Rep 8)	
8	05:02	05:46	06:39	07:32	07:29	15:33 (B 01)   08:19   13:25 (Rep 11)	
	21:46	21:03	19:54	18:42	16:36	27 16:00 (B 01)   16:02   98 15:20 (Rep 8)	
9	05:03	05:48	06:41	07:33	07:31	15:33 (B 01)   08:20   13:25 (Rep 11)	
	21:45	21:01	19:52	18:39	16:35	27 16:00 (B 01)   16:02   97 15:20 (Rep 8)	
10	05:04	05:49	06:43	07:35	07:33	15:33 (B 01)   08:22   13:25 (Rep 11)	
	21:45	20:59	19:49	18:37	16:33	27 16:00 (B 01)   16:02   97 15:20 (Rep 8)	
11	05:05	05:51	06:44	07:37	07:35	15:34 (B 01)   08:23   13:26 (Rep 11)	
	21:44	20:57	19:47	18:35	16:31	25 15:59 (B 01)   16:02   96 15:20 (Rep 8)	
12	05:06	05:53	06:46	07:39	07:37	15:34 (B 01)   08:24   13:27 (Rep 11)	
	21:43	20:55	19:44	18:32	16:30	23 15:57 (B 01)   16:01   97 15:21 (Rep 8)	
13	05:07	05:55	06:48	07:41	07:38	15:35 (B 01)   08:25   13:27 (Rep 11)	
	21:42	20:53	19:42	18:30	16:28	20 15:55 (B 01)   16:01   96 15:21 (Rep 8)	
14	05:08	05:56	06:50	07:42	07:40	15:36 (B 01)   08:26   13:28 (Rep 11)	
	21:41	20:51	19:40	18:28	16:26	17 15:53 (B 01)   16:01   96 15:21 (Rep 8)	
15	05:10	05:58	06:51	07:44	07:42	15:38 (B 01)   08:27   13:28 (Rep 11)	
	21:40	20:49	19:37	18:26	16:25	15 15:53 (B 01)   16:01   96 15:22 (Rep 8)	
16	05:11	06:00	06:53	07:46	07:44	14:31 (Rep 9)   08:28   13:28 (Rep 11)	
	21:39	20:47	19:35	18:23	16:23	25 15:51 (B 01)   16:01   95 15:21 (Rep 8)	
17	05:12	06:01	06:55	07:48	07:46	14:29 (Rep 9)   08:28   13:28 (Rep 11)	
	21:38	20:44	19:32	18:21	16:22	36 15:49 (B 01)   16:02   97 15:22 (Rep 8)	
18	05:14	06:03	06:57	07:50	07:48	13:34 (Rep 11)   08:29   13:29 (Rep 11)	
	21:36	20:42	19:30	18:19	16:20	54 15:48 (B 01)   16:02   95 15:22 (Rep 8)	
19	05:15	06:05	06:58	07:51	07:49	13:31 (Rep 11)   08:30   13:30 (Rep 11)	
	21:35	20:40	19:27	18:17	16:19	60 15:45 (B 01)   16:02   95 15:23 (Rep 8)	
20	05:16	06:07	07:00	07:53	07:51	13:29 (Rep 11)   08:31   13:29 (Rep 11)	
	21:34	20:38	19:25	18:14	16:18	65 15:10 (Rep 8)   16:02   96 15:23 (Rep 8)	
21	05:18	06:08	07:02	07:55	07:53	13:28 (Rep 11)   08:31   13:30 (Rep 11)	
	21:33	20:36	19:23	18:12	16:16	73 15:12 (Rep 8)   16:03   96 15:24 (Rep 8)	
22	05:19	06:10	07:03	07:57	07:55	13:27 (Rep 11)   08:32   13:30 (Rep 11)	
	21:31	20:34	19:20	18:10	16:15	77 15:12 (Rep 8)   16:03   96 15:24 (Rep 8)	
23	05:21	06:12	07:05	07:59	07:56	13:26 (Rep 11)   08:32   13:31 (Rep 11)	
	21:30	20:31	19:18	18:08	16:14	81 15:13 (Rep 8)   16:04   96 15:25 (Rep 8)	
24	05:22	06:13	07:07	08:01	07:58	13:26 (Rep 11)   08:33   13:32 (Rep 11)	
	21:28	20:29	19:15	18:06	16:13	83 15:14 (Rep 8)   16:04   95 15:25 (Rep 8)	
25	05:24	06:15	07:09	07:03	08:00	13:25 (Rep 11)   08:33   13:32 (Rep 11)	
	21:27	20:27	19:13	17:04	16:12	86 15:15 (Rep 8)   16:05   95 15:25 (Rep 8)	
26	05:25	06:17	07:10	07:05	08:02	13:25 (Rep 11)   08:33   13:32 (Rep 11)	
	21:26	20:25	19:10	17:01	16:11	88 15:16 (Rep 8)   16:06   95 15:25 (Rep 8)	
27	05:27	06:19	07:12	07:06	08:03	13:25 (Rep 11)   08:34   13:33 (Rep 11)	
	21:24	20:22	19:08	16:59	16:10	89 15:16 (Rep 8)   16:06   96 15:27 (Rep 8)	
28	05:28	06:20	07:14	07:08	08:05	13:24 (Rep 11)   08:34   13:34 (Rep 11)	
	21:22	20:20	19:06	16:57	16:09	91 15:16 (Rep 8)   16:07   95 15:27 (Rep 8)	
29	05:30	06:22	07:16	07:10	08:06	13:24 (Rep 11)   08:34   13:34 (Rep 11)	
	21:21	20:18	19:03	16:55	9 15:43 (B 01)   16:08   93 15:17 (Rep 8)   16:08   97 15:28 (Rep 8)		
30	05:31	06:24	07:17	07:12	08:08	15:40 (B 01)   08:08   13:24 (Rep 11)   08:34   13:35 (Rep 11)	
	21:19	20:15	19:01	16:53	14 15:54 (B 01)   16:07   93 15:17 (Rep 8)   16:09   96 15:29 (Rep 8)		
31	05:33	06:26		07:14	15:38 (B 01)		08:34   13:35 (Rep 11)
	21:17	20:13		16:51	18 15:56 (B 01)		16:10   96 15:28 (Rep 8)
Sonnenscheinstunden	509	458	382	329	261	237	2974
astr.max.mögl.Beschattung				41	1447		

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s57 - Südergellersen, Oerzer Str. 18

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember											
1	08:34	14:00 (Rep 9)	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10	14:52 (B 01)									
1	16:11	49 15:34 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06	28 15:20 (B 01)									
2	08:34	14:04 (Rep 9)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11	14:52 (B 01)									
2	16:12	43 15:35 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06	29 15:21 (B 01)									
3	08:34	14:37 (Rep 8)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12	14:53 (B 01)									
3	16:14	40 15:36 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05	29 15:22 (B 01)									
4	08:33	14:38 (Rep 8)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14	14:53 (B 01)									
4	16:15	37 15:36 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04	29 15:22 (B 01)									
5	08:33	14:40 (Rep 8)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15	14:54 (B 01)									
5	16:16	35 15:37 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04	29 15:23 (B 01)									
6	08:33	15:08 (B 01)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17	14:54 (B 01)									
6	16:17	29 15:37 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03	29 15:23 (B 01)									
7	08:32	15:08 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18	14:27 (Rep 8)									
7	16:19	29 15:37 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	34 15:23 (B 01)									
8	08:32	15:09 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	14:26 (Rep 8)									
8	16:20	29 15:38 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	37 15:24 (B 01)									
9	08:31	15:09 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	14:25 (Rep 8)									
9	16:21	29 15:38 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	40 15:24 (B 01)									
10	08:31	15:09 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22	14:24 (Rep 8)									
10	16:23	29 15:38 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	21:05	20:59	19:49	16:33	16:02	42 15:24 (B 01)									
11	08:30	15:09 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23	13:50 (Rep 9)									
11	16:24	29 15:38 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	49 15:24 (B 01)									
12	08:29	15:10 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	13:50 (Rep 9)									
12	16:26	28 15:38 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	52 15:25 (B 01)									
13	08:29	15:10 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38	08:25	13:50 (Rep 9)									
13	16:27	29 15:39 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	53 15:25 (B 01)									
14	08:28	15:11 (B 01)	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	12:44 (Rep 8)									
14	16:29	28 15:39 (B 01)	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	61 15:25 (B 01)									
15	08:27	15:12 (B 01)	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	12:43 (Rep 8)									
15	16:31	27 15:39 (B 01)	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	65 15:25 (B 01)									
16	08:26	15:12 (B 01)	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28	12:42 (Rep 8)									
16	16:32	27 15:39 (B 01)	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	70 15:24 (B 01)									
17	08:25	15:13 (B 01)	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:28	12:42 (Rep 8)									
17	16:34	26 15:39 (B 01)	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	8 15:07 (B 01)	69 15:24 (B 01)									
18	08:24	15:14 (B 01)	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	8 14:57 (B 01)	08:29 12:42 (Rep 11)									
18	16:36	26 15:40 (B 01)	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	13 15:10 (B 01)	16:02 72 15:25 (B 01)									
19	08:23	15:16 (B 01)	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	14:54 (B 01)	08:30 12:42 (Rep 11)									
19	16:37	24 15:40 (B 01)	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	17 15:11 (B 01)	16:02 72 15:25 (B 01)									
20	08:22	15:16 (B 01)	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	14:53 (B 01)	08:31 12:42 (Rep 11)									
20	16:39	23 15:39 (B 01)	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	19 15:12 (B 01)	16:02 73 15:25 (B 01)									
21	08:21	15:17 (B 01)	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	14:52 (B 01)	08:31 12:43 (Rep 11)									
21	16:41	21 15:38 (B 01)	17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	21 15:13 (B 01)	16:03 74 15:26 (B 01)									
22	08:19	15:18 (B 01)	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	14:52 (B 01)	08:32 12:43 (Rep 11)									
22	16:43	19 15:37 (B 01)	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	23 15:15 (B 01)	16:03 75 15:26 (B 01)									
23	08:18	15:20 (B 01)	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:56	14:52 (B 01)	08:32 12:44 (Rep 11)									
23	16:45	17 15:37 (B 01)	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	24 15:16 (B 01)	16:04 74 15:27 (B 01)									
24	08:17	15:23 (B 01)	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	14:51 (B 01)	08:33 12:44 (Rep 11)									
24	16:46	13 15:36 (B 01)	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	26 15:17 (B 01)	16:04 72 15:27 (B 01)									
25	08:16	15:25 (B 01)	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	14:51 (B 01)	08:33 12:45 (Rep 11)									
25	16:48	8 15:33 (B 01)	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	26 15:17 (B 01)	16:05 72 15:28 (B 01)									
26	08:14	15:26 (B 01)	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	14:52 (B 01)	08:33 12:46 (Rep 11)									
26	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	26 15:18 (B 01)	16:06 70 15:29 (B 01)										
27	08:13	15:27 (B 01)	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	14:52 (B 01)	08:34 12:47 (Rep 11)									
27	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	27 15:19 (B 01)	16:06 71 15:30 (B 01)										
28	08:11	15:28 (B 01)	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	14:51 (B 01)	08:34 12:49 (Rep 11)									
28	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	28 15:19 (B 01)	16:07 67 15:31 (B 01)										
29	08:10	15:29 (B 01)	07:10	06:04	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	14:51 (B 01)	08:34 12:50 (Rep 11)									
29	16:56	17:56	18:48	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	29 15:20 (B 01)	16:08 64 15:32 (B 01)										
30	08:08	15:30 (B 01)	07:08	06:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	14:52 (B 01)	08:34 13:57 (Rep 9)									
30	16:58	17:58	18:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	29 15:21 (B 01)	16:09 56 15:33 (B 01)										
31	08:07	15:31 (B 01)	07:07	06:00	05:50	05:00	04:53	05:33	06:26	07:19	07:14	08:04	14:53 (B 01)	08:34 13:58 (Rep 9)									
31	17:00	18:00	19:51	21:34	21:34	21:17	20:13	19:09	16:51	16:51	16:10	16:10	53 15:33 (B 01)										
Sonnenscheinstunden	253		275		419		506		509		458		382		329		261		316		237		1710
astr.max.mögl.Beschattung		694																					

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s58 - Südergellersen, Oerzer Str. 19

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34	13:04 (Rep 11)   08:05	15:51 (B 01)   07:09	06:55	05:48	05:00
	16:11	109 15:20 (Rep 8)   17:01	29 16:20 (B 01)   17:56	19:53	20:47	21:35
2	08:34	13:05 (Rep 11)   08:03	15:51 (B 01)   07:07	06:53	05:46	04:59
	16:12	109 15:21 (Rep 8)   17:03	29 16:20 (B 01)   17:58	19:55	20:48	21:36
3	08:34	13:06 (Rep 11)   08:02	15:52 (B 01)   07:04	06:51	05:44	04:58
	16:14	108 15:22 (Rep 8)   17:05	29 16:21 (B 01)   18:00	19:56	20:50	21:38
4	08:33	13:06 (Rep 11)   08:00	15:52 (B 01)   07:02	06:48	05:42	04:57
	16:15	107 15:21 (Rep 8)   17:07	29 16:21 (B 01)   18:01	19:58	20:52	21:39
5	08:33	13:07 (Rep 11)   07:58	15:53 (B 01)   07:00	06:46	05:40	04:56
	16:16	107 15:22 (Rep 8)   17:09	27 16:20 (B 01)   18:03	20:00	20:54	21:40
6	08:33	13:07 (Rep 11)   07:56	15:53 (B 01)   06:57	06:43	05:38	04:56
	16:17	107 15:22 (Rep 8)   17:11	27 16:20 (B 01)   18:05	20:02	20:55	21:41
7	08:32	13:07 (Rep 11)   07:55	15:54 (B 01)   06:55	06:41	05:36	04:55
	16:19	106 15:22 (Rep 8)   17:13	25 16:19 (B 01)   18:07	20:04	20:57	21:42
8	08:32	13:09 (Rep 11)   07:53	15:55 (B 01)   06:53	06:39	05:34	04:54
	16:20	106 15:24 (Rep 8)   17:15	23 16:18 (B 01)   18:09	20:05	20:59	21:43
9	08:31	13:09 (Rep 11)   07:51	15:56 (B 01)   06:50	06:36	05:32	04:54
	16:21	104 15:24 (Rep 8)   17:17	21 16:17 (B 01)   18:11	20:07	21:01	21:44
10	08:31	13:10 (Rep 11)   07:49	15:58 (B 01)   06:48	06:34	05:30	04:53
	16:23	103 15:24 (Rep 8)   17:19	18 16:16 (B 01)   18:13	20:09	21:02	21:44
11	08:30	13:10 (Rep 11)   07:47	16:00 (B 01)   06:46	06:32	05:29	04:53
	16:24	104 15:24 (Rep 8)   17:21	14 16:14 (B 01)   18:15	20:11	21:04	21:45
12	08:29	13:11 (Rep 11)   07:45	16:05 (B 01)   06:43	06:29	05:27	04:52
	16:26	101 15:24 (Rep 8)   17:23	5 16:10 (B 01)   18:16	20:13	21:06	21:46
13	08:29	13:12 (Rep 11)   07:43	06:41	06:27	05:25	04:52
	16:27	99 15:24 (Rep 8)   17:25	18:18	20:14	21:07	21:47
14	08:28	13:13 (Rep 11)   07:41	06:39	06:25	05:23	04:52
	16:29	96 15:24 (Rep 8)   17:27	18:20	20:16	21:09	21:47
15	08:27	13:14 (Rep 11)   07:39	06:36	06:22	05:22	04:52
	16:31	93 15:24 (Rep 8)   17:29	18:22	20:18	21:11	21:48
16	08:26	13:15 (Rep 11)   07:37	06:34	06:20	05:20	04:52
	16:32	91 15:25 (Rep 8)   17:31	18:24	20:20	21:12	21:48
17	08:25	13:17 (Rep 11)   07:35	06:31	06:18	05:18	04:51
	16:34	87 15:25 (Rep 8)   17:33	18:26	20:22	21:14	21:49
18	08:24	13:18 (Rep 11)   07:33	06:29	06:16	05:17	04:51
	16:36	85 16:02 (B 01)   17:35	18:27	20:23	21:16	21:49
19	08:23	13:20 (Rep 11)   07:31	06:27	06:13	05:15	04:51
	16:37	84 16:04 (B 01)   17:37	18:29	20:25	21:17	21:50
20	08:22	13:21 (Rep 11)   07:29	06:24	06:11	05:14	04:51
	16:39	80 16:05 (B 01)   17:39	18:31	20:27	21:19	21:50
21	08:21	13:24 (Rep 11)   07:27	06:22	06:09	05:13	04:52
	16:41	74 16:08 (B 01)   17:40	18:33	20:29	21:20	21:50
22	08:19	13:25 (Rep 11)   07:24	06:19	06:07	05:11	04:52
	16:43	69 16:09 (B 01)   17:42	18:35	20:31	21:22	21:50
23	08:18	13:29 (Rep 11)   07:22	06:17	06:04	05:10	04:52
	16:45	58 16:11 (B 01)   17:44	18:37	20:32	21:23	21:51
24	08:17	14:40 (Rep 9)   07:20	06:15	06:02	05:08	04:52
	16:46	32 16:14 (B 01)   17:46	18:38	20:34	21:25	21:51
25	08:15	15:51 (B 01)   07:18	06:12	06:00	05:07	04:53
	16:48	25 16:16 (B 01)   17:48	18:40	20:36	21:26	21:51
26	08:14	15:51 (B 01)   07:16	06:10	05:58	05:06	04:53
	16:50	26 16:17 (B 01)   17:50	18:42	20:38	21:27	21:51
27	08:13	15:51 (B 01)   07:13	06:07	05:56	05:05	04:54
	16:52	28 16:19 (B 01)   17:52	18:44	20:40	21:29	21:51
28	08:11	15:51 (B 01)   07:11	06:05	05:54	05:04	04:54
	16:54	28 16:19 (B 01)   17:54	18:46	20:41	21:30	21:51
29	08:10	15:50 (B 01)	07:02	05:52	05:03	04:55
	16:56	29 16:19 (B 01)	19:47	20:43	21:31	21:50
30	08:08	15:51 (B 01)	07:00	05:50	05:01	04:55
	16:58	29 16:20 (B 01)	19:49	20:45	21:33	21:50
31	08:07	15:51 (B 01)	06:58		05:00	
	17:00	29 16:20 (B 01)	19:51		21:34	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	2413	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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s58 - Südergellersen, Oerzer Str. 19

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember	
1	04:56	05:35	06:27	07:19	07:16	15:27 (B 01)   08:09   12:53 (Rep 11)	
	21:50	21:16	20:11	18:58	16:49	19   15:46 (B 01)   16:06   102   15:06 (Rep 8)	
2	04:57	05:36	06:29	07:21	07:18	15:26 (B 01)   08:11   12:53 (Rep 11)	
	21:49	21:14	20:08	18:56	16:47	21   15:47 (B 01)   16:06   104   15:07 (Rep 8)	
3	04:57	05:38	06:31	07:23	07:20	15:25 (B 01)   08:12   12:53 (Rep 11)	
	21:49	21:12	20:06	18:54	16:45	23   15:48 (B 01)   16:05   105   15:08 (Rep 8)	
4	04:58	05:39	06:32	07:24	07:22	15:24 (B 01)   08:14   12:53 (Rep 11)	
	21:49	21:10	20:04	18:51	16:44	25   15:49 (B 01)   16:04   106   15:08 (Rep 8)	
5	04:59	05:41	06:34	07:26	07:23	15:23 (B 01)   08:15   12:53 (Rep 11)	
	21:48	21:09	20:01	18:49	16:42	27   15:50 (B 01)   16:04   107   15:09 (Rep 8)	
6	05:00	05:43	06:36	07:28	07:25	15:22 (B 01)   08:17   12:53 (Rep 11)	
	21:47	21:07	19:59	18:46	16:40	28   15:50 (B 01)   16:03   108   15:09 (Rep 8)	
7	05:01	05:44	06:38	07:30	07:27	15:22 (B 01)   08:18   12:53 (Rep 11)	
	21:47	21:05	19:56	18:44	16:38	29   15:51 (B 01)   16:03   108   15:09 (Rep 8)	
8	05:02	05:46	06:39	07:32	07:29	15:22 (B 01)   08:19   12:54 (Rep 11)	
	21:46	21:03	19:54	18:42	16:36	29   15:51 (B 01)   16:02   108   15:10 (Rep 8)	
9	05:03	05:48	06:41	07:33	07:31	15:22 (B 01)   08:20   12:54 (Rep 11)	
	21:45	21:01	19:52	18:39	16:35	29   15:51 (B 01)   16:02   108   15:10 (Rep 8)	
10	05:04	05:49	06:43	07:35	07:33	15:21 (B 01)   08:22   12:54 (Rep 11)	
	21:45	20:59	19:49	18:37	16:33	30   15:51 (B 01)   16:02   109   15:10 (Rep 8)	
11	05:05	05:51	06:44	07:37	07:35	15:22 (B 01)   08:23   12:54 (Rep 11)	
	21:44	20:57	19:47	18:35	16:31	29   15:51 (B 01)   16:02   109   15:10 (Rep 8)	
12	05:06	05:53	06:46	07:39	07:37	15:22 (B 01)   08:24   12:55 (Rep 11)	
	21:43	20:55	19:44	18:32	16:30	29   15:51 (B 01)   16:01   109   15:11 (Rep 8)	
13	05:07	05:55	06:48	07:41	07:38	15:22 (B 01)   08:25   11:13 (Oerzen 1)	
	21:42	20:53	19:42	18:30	16:28	29   15:51 (B 01)   16:01   116   15:12 (Rep 8)	
14	05:08	05:56	06:50	07:42	07:40	15:22 (B 01)   08:26   11:12 (Oerzen 1)	
	21:41	20:51	19:40	18:28	16:26	29   15:51 (B 01)   16:01   119   15:12 (Rep 8)	
15	05:10	05:58	06:51	07:44	07:42	15:24 (B 01)   08:27   11:12 (Oerzen 1)	
	21:40	20:49	19:37	18:26	16:25	28   15:52 (B 01)   16:01   120   15:12 (Rep 8)	
16	05:11	06:00	06:53	07:46	07:44	15:25 (B 01)   08:28   11:11 (Oerzen 1)	
	21:39	20:47	19:35	18:23	16:23	26   15:51 (B 01)   16:01   122   15:12 (Rep 8)	
17	05:12	06:01	06:55	07:48	07:46	15:25 (B 01)   08:28   11:11 (Oerzen 1)	
	21:38	20:44	19:32	18:21	16:22	24   15:49 (B 01)   16:02   123   15:12 (Rep 8)	
18	05:14	06:03	06:57	07:50	07:48	14:14 (Rep 9)   08:29   11:11 (Oerzen 1)	
	21:36	20:42	19:30	18:19	16:20	32   15:48 (B 01)   16:02   123   15:13 (Rep 8)	
19	05:15	06:05	06:58	07:51	07:49	13:03 (Rep 11)   08:30   11:11 (Oerzen 1)	
	21:35	20:40	19:27	18:17	16:19	58   15:45 (B 01)   16:02   124   15:14 (Rep 8)	
20	05:16	06:07	07:00	07:53	07:51	13:00 (Rep 11)   08:31   11:11 (Oerzen 1)	
	21:34	20:38	19:25	18:14	16:18	69   15:44 (B 01)   16:02   125   15:14 (Rep 8)	
21	05:18	06:08	07:02	07:55	07:53	12:59 (Rep 11)   08:31   11:12 (Oerzen 1)	
	21:33	20:36	19:23	18:12	16:16	74   15:43 (B 01)   16:03   126   15:15 (Rep 8)	
22	05:19	06:10	07:03	07:57	07:55	12:57 (Rep 11)   08:32   11:12 (Oerzen 1)	
	21:31	20:34	19:20	18:10	16:15	80   15:41 (B 01)   16:03   126   15:15 (Rep 8)	
23	05:21	06:12	07:05	07:59	07:56	12:56 (Rep 11)   08:32   11:13 (Oerzen 1)	
	21:30	20:31	19:18	18:08	16:14	84   15:40 (B 01)   16:04   126   15:16 (Rep 8)	
24	05:22	06:13	07:07	08:01	07:58	12:55 (Rep 11)   08:33   11:13 (Oerzen 1)	
	21:29	20:29	19:15	18:06	16:13	86   15:39 (B 01)   16:04   124   15:16 (Rep 8)	
25	05:24	06:15	07:09	07:03	08:00	12:55 (Rep 11)   08:33   11:14 (Oerzen 1)	
	21:27	20:27	19:13	17:04	16:12	86   15:03 (Rep 8)   16:05   123   15:16 (Rep 8)	
26	05:25	06:17	07:10	07:05	08:02	12:55 (Rep 11)   08:33   11:14 (Oerzen 1)	
	21:26	20:25	19:10	17:01	16:11	90   15:04 (Rep 8)   16:06   123   15:16 (Rep 8)	
27	05:27	06:19	07:12	07:06	08:03	12:54 (Rep 11)   08:34   11:16 (Oerzen 1)	
	21:24	20:22	19:08	16:59	16:10	94   15:05 (Rep 8)   16:06   123   15:18 (Rep 8)	
28	05:28	06:20	07:14	07:08	08:05	12:53 (Rep 11)   08:34   11:17 (Oerzen 1)	
	21:22	20:20	19:06	16:57	16:09	95   15:04 (Rep 8)   16:07   121   15:18 (Rep 8)	
29	05:30	06:22	07:16	07:10	08:06	12:53 (Rep 11)   08:34   11:18 (Oerzen 1)	
	21:21	20:18	19:03	16:55	16:08	99   15:05 (Rep 8)   16:08   119   15:19 (Rep 8)	
30	05:31	06:24	07:17	07:12	08:08	12:53 (Rep 11)   08:34   11:20 (Oerzen 1)	
	21:19	20:15	19:01	16:53	16:07	101   15:06 (Rep 8)   16:09   117   15:19 (Rep 8)	
31	05:33	06:26		07:14	15:30 (B 01)		08:34   11:22 (Oerzen 1)
	21:17	20:13		16:51	15:44 (B 01)		16:10   112   15:19 (Rep 8)
Sonnenscheinstunden	509	458	382	329	261	237	
astr.max.mögl.Beschattung				22	1502		3595

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s59 - Südergellersen, Poggenpohl 7

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni
1	08:34	12:32 (Rep 11)   08:05	15:33 (B 01)   07:09	06:55	05:48	05:00
	16:11	104 15:35 (B 01)   17:01	18 15:51 (B 01)   17:56	19:53	20:47	21:35
2	08:34	12:34 (Rep 11)   08:03	15:36 (B 01)   07:07	06:53	05:46	04:59
	16:12	103 15:36 (B 01)   17:03	12 15:48 (B 01)   17:58	19:55	20:48	21:36
3	08:34	12:35 (Rep 11)   08:02	15:41 (B 01)   07:04	06:51	05:44	04:58
	16:14	102 15:38 (B 01)   17:05	3 15:44 (B 01)   18:00	19:56	20:50	21:38
4	08:33	12:35 (Rep 11)   08:00	07:02	06:48	05:42	04:57
	16:15	102 15:38 (B 01)   17:07	18:02	19:58	20:52	21:39
5	08:33	12:37 (Rep 11)   07:58	07:00	06:46	05:40	04:56
	16:16	98 15:40 (B 01)   17:09	18:03	20:00	20:54	21:40
6	08:33	12:37 (Rep 11)   07:56	06:57	06:43	05:38	04:56
	16:17	99 15:41 (B 01)   17:11	18:05	20:02	20:55	21:41
7	08:32	12:38 (Rep 11)   07:55	06:55	06:41	05:36	04:55
	16:19	96 15:42 (B 01)   17:13	18:07	20:04	20:57	21:42
8	08:32	12:40 (Rep 11)   07:53	06:53	06:39	05:34	04:54
	16:20	93 15:44 (B 01)   17:15	18:09	20:05	20:59	21:43
9	08:31	12:41 (Rep 11)   07:51	06:50	06:36	05:32	04:54
	16:21	91 15:46 (B 01)   17:17	18:11	20:07	21:01	21:44
10	08:31	12:42 (Rep 11)   07:49	06:48	06:34	05:30	04:53
	16:23	86 15:47 (B 01)   17:19	18:13	20:09	21:02	21:44
11	08:30	12:44 (Rep 11)   07:47	06:46	06:32	05:29	04:53
	16:24	81 15:49 (B 01)   17:21	18:15	20:11	21:04	21:45
12	08:29	12:46 (Rep 11)   07:45	06:43	06:29	05:27	04:52
	16:26	75 15:50 (B 01)   17:23	18:16	20:13	21:06	21:46
13	08:29	12:48 (Rep 11)   07:43	06:41	06:27	05:25	04:52
	16:27	63 15:51 (B 01)   17:25	18:18	20:14	21:07	21:47
14	08:28	12:52 (Rep 11)   07:41	06:39	06:25	05:23	04:52
	16:29	42 15:52 (B 01)   17:27	18:20	20:16	21:09	21:47
15	08:27	15:22 (B 01)   07:39	06:36	06:22	05:22	04:52
	16:31	31 15:53 (B 01)   17:29	18:22	20:18	21:11	21:48
16	08:26	15:22 (B 01)   07:37	06:34	06:20	05:20	04:52
	16:32	31 15:53 (B 01)   17:31	18:24	20:20	21:12	21:48
17	08:25	15:22 (B 01)   07:35	06:31	06:18	05:18	04:51
	16:34	32 15:54 (B 01)   17:33	18:26	20:22	21:14	21:49
18	08:24	15:23 (B 01)   07:33	06:29	06:16	05:17	04:51
	16:36	32 15:55 (B 01)   17:35	18:27	20:23	21:16	21:49
19	08:23	15:23 (B 01)   07:31	06:27	06:13	05:15	04:51
	16:37	32 15:55 (B 01)   17:37	18:29	20:25	21:17	21:50
20	08:22	15:23 (B 01)   07:29	06:24	06:11	05:14	04:51
	16:39	32 15:55 (B 01)   17:39	18:31	20:27	21:19	21:50
21	08:21	15:24 (B 01)   07:27	06:22	06:09	05:13	04:52
	16:41	31 15:55 (B 01)   17:41	18:33	20:29	21:20	21:50
22	08:19	15:24 (B 01)   07:24	06:19	06:07	05:11	04:52
	16:43	31 15:55 (B 01)   17:42	18:35	20:31	21:22	21:50
23	08:18	15:25 (B 01)   07:22	06:17	06:04	05:10	04:52
	16:45	31 15:56 (B 01)   17:44	18:37	20:32	21:23	21:51
24	08:17	15:26 (B 01)   07:20	06:15	06:02	05:08	04:52
	16:46	30 15:56 (B 01)   17:46	18:38	20:34	21:25	21:51
25	08:16	15:26 (B 01)   07:18	06:12	06:00	05:07	04:53
	16:48	30 15:56 (B 01)   17:48	18:40	20:36	21:26	21:51
26	08:14	15:26 (B 01)   07:16	06:10	05:58	05:06	04:53
	16:50	29 15:55 (B 01)   17:50	18:42	20:38	21:27	21:51
27	08:13	15:27 (B 01)   07:13	06:07	05:56	05:05	04:54
	16:52	28 15:55 (B 01)   17:52	18:44	20:40	21:29	21:51
28	08:11	15:28 (B 01)   07:11	06:05	05:54	05:04	04:54
	16:54	26 15:54 (B 01)   17:54	18:46	20:41	21:30	21:51
29	08:10	15:29 (B 01)	07:02	05:52	05:03	04:55
	16:56	25 15:54 (B 01)	19:47	20:43	21:31	21:50
30	08:08	15:31 (B 01)	07:00	05:50	05:01	04:55
	16:58	22 15:53 (B 01)	19:49	20:45	21:33	21:50
31	08:07	15:32 (B 01)	06:58		05:00	
	17:00	20 15:52 (B 01)	19:51		21:34	
Sonnenscheinstunden	253	275	367	419	491	506
astr.max.mögl.Beschattung	1728	33				

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s59 - Südergellersen, Poggenpohl 7

### Annahmen für Schattenwurfberechnung

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

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

	Juli	August	September	Oktober	November	Dezember
1	04:56	05:35	06:27	07:19	07:16	08:10 12:26 (Rep 11)
	21:50	21:16	20:11	18:58	16:49	16:06 80 15:31 (B 01)
2	04:57	05:36	06:29	07:21	07:18	08:11 12:25 (Rep 11)
	21:49	21:14	20:08	18:56	16:47	16:06 86 15:30 (B 01)
3	04:57	05:38	06:31	07:23	07:20	08:12 12:25 (Rep 11)
	21:49	21:12	20:06	18:54	16:45	16:05 91 15:30 (B 01)
4	04:58	05:39	06:32	07:24	07:22	08:14 12:24 (Rep 11)
	21:49	21:10	20:04	18:51	16:44	16:04 94 15:29 (B 01)
5	04:59	05:41	06:34	07:26	07:23	08:15 12:24 (Rep 11)
	21:48	21:09	20:01	18:49	16:42	16:04 96 15:28 (B 01)
6	05:00	05:43	06:36	07:28	07:25	08:17 12:23 (Rep 11)
	21:47	21:07	19:59	18:46	16:40	16:03 99 15:27 (B 01)
7	05:01	05:44	06:38	07:30	07:27	08:18 12:23 (Rep 11)
	21:47	21:05	19:56	18:44	16:38	16:03 98 15:26 (B 01)
8	05:02	05:46	06:39	07:32	07:29	15:10 (B 01) 08:19 12:23 (Rep 11)
	21:46	21:03	19:54	18:42	16:36	5 15:15 (B 01) 16:02 103 15:27 (B 01)
9	05:03	05:48	06:41	07:33	07:31	15:06 (B 01) 08:20 12:23 (Rep 11)
	21:45	21:01	19:52	18:39	16:35	13 15:19 (B 01) 16:02 102 15:26 (B 01)
10	05:04	05:49	06:43	07:35	07:33	15:04 (B 01) 08:22 12:23 (Rep 11)
	21:45	20:59	19:49	18:37	16:33	17 15:21 (B 01) 16:02 103 15:25 (B 01)
11	05:05	05:51	06:44	07:37	07:35	15:03 (B 01) 08:23 12:23 (Rep 11)
	21:44	20:57	19:47	18:35	16:31	20 15:23 (B 01) 16:02 103 15:25 (B 01)
12	05:06	05:53	06:46	07:39	07:37	15:01 (B 01) 08:24 12:24 (Rep 11)
	21:43	20:55	19:44	18:32	16:30	23 15:24 (B 01) 16:01 104 15:25 (B 01)
13	05:07	05:55	06:48	07:41	07:38	15:00 (B 01) 08:25 12:24 (Rep 11)
	21:42	20:53	19:42	18:30	16:28	25 15:25 (B 01) 16:01 105 15:25 (B 01)
14	05:08	05:56	06:50	07:42	07:40	15:00 (B 01) 08:26 12:24 (Rep 11)
	21:41	20:51	19:40	18:28	16:26	26 15:26 (B 01) 16:01 105 15:25 (B 01)
15	05:10	05:58	06:51	07:44	07:42	15:00 (B 01) 08:27 12:24 (Rep 11)
	21:40	20:49	19:37	18:26	16:25	28 15:28 (B 01) 16:01 105 15:25 (B 01)
16	05:11	06:00	06:53	07:46	07:44	15:00 (B 01) 08:28 12:24 (Rep 11)
	21:39	20:47	19:35	18:23	16:23	29 15:29 (B 01) 16:01 104 15:24 (B 01)
17	05:12	06:01	06:55	07:48	07:46	15:00 (B 01) 08:28 12:24 (Rep 11)
	21:38	20:44	19:32	18:21	16:22	29 15:29 (B 01) 16:02 104 15:24 (B 01)
18	05:14	06:03	06:57	07:50	07:48	15:00 (B 01) 08:29 10:54 (Oerzen 1)
	21:37	20:42	19:30	18:19	16:20	30 15:30 (B 01) 16:02 106 15:25 (B 01)
19	05:15	06:05	06:58	07:52	07:49	14:59 (B 01) 08:30 10:53 (Oerzen 1)
	21:35	20:40	19:27	18:17	16:19	31 15:30 (B 01) 16:02 109 15:25 (B 01)
20	05:16	06:07	07:00	07:53	07:51	14:59 (B 01) 08:31 10:53 (Oerzen 1)
	21:34	20:38	19:25	18:14	16:18	31 15:30 (B 01) 16:02 109 15:25 (B 01)
21	05:18	06:08	07:02	07:55	07:53	14:59 (B 01) 08:31 10:53 (Oerzen 1)
	21:33	20:36	19:23	18:12	16:16	31 15:30 (B 01) 16:03 111 15:26 (B 01)
22	05:19	06:10	07:03	07:57	07:55	14:59 (B 01) 08:32 10:53 (Oerzen 1)
	21:31	20:34	19:20	18:10	16:15	32 15:31 (B 01) 16:03 111 15:26 (B 01)
23	05:21	06:12	07:05	07:59	07:56	14:59 (B 01) 08:32 10:54 (Oerzen 1)
	21:30	20:31	19:18	18:08	16:14	32 15:31 (B 01) 16:04 111 15:27 (B 01)
24	05:22	06:13	07:07	08:01	07:58	15:00 (B 01) 08:33 10:55 (Oerzen 1)
	21:29	20:29	19:15	18:06	16:13	32 15:32 (B 01) 16:04 109 15:27 (B 01)
25	05:24	06:15	07:09	07:03	08:00	15:00 (B 01) 08:33 10:56 (Oerzen 1)
	21:27	20:27	19:13	17:04	16:12	32 15:32 (B 01) 16:05 108 15:28 (B 01)
26	05:25	06:17	07:10	07:05	08:02	15:01 (B 01) 08:33 12:29 (Rep 11)
	21:26	20:25	19:10	17:01	16:11	31 15:32 (B 01) 16:06 103 15:29 (B 01)
27	05:27	06:19	07:12	07:06	08:03	15:02 (B 01) 08:34 12:29 (Rep 11)
	21:24	20:22	19:08	16:59	16:10	31 15:33 (B 01) 16:06 105 15:30 (B 01)
28	05:28	06:20	07:14	07:08	08:05	12:33 (Rep 11) 08:34 12:30 (Rep 11)
	21:22	20:20	19:06	16:57	16:09	40 15:32 (B 01) 16:07 104 15:31 (B 01)
29	05:30	06:22	07:16	07:10	08:06	12:29 (Rep 11) 08:34 12:31 (Rep 11)
	21:21	20:18	19:03	16:55	16:08	63 15:32 (B 01) 16:08 104 15:32 (B 01)
30	05:31	06:24	07:17	07:12	08:08	12:28 (Rep 11) 08:34 12:31 (Rep 11)
	21:19	20:15	19:01	16:53	16:07	73 15:32 (B 01) 16:09 105 15:33 (B 01)
31	05:33	06:26		07:14		08:34 12:31 (Rep 11)
	21:17	20:13		16:51		16:10 103 15:33 (B 01)
Sonnenscheinstunden	509	458	382	329	261	237
astr.max.mögl.Beschattung					704	3180

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s60 - Südergellersen, Poggenpohl 8

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:34	12:12 (Rep 11)	08:05	07:09	06:55	05:48	05:00	04:56	05:25	06:27	07:19	08:10	14:37 (B 01)
	16:11	15:22 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:06	30 15:07 (B 01)
2	08:34	12:14 (Rep 11)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	08:11	14:37 (B 01)
	16:12	15:23 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:06	31 15:08 (B 01)
3	08:34	12:16 (Rep 11)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	08:12	14:38 (B 01)
	16:14	15:24 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:05	31 15:09 (B 01)
4	08:33	12:19 (Rep 11)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	08:14	14:37 (B 01)
	16:15	15:23 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:04	32 15:09 (B 01)
5	08:33	14:52 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	08:15	14:38 (B 01)
	16:16	15:24 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:04	32 15:10 (B 01)
6	08:33	14:52 (B 01)	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	08:17	14:38 (B 01)
	16:17	15:24 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:03	32 15:10 (B 01)
7	08:32	14:54 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	08:18	14:38 (B 01)
	16:19	15:24 (B 01)	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:03	32 15:10 (B 01)
8	08:32	14:53 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	08:19	12:07 (Rep 11)
	16:20	15:25 (B 01)	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:02	38 15:12 (B 01)
9	08:31	14:54 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	08:20	12:05 (Rep 11)
	16:21	15:25 (B 01)	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:02	43 15:12 (B 01)
10	08:31	14:54 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	08:22	12:03 (Rep 11)
	16:23	15:25 (B 01)	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:02	47 15:12 (B 01)
11	08:30	14:54 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	08:23	12:02 (Rep 11)
	16:24	15:25 (B 01)	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:02	49 15:12 (B 01)
12	08:29	14:55 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	08:24	12:03 (Rep 11)
	16:26	15:25 (B 01)	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:01	56 15:13 (B 01)
13	08:29	14:57 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	08:25	12:03 (Rep 11)
	16:27	15:26 (B 01)	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:01	59 15:14 (B 01)
14	08:28	14:56 (B 01)	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	08:26	12:02 (Rep 11)
	16:29	15:25 (B 01)	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:01	64 15:14 (B 01)
15	08:27	14:57 (B 01)	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	08:27	12:02 (Rep 11)
	16:31	15:25 (B 01)	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:01	70 15:15 (B 01)
16	08:26	14:58 (B 01)	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	08:28	12:02 (Rep 11)
	16:32	15:25 (B 01)	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:01	73 15:14 (B 01)
17	08:25	15:00 (B 01)	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	08:29	12:02 (Rep 11)
	16:34	15:25 (B 01)	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:02	78 15:15 (B 01)
18	08:24	15:01 (B 01)	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	08:29	12:02 (Rep 11)
	16:36	15:25 (B 01)	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:02	80 15:16 (B 01)
19	08:23	15:02 (B 01)	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	08:29	12:03 (Rep 11)
	16:37	15:25 (B 01)	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:01	80 15:16 (B 01)
20	08:22	15:03 (B 01)	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	08:31	12:03 (Rep 11)
	16:39	15:23 (B 01)	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:01	81 15:16 (B 01)
21	08:21	15:05 (B 01)	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	08:31	12:04 (Rep 11)
	16:41	15:23 (B 01)	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:01	81 15:17 (B 01)
22	08:19	15:07 (B 01)	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	08:32	12:04 (Rep 11)
	16:43	15:21 (B 01)	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:01	81 15:17 (B 01)
23	08:18	15:10 (B 01)	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	08:32	12:05 (Rep 11)
	16:45	15:19 (B 01)	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:01	81 15:18 (B 01)
24	08:17	17:46	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33	12:05 (Rep 11)
	16:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	15:02	16:04	81 15:18 (B 01)
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33	12:05 (Rep 11)
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	15:05	80 15:19 (B 01)
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33	12:07 (Rep 11)
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	15:06	78 15:20 (B 01)
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34	12:07 (Rep 11)
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	15:06	76 15:20 (B 01)
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34	12:08 (Rep 11)
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	15:06	72 15:21 (B 01)
29	08:10	07:02	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	14:37 (B 01)	08:34	12:09 (Rep 11)
	16:56	19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	15:06	16:08	64 15:21 (B 01)
30	08:08	07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	14:37 (B 01)	08:34	12:10 (Rep 11)
	16:58	19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	15:07 (B 01)	16:09	62 15:22 (B 01)
31	08:07	06:58	05:50	05:00	05:00	05:33	06:26	07:14	07:14	08:09	14:37 (B 01)	08:34	12:10 (Rep 11)
	17:00	19:51	20:47	21:34	21:50	21:17	20:13	19:01	16:51	16:07	15:07 (B 01)	16:10	58 15:21 (B 01)
Sonnenscheinstunden	253			419	491	506	509	458	382	329	261	275	1852
astr.max.mögl.Beschattung	675												

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s61 - Südergellersen, Schwarzer Weg 2

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
4	08:34	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14
	16:15	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04
5	08:33	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15
	16:16	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04
6	08:33	07:56	06:57	06:43	05:38	04:56	05:00	05:43	06:36	07:28	07:25	08:17
	16:17	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03
7	08:32	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18
	16:19	17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:57	18:44	16:38	16:03
8	08:32	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19
	16:20	17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02
9	08:31	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20
	16:21	17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02
10	08:31	07:49	06:48	06:34	05:30	04:53	05:04	05:50	06:43	07:35	07:33	08:22
	16:23	17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02
11	08:30	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:45	07:37	07:35	08:23
	16:24	17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02
12	08:29	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24
	16:26	17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01
13	08:29	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:39	08:25
	16:27	17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01
14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	08:25	07:35	06:31	06:18	05:19	04:51	05:12	06:01	06:55	07:48	07:46	08:29
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:17	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:14	07:07	08:01	07:58	08:33
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10		07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s62 - Südergellersen, Schwarzer Weg 9

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
	16:12	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06
3	08:34	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12
	16:14	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05
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27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34
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31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s63 - Südergellersen, Westergellerser Weg 1

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34	08:05	07:09	06:55	05:48	05:00	04:56	05:35	06:27	07:19	07:16	08:10
	16:11	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06
2	08:34	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11
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	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
	Minuten mit Schatten	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s64 - Südergellersen, Westergellersen Weg 4

### Annahmen für Schattenwurfberechnung

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

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14	08:28	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26
	16:29	17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01
15	08:27	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27
	16:31	17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01
16	08:26	07:37	06:34	06:20	05:20	04:52	05:11	06:00	06:53	07:46	07:44	08:28
	16:32	17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01
17	08:25	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29
	16:34	17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02
18	08:24	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29
	16:36	17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02
19	08:23	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30
	16:37	17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02
20	08:22	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31
	16:39	17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02
21	08:21	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31
	16:41	17:41	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03
22	08:19	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32
	16:43	17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03
23	08:18	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32
	16:45	17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33
	16:46	17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04
25	08:16	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	07:03	08:00	08:33
	16:48	17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	17:04	16:12	16:05
26	08:14	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	07:05	08:02	08:33
	16:50	17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	17:01	16:11	16:06
27	08:13	07:13	06:07	05:56	05:05	04:54	05:27	06:19	07:12	07:06	08:03	08:34
	16:52	17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	16:59	16:10	16:06
28	08:11	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	07:08	08:05	08:34
	16:54	17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	16:57	16:09	16:07
29	08:10		07:03	05:52	05:03	04:55	05:30	06:22	07:16	07:10	08:06	08:34
	16:56		19:47	20:43	21:32	21:50	21:21	20:18	19:03	16:55	16:08	16:08
30	08:08		07:00	05:50	05:01	04:55	05:31	06:24	07:17	07:12	08:08	08:34
	16:58		19:49	20:45	21:33	21:50	21:19	20:15	19:01	16:53	16:07	16:09
31	08:07		06:58		05:00		05:33	06:26		07:14		08:34
	17:00		19:51		21:34		21:17	20:13		16:51		16:10
Sonnenscheinstunden	253	275	367	419	491	506	509	458	382	329	261	237
astr.max.mögl.Beschattung												

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

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

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s65 - Südergellersen, Wetzter Weg 3

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	09:43 (Oerzen 1) 11:05 (Rep 11)	07:09 17:01	06:55 17:56	05:48 19:53	05:00 20:47	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49	08:10 16:06
2	08:34 16:13	09:44 (Oerzen 1) 11:05 (Rep 11)	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	08:11 16:47
3	08:34 16:14	09:45 (Oerzen 1) 11:05 (Rep 11)	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	08:12 16:45
4	08:34 16:15	09:45 (Oerzen 1) 11:04 (Rep 11)	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	08:14 16:44
5	08:33 16:16	09:46 (Oerzen 1) 11:04 (Rep 11)	07:58 17:09	07:00 18:03	06:46 19:58	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	08:15 16:42
6	08:33 16:17	09:47 (Oerzen 1) 11:03 (Rep 11)	07:56 17:11	06:57 18:05	06:43 19:55	05:38 20:55	04:56 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	08:17 16:40
7	08:32 16:19	09:48 (Oerzen 1) 11:01 (Rep 11)	07:55 17:13	06:55 18:07	06:41 19:54	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:57	07:30 18:44	08:18 16:38
8	08:32 16:20	09:49 (Oerzen 1) 10:06 (Oerzen 1)	07:53 17:15	06:53 18:09	06:39 19:55	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	08:19 16:36
9	08:31 16:21	09:50 (Oerzen 1) 10:05 (Oerzen 1)	07:51 17:17	06:50 18:11	06:36 19:57	05:32 20:07	04:54 21:01	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	08:20 16:35
10	08:31 16:23	09:52 (Oerzen 1) 10:04 (Oerzen 1)	07:49 17:19	06:48 18:13	06:34 19:59	05:30 21:02	04:53 21:44	05:04 21:45	05:50 20:59	06:43 19:49	07:35 18:37	08:22 16:33
11	08:30 16:24	09:54 (Oerzen 1) 10:03 (Oerzen 1)	07:47 17:21	06:46 18:15	06:32 19:59	05:29 20:11	04:53 21:45	05:05 21:44	05:51 20:57	06:45 19:47	07:37 18:35	08:23 16:31
12	08:29 16:26	09:57 (Oerzen 1) 10:00 (Oerzen 1)	07:45 17:23	06:43 18:16	06:29 20:13	05:27 21:06	04:52 21:46	05:06 21:43	05:53 20:55	06:46 19:44	07:39 18:32	08:24 16:30
13	08:29 16:27	09:57 (Oerzen 1) 10:00 (Oerzen 1)	07:43 17:25	06:41 18:18	06:27 20:14	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	08:25 16:28
14	08:28 16:29	09:58 (Oerzen 1) 10:01 (Rep 11)	07:41 17:27	06:39 18:20	06:25 20:16	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	08:26 16:26
15	08:27 16:31	09:59 (Oerzen 1) 10:02 (Rep 11)	07:39 17:29	06:36 18:22	06:22 20:18	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	08:27 16:25
16	08:26 16:32	09:59 (Oerzen 1) 10:03 (Rep 11)	07:37 17:31	06:34 18:24	06:20 20:20	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	08:28 16:23
17	08:25 16:34	09:59 (Oerzen 1) 10:04 (Rep 11)	07:35 17:33	06:31 18:26	06:18 20:22	05:19 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	08:29 16:22
18	08:24 16:36	09:59 (Oerzen 1) 10:05 (Rep 11)	07:33 17:35	06:29 18:27	06:16 20:23	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	08:30 16:21
19	08:23 16:37	09:59 (Oerzen 1) 10:06 (Rep 11)	07:31 17:37	06:27 18:29	06:13 20:25	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	08:31 16:19
20	08:22 16:39	09:59 (Oerzen 1) 10:07 (Rep 11)	07:29 17:39	06:24 18:31	06:11 20:27	05:14 21:19	04:51 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	08:32 16:18
21	08:21 16:41	09:59 (Oerzen 1) 10:08 (Rep 11)	07:27 17:41	06:22 18:33	06:09 20:29	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	08:33 16:17
22	08:19 16:43	09:59 (Oerzen 1) 10:09 (Rep 11)	07:24 17:42	06:19 18:35	06:07 20:31	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	08:34 16:15
23	08:18 16:45	09:59 (Oerzen 1) 10:10 (Rep 11)	07:22 17:44	06:17 18:37	06:04 20:32	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:59 18:08	08:35 16:14
24	08:17 16:46	09:59 (Oerzen 1) 10:11 (Rep 11)	07:20 17:46	06:15 18:38	06:02 20:34	05:08 21:25	04:52 21:51	05:22 21:29	06:14 20:29	07:07 19:15	08:01 18:06	08:36 16:13
25	08:16 16:48	09:59 (Oerzen 1) 10:12 (Rep 11)	07:18 17:48	06:12 18:40	06:00 20:36	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	08:03 17:04	08:37 16:12
26	08:14 16:50	09:59 (Oerzen 1) 10:13 (Rep 11)	07:16 17:50	06:10 18:42	05:58 20:38	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	08:05 17:01	08:38 16:11
27	08:13 16:52	09:59 (Oerzen 1) 10:14 (Rep 11)	07:13 17:52	06:07 18:44	05:56 20:40	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	08:06 16:59	08:39 16:10
28	08:11 16:54	09:59 (Oerzen 1) 10:15 (Rep 11)	07:11 17:54	06:05 18:46	05:54 20:41	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	08:08 16:57	08:40 16:09
29	08:10 16:56	09:59 (Oerzen 1) 10:16 (Rep 11)	07:09 17:56	06:03 18:47	05:52 20:43	05:03 21:32	04:55 21:51	05:30 21:21	06:22 20:18	07:16 19:03	08:10 16:55	08:41 16:08
30	08:08 16:58	09:59 (Oerzen 1) 10:17 (Rep 11)	07:07 17:57	06:01 18:49	05:50 20:45	05:01 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	08:12 16:53	08:42 16:07
31	08:07 17:00	09:59 (Oerzen 1) 10:18 (Rep 11)	07:05 17:58	06:58 18:51	05:50 20:47	05:00 21:34	04:55 21:50	05:33 21:17	06:26 20:13	07:18 18:51	08:14 16:51	08:43 16:05
Sonnenscheinstunden	253		275		419	491	506	509	458	382	329	261
astr.max.mögl.Beschattung	316										1	1310

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s66 - Südergellersen, Wetzter Weg 6

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:34 16:11	09:13 (0erzen 1) 13:46 (B 01)	08:05 17:02	07:09 17:56	06:55 19:53	05:48 20:47	05:00 21:35	04:56 21:50	05:35 21:16	06:27 20:11	07:19 18:58	07:16 16:49
2	08:34 16:13	09:14 (0erzen 1) 13:47 (B 01)	08:03 17:03	07:07 17:58	06:53 19:55	05:46 20:48	04:59 21:36	04:57 21:49	05:36 21:14	06:29 20:08	07:21 18:56	07:18 16:47
3	08:34 16:14	09:14 (0erzen 1) 13:47 (B 01)	08:02 17:05	07:04 18:00	06:51 19:56	05:44 20:50	04:58 21:38	04:57 21:49	05:38 21:12	06:31 20:06	07:23 18:54	07:20 16:45
4	08:34 16:15	09:14 (0erzen 1) 13:46 (B 01)	08:00 17:07	07:02 18:02	06:48 19:58	05:42 20:52	04:57 21:39	04:58 21:49	05:39 21:10	06:32 20:04	07:24 18:51	07:22 16:44
5	08:33 16:16	09:15 (0erzen 1) 13:46 (B 01)	07:58 17:09	07:00 18:03	06:46 19:58	05:40 20:54	04:56 21:40	04:59 21:48	05:41 21:09	06:34 20:01	07:26 18:49	07:23 16:42
6	08:33 16:17	09:14 (0erzen 1) 13:45 (B 01)	07:56 17:11	06:57 18:05	06:43 19:55	05:38 20:55	04:56 21:41	05:00 21:47	05:43 21:07	06:36 19:59	07:28 18:46	07:25 16:40
7	08:32 16:19	09:14 (0erzen 1) 13:44 (B 01)	07:55 17:13	06:55 18:07	06:41 19:54	05:36 20:57	04:55 21:42	05:01 21:47	05:44 21:05	06:38 19:57	07:30 18:44	07:27 16:38
8	08:32 16:20	09:15 (0erzen 1) 13:44 (B 01)	07:53 17:15	06:53 18:09	06:39 19:55	05:34 20:59	04:54 21:43	05:02 21:46	05:46 21:03	06:39 19:54	07:32 18:42	07:29 16:36
9	08:31 16:21	09:15 (0erzen 1) 13:43 (B 01)	07:51 17:17	06:50 18:11	06:36 19:57	05:32 21:01	04:54 21:44	05:03 21:45	05:48 21:01	06:41 19:52	07:33 18:39	07:31 16:35
10	08:31 16:23	09:15 (0erzen 1) 13:41 (B 01)	07:49 17:19	06:48 18:13	06:34 19:59	05:30 21:02	04:53 21:44	05:04 21:45	05:50 20:59	06:43 19:49	07:35 18:37	07:33 16:33
11	08:30 16:24	09:15 (0erzen 1) 10:42 (Rep 11)	07:47 17:21	06:46 18:15	06:32 19:59	05:29 21:04	04:53 21:45	05:05 21:46	05:51 20:57	06:45 19:47	07:37 18:35	07:35 16:31
12	08:29 16:26	09:16 (0erzen 1) 10:43 (Rep 11)	07:45 17:23	06:43 18:16	06:29 19:59	05:27 21:06	04:52 21:46	05:06 21:47	05:53 20:55	06:46 19:44	07:37 18:32	07:37 16:30
13	08:29 16:27	09:17 (0erzen 1) 10:44 (Rep 11)	07:43 17:25	06:41 18:18	06:27 19:59	05:25 21:07	04:52 21:47	05:07 21:42	05:55 20:53	06:48 19:42	07:41 18:30	07:39 16:28
14	08:28 16:29	09:16 (0erzen 1) 10:43 (Rep 11)	07:41 17:27	06:39 18:20	06:25 19:59	05:23 21:09	04:52 21:47	05:08 21:41	05:56 20:51	06:50 19:40	07:42 18:28	07:40 16:26
15	08:27 16:31	09:17 (0erzen 1) 10:43 (Rep 11)	07:39 17:29	06:36 18:22	06:22 19:59	05:22 21:11	04:52 21:48	05:10 21:40	05:58 20:49	06:51 19:37	07:44 18:26	07:44 16:25
16	08:26 16:32	09:17 (0erzen 1) 10:43 (Rep 11)	07:37 17:31	06:34 18:24	06:20 19:59	05:20 21:12	04:52 21:48	05:11 21:39	06:00 20:47	06:53 19:35	07:46 18:23	07:46 16:23
17	08:25 16:34	09:18 (0erzen 1) 10:43 (Rep 11)	07:35 17:33	06:31 18:26	06:18 19:59	05:19 21:14	04:51 21:49	05:12 21:38	06:01 20:44	06:55 19:32	07:48 18:21	07:48 16:22
18	08:24 16:36	09:19 (0erzen 1) 10:43 (Rep 11)	07:33 17:35	06:29 18:27	06:16 19:59	05:17 21:16	04:51 21:49	05:14 21:37	06:03 20:42	06:57 19:30	07:50 18:19	07:48 16:21
19	08:23 16:37	09:20 (0erzen 1) 10:43 (Rep 11)	07:31 17:37	06:27 18:29	06:13 19:59	05:15 21:17	04:51 21:50	05:15 21:35	06:05 20:40	06:58 19:27	07:52 18:17	07:49 16:19
20	08:22 16:39	09:20 (0erzen 1) 10:43 (Rep 11)	07:29 17:39	06:24 18:31	06:11 19:59	05:14 21:19	04:52 21:50	05:16 21:34	06:07 20:38	07:00 19:25	07:53 18:14	07:51 16:18
21	08:21 16:41	09:21 (0erzen 1) 10:43 (Rep 11)	07:27 17:41	06:22 18:33	06:09 19:59	05:13 21:20	04:52 21:50	05:18 21:33	06:08 20:36	07:02 19:23	07:55 18:12	07:53 16:17
22	08:19 16:43	09:22 (0erzen 1) 10:42 (Rep 11)	07:24 17:42	06:19 18:35	06:07 19:59	05:11 21:22	04:52 21:50	05:19 21:31	06:10 20:34	07:03 19:20	07:57 18:10	07:55 16:15
23	08:18 16:45	09:22 (0erzen 1) 10:41 (Rep 11)	07:22 17:44	06:17 18:37	06:04 19:59	05:10 21:23	04:52 21:51	05:21 21:30	06:12 20:31	07:05 19:18	07:57 18:08	07:57 16:14
24	08:17 16:46	09:24 (0erzen 1) 10:41 (Rep 11)	07:20 17:46	06:15 18:38	06:02 19:59	05:08 21:25	04:52 21:51	05:22 21:29	06:14 20:29	07:07 19:15	07:58 18:06	07:58 16:13
25	08:16 16:48	09:25 (0erzen 1) 10:39 (Rep 11)	07:18 17:48	06:12 18:40	06:00 19:59	05:07 21:26	04:53 21:51	05:24 21:27	06:15 20:27	07:09 19:13	07:59 18:04	07:59 16:12
26	08:14 16:50	09:26 (0erzen 1) 10:38 (Rep 11)	07:16 17:50	06:10 18:42	05:58 19:59	05:06 21:27	04:53 21:51	05:25 21:26	06:17 20:25	07:10 19:10	08:00 18:02	08:02 16:11
27	08:13 16:52	09:28 (0erzen 1) 10:37 (Rep 11)	07:13 17:52	06:07 18:44	05:56 19:59	05:05 21:29	04:54 21:51	05:27 21:24	06:19 20:22	07:12 19:08	08:03 18:00	08:03 16:10
28	08:11 16:54	09:31 (0erzen 1) 10:34 (Rep 11)	07:11 17:54	06:05 18:46	05:54 19:59	05:04 21:30	04:54 21:51	05:28 21:22	06:20 20:20	07:14 19:06	08:05 18:00	08:05 16:09
29	08:10 16:56	10:23 (Rep 11) 10:31 (Rep 11)	07:03 17:54	06:03 18:47	05:52 19:59	05:03 21:32	04:55 21:50	05:30 21:21	06:22 20:18	07:16 19:03	08:06 18:00	08:06 16:08
30	08:08 16:58		07:00 17:54	05:50 18:45	05:02 19:59	05:02 21:33	04:55 21:50	05:31 21:19	06:24 20:15	07:17 19:01	08:08 18:00	08:08 16:07
31	08:07 17:00		06:58 19:51	05:58 19:51	05:01 19:51	05:01 21:34	05:33 21:17	05:26 20:13	06:26 20:13	07:14 18:51	08:07 18:00	08:07 16:07
	Sonnenscheinstunden astr.max.mögl.Beschattung	253 2109	275 367	419 491	506 509	506 509	458 458	382 329	261 329	999	261 329	237 3766

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s67 - Südergellersen, In de Masch 8

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember			
1	08:34	14:45 (B 01)	08:05	07:09	06:55	05:48	04:59	04:56	05:35	06:27	07:19	07:16	08:10		
16:11	15	15:00 (B 01)	17:01	17:56	19:53	20:47	21:35	21:50	21:16	20:11	18:58	16:49	16:06		
2	08:34	14:47 (B 01)	08:03	07:07	06:53	05:46	04:59	04:57	05:36	06:29	07:21	07:18	08:11		
16:12	13	15:00 (B 01)	17:03	17:58	19:55	20:48	21:36	21:49	21:14	20:08	18:56	16:47	16:06		
3	08:34	14:48 (B 01)	08:02	07:04	06:51	05:44	04:58	04:57	05:38	06:31	07:23	07:20	08:12		
16:14	12	15:00 (B 01)	17:05	18:00	19:56	20:50	21:38	21:49	21:12	20:06	18:54	16:45	16:05		
4	08:33	14:49 (B 01)	08:00	07:02	06:48	05:42	04:57	04:58	05:39	06:32	07:24	07:22	08:14		
16:15	10	14:59 (B 01)	17:07	18:02	19:58	20:52	21:39	21:49	21:10	20:04	18:51	16:44	16:04		
5	08:33	14:51 (B 01)	07:58	07:00	06:46	05:40	04:56	04:59	05:41	06:34	07:26	07:23	08:15		
16:16	8	14:59 (B 01)	17:09	18:03	20:00	20:54	21:40	21:48	21:09	20:01	18:49	16:42	16:04		
6	08:33	14:54 (B 01)	07:56	06:57	06:43	05:38	04:55	05:00	05:43	06:36	07:28	07:25	08:17		
16:17	2	14:56 (B 01)	17:11	18:05	20:02	20:55	21:41	21:47	21:07	19:59	18:46	16:40	16:03		
7	08:32	14:57 (B 01)	07:55	06:55	06:41	05:36	04:55	05:01	05:44	06:38	07:30	07:27	08:18		
16:19		17:13	18:07	20:04	20:57	21:42	21:47	21:05	19:56	18:44	16:38	16:03	7	14:45 (B 01)	
8	08:32	14:58 (B 01)	07:53	06:53	06:39	05:34	04:54	05:02	05:46	06:39	07:32	07:29	08:19	7	14:47 (B 01)
16:20		17:15	18:09	20:05	20:59	21:43	21:46	21:03	19:54	18:42	16:36	16:02	10	14:47 (B 01)	
9	08:31	14:59 (B 01)	07:51	06:50	06:36	05:32	04:54	05:03	05:48	06:41	07:33	07:31	08:20	10	14:36 (B 01)
16:21		17:17	18:11	20:07	21:01	21:44	21:45	21:01	19:52	18:39	16:35	16:02	12	14:48 (B 01)	
10	08:31	15:00 (B 01)	07:49	06:48	06:34	05:30	04:53	05:04	05:49	06:43	07:35	07:33	08:22	12	14:36 (B 01)
16:23		17:19	18:13	20:09	21:02	21:44	21:45	20:59	19:49	18:37	16:33	16:02	13	14:49 (B 01)	
11	08:30	15:01 (B 01)	07:47	06:46	06:32	05:29	04:53	05:05	05:51	06:44	07:37	07:35	08:23	13	14:35 (B 01)
16:24		17:21	18:15	20:11	21:04	21:45	21:44	20:57	19:47	18:35	16:31	16:02	15	14:50 (B 01)	
12	08:29	15:02 (B 01)	07:45	06:43	06:29	05:27	04:52	05:06	05:53	06:46	07:39	07:37	08:24	15	14:36 (B 01)
16:26		17:23	18:16	20:13	21:06	21:46	21:43	20:55	19:44	18:32	16:30	16:01	16	14:52 (B 01)	
13	08:29	15:03 (B 01)	07:43	06:41	06:27	05:25	04:52	05:07	05:55	06:48	07:41	07:38	08:25	16	14:36 (B 01)
16:27		17:25	18:18	20:14	21:07	21:47	21:42	20:53	19:42	18:30	16:28	16:01	17	14:53 (B 01)	
14	08:28	15:04 (B 01)	07:41	06:39	06:25	05:23	04:52	05:08	05:56	06:50	07:42	07:40	08:26	17	14:36 (B 01)
16:29		17:27	18:20	20:16	21:09	21:47	21:41	20:51	19:40	18:28	16:26	16:01	18	14:54 (B 01)	
15	08:27	15:05 (B 01)	07:39	06:36	06:22	05:22	04:52	05:10	05:58	06:51	07:44	07:42	08:27	18	14:36 (B 01)
16:31		17:29	18:22	20:18	21:11	21:48	21:40	20:49	19:37	18:26	16:25	16:01	18	14:54 (B 01)	
16	08:26	15:06 (B 01)	07:37	06:34	06:20	05:20	04:51	05:11	06:00	06:53	07:46	07:44	08:28	18	14:36 (B 01)
16:32		17:31	18:24	20:20	21:12	21:48	21:39	20:47	19:35	18:23	16:23	16:01	18	14:54 (B 01)	
17	08:25	15:07 (B 01)	07:35	06:31	06:18	05:18	04:51	05:12	06:01	06:55	07:48	07:46	08:29	18	14:36 (B 01)
16:34		17:33	18:26	20:22	21:14	21:49	21:38	20:44	19:32	18:21	16:22	16:02	19	14:55 (B 01)	
18	08:24	15:08 (B 01)	07:33	06:29	06:16	05:17	04:51	05:14	06:03	06:57	07:50	07:48	08:29	19	14:37 (B 01)
16:36		17:35	18:27	20:23	21:16	21:49	21:37	20:42	19:30	18:19	16:20	16:02	19	14:56 (B 01)	
19	08:23	15:09 (B 01)	07:31	06:27	06:13	05:15	04:51	05:15	06:05	06:58	07:52	07:49	08:30	19	14:37 (B 01)
16:37		17:37	18:29	20:25	21:17	21:50	21:35	20:40	19:27	18:17	16:19	16:02	20	14:57 (B 01)	
20	08:22	15:10 (B 01)	07:29	06:24	06:11	05:14	04:51	05:16	06:07	07:00	07:53	07:51	08:31	20	14:37 (B 01)
16:39		17:39	18:31	20:27	21:19	21:50	21:34	20:38	19:25	18:14	16:18	16:02	20	14:57 (B 01)	
21	08:21	15:11 (B 01)	07:27	06:22	06:09	05:13	04:52	05:18	06:08	07:02	07:55	07:53	08:31	20	14:38 (B 01)
16:41		17:40	18:33	20:29	21:20	21:50	21:33	20:36	19:23	18:12	16:16	16:03	20	14:58 (B 01)	
22	08:19	15:12 (B 01)	07:24	06:19	06:07	05:11	04:52	05:19	06:10	07:03	07:57	07:55	08:32	20	14:38 (B 01)
16:43		17:42	18:35	20:31	21:22	21:50	21:31	20:34	19:20	18:10	16:15	16:03	20	14:58 (B 01)	
23	08:18	15:13 (B 01)	07:22	06:17	06:04	05:10	04:52	05:21	06:12	07:05	07:59	07:57	08:32	20	14:39 (B 01)
16:45		17:44	18:37	20:32	21:23	21:51	21:30	20:31	19:18	18:08	16:14	16:04	20	14:59 (B 01)	
24	08:17	15:14 (B 01)	07:20	06:15	06:02	05:08	04:52	05:22	06:13	07:07	08:01	07:58	08:33	20	14:39 (B 01)
16:46		17:46	18:38	20:34	21:25	21:51	21:29	20:29	19:15	18:06	16:13	16:04	20	14:59 (B 01)	
25	08:16	15:15 (B 01)	07:18	06:12	06:00	05:07	04:53	05:24	06:15	07:09	08:03	08:00	08:33	20	14:40 (B 01)
16:48		17:48	18:40	20:36	21:26	21:51	21:27	20:27	19:13	18:04	16:12	16:05	19	14:59 (B 01)	
26	08:14	15:16 (B 01)	07:16	06:10	05:58	05:06	04:53	05:25	06:17	07:10	08:05	08:02	08:33	19	14:41 (B 01)
16:50		17:50	18:42	20:38	21:27	21:51	21:26	20:25	19:10	18:01	16:11	16:06	19	15:00 (B 01)	
27	08:13	15:17 (B 01)	07:13	06:07	05:56	05:05	04:53	05:27	06:19	07:12	08:06	08:03	08:34	19	14:41 (B 01)
16:52		17:52	18:44	20:40	21:29	21:51	21:24	20:22	19:08	18:00	16:10	16:06	19	15:00 (B 01)	
28	08:11	15:18 (B 01)	07:11	06:05	05:54	05:04	04:54	05:28	06:20	07:14	08:08	08:05	08:34	19	14:42 (B 01)
16:54		17:54	18:46	20:41	21:30	21:51	21:22	20:20	19:06	18:00	16:10	16:07	18	15:00 (B 01)	
29	08:10	15:19 (B 01)	07:08	06:02	05:52	05:02	04:55	05:30	06:22	07:16	08:10	08:06	08:34	18	14:43 (B 01)
16:56		17:56	18:48	20:43	21:32	21:50	21:21	20:18	19:03	18:00	16:10	16:08	17	15:00 (B 01)	
30	08:08	15:20 (B 01)	07:00	05:50	05:01	04:55	05:31	06:24	07:17	08:11	09:05	08:08	08:34	17	14:44 (B 01)
16:58		17:58	18:50	20:45	21:33	21:50	21:19	20:15	19:01	18:00	16:10	16:07	17	15:01 (B 01)	
31	08:07	15:21 (B 01)	06:58	05:00	04:50	04:50	05:33	06:26	07:19	08:13	09:07	08:08	08:34	17	14:45 (B 01)
17:00		17:59	18:51	20:46	21:34	21:50	21:17	20:13	19:00	18:00	16:10	16:07	16	15:01 (B 01)	
Sonnenscheinstunden	253														
astr.max.mögl.Beschattung	60	275	367	419	491	506	509	458	382	329	261	237	427		

**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	

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s68 - Wetzten, Zum Lerchenberg 5

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April	Mai		Juni	
1	08:34	08:05	07:09	06:56	05:48		05:00	05:30 (B 04)
	16:12	17:02	17:56	19:53	20:47		21:35	18 05:58 (B 06)
2	08:34	08:03	07:07	06:53	05:46		04:59	05:29 (B 04)
	16:13	17:04	17:58	19:55	20:49		21:36	17 05:57 (B 06)
3	08:34	08:02	07:04	06:51	05:44		04:58	05:28 (B 04)
	16:14	17:06	18:00	19:57	20:50		21:38	15 05:56 (B 06)
4	08:34	08:00	07:02	06:48	05:42		04:57	05:28 (B 04)
	16:15	17:08	18:02	19:58	20:52		21:39	11 05:39 (B 04)
5	08:33	07:58	07:00	06:46	05:40		04:57	05:27 (B 04)
	16:16	17:10	18:04	20:00	20:54		21:40	12 05:39 (B 04)
6	08:33	07:57	06:58	06:44	05:38		04:56	05:26 (B 04)
	16:18	17:12	18:06	20:02	20:56		21:41	13 05:39 (B 04)
7	08:32	07:55	06:55	06:41	05:36		04:55	05:26 (B 04)
	16:19	17:13	18:07	20:04	20:57		21:42	13 05:39 (B 04)
8	08:32	07:53	06:53	06:39	05:34		06:00 (B 03)	04:55
	16:20	17:15	18:09	20:06	20:59	1	06:01 (B 03)	21:43
9	08:31	07:51	06:51	06:37	05:32		05:59 (B 03)	04:54
	16:22	17:17	18:11	20:07	21:01	3	06:02 (B 03)	21:44
10	08:31	07:49	06:48	06:34	05:31		05:57 (B 03)	04:54
	16:23	17:19	18:13	20:09	21:02	5	06:02 (B 03)	21:44
11	08:30	07:47	06:46	06:32	05:29		05:55 (B 03)	04:53
	16:25	17:21	18:15	20:11	21:04	7	06:02 (B 03)	21:45
12	08:29	07:45	06:44	06:30	05:27		05:54 (B 03)	04:53
	16:26	17:23	18:17	20:13	21:06	9	06:03 (B 03)	21:46
13	08:29	07:43	06:41	06:27	05:25		05:52 (B 06)	04:53
	16:28	17:25	18:19	20:15	21:08	10	06:02 (B 03)	21:47
14	08:28	07:41	06:39	06:25	05:24		05:51 (B 06)	04:52
	16:29	17:27	18:20	20:16	21:09	11	06:02 (B 03)	21:47
15	08:27	07:39	06:36	06:23	05:22		05:49 (B 06)	04:52
	16:31	17:29	18:22	20:18	21:11	12	06:01 (B 03)	21:48
16	08:26	07:37	06:34	06:20	05:20		05:48 (B 06)	04:52
	16:33	17:31	18:24	20:20	21:12	13	06:01 (B 03)	21:48
17	08:25	07:35	06:32	06:18	05:19		05:46 (B 06)	04:52
	16:34	17:33	18:26	20:22	21:14	14	06:00 (B 06)	21:49
18	08:24	07:33	06:29	06:16	05:17		05:45 (B 06)	04:52
	16:36	17:35	18:28	20:24	21:16	16	06:01 (B 06)	21:49
19	08:23	07:31	06:27	06:14	05:16		05:44 (B 06)	04:52
	16:38	17:37	18:30	20:25	21:17	17	06:01 (B 06)	21:50
20	08:22	07:29	06:24	06:11	05:14		05:43 (B 06)	04:52
	16:40	17:39	18:31	20:27	21:19	18	06:01 (B 06)	21:50
21	08:21	07:27	06:22	06:09	05:13		05:43 (B 06)	04:52
	16:41	17:41	18:33	20:29	21:20	18	06:01 (B 06)	21:50
22	08:20	07:25	06:20	06:07	05:11		05:44 (B 06)	04:52
	16:43	17:43	18:35	20:31	21:22	18	06:02 (B 06)	21:50
23	08:18	07:22	06:17	06:05	05:10		05:44 (B 06)	04:52
	16:45	17:45	18:37	20:33	21:23	18	06:02 (B 06)	21:51
24	08:17	07:20	06:15	06:03	05:09		05:43 (B 06)	04:53
	16:47	17:47	18:39	20:34	21:25	18	06:01 (B 06)	21:51
25	08:16	07:18	06:12	06:00	05:08		05:44 (B 06)	04:53
	16:49	17:48	18:40	20:36	21:26	17	06:01 (B 06)	21:51
26	08:14	07:16	06:10	05:58	05:06		05:44 (B 06)	04:53
	16:50	17:50	18:42	20:38	21:28	17	06:01 (B 06)	21:51
27	08:13	07:14	06:08	05:56	05:05		05:34 (B 04)	04:54
	16:52	17:52	18:44	20:40	21:29	17	06:00 (B 06)	21:51
28	08:11	07:11	06:05	05:54	05:04		05:33 (B 04)	04:54
	16:54	17:54	18:46	20:41	21:30	18	06:00 (B 06)	21:51
29	08:10		07:03	05:52	05:03		05:32 (B 04)	04:55
	16:56		19:48	20:43	21:32	19	06:00 (B 06)	21:50
30	08:08		07:00	05:50	05:02		05:31 (B 04)	04:56
	16:58		19:49	20:45	21:33	19	05:59 (B 06)	21:50
31	08:07		06:58		05:01		05:31 (B 04)	
	17:00		19:51		21:34	18	05:59 (B 06)	
Sonnenscheinstunden	253	275	367	419	491		506	
astr.max.mögl.Beschattung						333		394

**Tabellen-Layout: Die Daten für jeden Tag 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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## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s68 - Wetzten, Zum Lerchenberg 5

### Annahmen für Schattenwurfberechnung

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

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

	July	August	September	Oktober	November	Dezember
1	04:56	05:30 (B 04)   05:35	06:05 (B 03)   06:28	07:19	07:16	08:10
	21:50	13 05:43 (B 04)   21:16	8 06:13 (B 03)   20:11	18:59	16:50	16:07
2	04:57	05:30 (B 04)   05:37	06:06 (B 03)   06:29	07:21	07:18	08:11
	21:49	14 05:44 (B 04)   21:14	7 06:13 (B 03)   20:09	18:56	16:48	16:06
3	04:58	05:31 (B 04)   05:38	06:08 (B 03)   06:31	07:23	07:20	08:13
	21:49	14 05:45 (B 04)   21:12	5 06:13 (B 03)   20:06	18:54	16:46	16:05
4	04:59	05:31 (B 04)   05:40	06:09 (B 03)   06:33	07:25	07:22	08:14
	21:49	14 05:45 (B 04)   21:10	3 06:12 (B 03)   20:04	18:51	16:44	16:05
5	04:59	05:32 (B 04)   05:41	06:34	07:26	07:24	08:15
	21:48	14 05:46 (B 04)   21:09	20:01	18:49	16:42	16:04
6	05:00	05:32 (B 04)   05:43	06:36	07:28	07:25	08:17
	21:48	13 05:45 (B 04)   21:07	19:59	18:47	16:40	16:04
7	05:01	05:33 (B 04)   05:45	06:38	07:30	07:27	08:18
	21:47	12 05:45 (B 04)   21:05	19:57	18:44	16:38	16:03
8	05:02	05:34 (B 04)   05:46	06:40	07:32	07:29	08:19
	21:46	12 05:46 (B 04)   21:03	19:54	18:42	16:37	16:03
9	05:03	05:35 (B 04)   05:48	06:41	07:34	07:31	08:21
	21:45	13 06:02 (B 06)   21:01	19:52	18:40	16:35	16:02
10	05:04	05:36 (B 04)   05:50	06:43	07:35	07:33	08:22
	21:45	16 06:04 (B 06)   20:59	19:49	18:37	16:33	16:02
11	05:05	05:37 (B 04)   05:52	06:45	07:37	07:35	08:23
	21:44	17 06:05 (B 06)   20:57	19:47	18:35	16:31	16:02
12	05:06	05:38 (B 04)   05:53	06:46	07:39	07:37	08:24
	21:43	18 06:06 (B 06)   20:55	19:45	18:33	16:30	16:02
13	05:08	05:39 (B 04)   05:55	06:48	07:41	07:39	08:25
	21:42	19 06:07 (B 06)   20:53	19:42	18:30	16:28	16:02
14	05:09	05:40 (B 04)   05:57	06:50	07:43	07:40	08:26
	21:41	19 06:08 (B 06)   20:51	19:40	18:28	16:27	16:02
15	05:10	05:42 (B 04)   05:58	06:52	07:44	07:42	08:27
	21:40	18 06:09 (B 06)   20:49	19:37	18:26	16:25	16:02
16	05:11	05:43 (B 04)   06:00	06:53	07:46	07:44	08:28
	21:39	19 06:10 (B 06)   20:47	19:35	18:24	16:24	16:02
17	05:13	05:44 (B 04)   06:02	06:55	07:48	07:46	08:29
	21:38	17 06:10 (B 06)   20:45	19:33	18:21	16:22	16:02
18	05:14	05:53 (B 06)   06:03	06:57	07:50	07:48	08:29
	21:37	17 06:10 (B 06)   20:42	19:30	18:19	16:21	16:02
19	05:15	05:54 (B 06)   06:05	06:58	07:52	07:50	08:30
	21:35	17 06:11 (B 06)   20:40	19:28	18:17	16:19	16:02
20	05:17	05:54 (B 06)   06:07	07:00	07:54	07:51	08:31
	21:34	17 06:11 (B 06)   20:38	19:25	18:15	16:18	16:03
21	05:18	05:53 (B 06)   06:09	07:02	07:55	07:53	08:31
	21:33	18 06:11 (B 06)   20:36	19:23	18:12	16:17	16:03
22	05:20	05:53 (B 06)   06:10	07:04	07:57	07:55	08:32
	21:31	18 06:11 (B 06)   20:34	19:20	18:10	16:16	16:04
23	05:21	05:54 (B 06)   06:12	07:05	07:59	07:57	08:32
	21:30	18 06:12 (B 06)   20:31	19:18	18:08	16:14	16:04
24	05:22	05:54 (B 06)   06:14	07:07	08:01	07:58	08:33
	21:29	17 06:11 (B 06)   20:29	19:16	18:06	16:13	16:05
25	05:24	05:55 (B 06)   06:16	07:09	07:03	08:00	08:33
	21:27	17 06:12 (B 06)   20:27	19:13	17:04	16:12	16:05
26	05:25	05:56 (B 06)   06:17	07:11	07:05	08:02	08:33
	21:26	15 06:11 (B 06)   20:25	19:11	17:02	16:11	16:06
27	05:27	05:57 (B 06)   06:19	07:12	07:07	08:03	08:34
	21:24	13 06:10 (B 06)   20:22	19:08	17:00	16:10	16:07
28	05:29	05:59 (B 06)   06:21	07:14	07:08	08:05	08:34
	21:22	13 06:12 (B 03)   20:20	19:06	16:58	16:09	16:08
29	05:30	06:00 (B 06)   06:22	07:16	07:10	08:07	08:34
	21:21	12 06:12 (B 03)   20:18	19:03	16:56	16:08	16:09
30	05:32	06:02 (B 06)   06:24	07:18	07:12	08:08	08:34
	21:19	11 06:13 (B 03)   20:16	19:01	16:54	16:07	16:09
31	05:33	06:03 (B 06)   06:26		07:14		08:34
	21:18	10 06:13 (B 03)   20:13		16:52		16:10
Sonnenscheinstunden	509	458	382	329	262	237
astr.max.mögl.Beschattung	475	23				

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
	Sonnenuntergang (SS:MM)			

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s69 - Wetzen, Zum Lerchenberg 10

### Annahmen für Schattenwurfberechnung

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

Die Sonne scheint täglich von Sonnenauf- bis -untergang

Die Rotorfläche steht immer senkrecht zur Sonneneinfallrichtung

Die Windenergieanlage/n ist/sind immer in Betrieb

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember					
1	08:34	08:05	07:09	06:56	05:48	05:00	05:35 (B 03)	04:56	05:28 (B 06)	05:35	06:28	07:19	07:16	08:10			
	16:12	17:02	17:56	19:53	20:47	21:35	05:46 (B 03)	21:50	05:43 (B 06)	21:16	20:11	18:59	16:50	16:07			
2	08:34	08:03	07:07	06:53	05:46	04:59	05:35 (B 03)	04:57	05:29 (B 06)	05:37	06:29	07:21	07:18	08:11			
	16:13	17:04	17:58	19:55	20:49	21:36	05:45 (B 03)	21:49	05:43 (B 06)	21:14	20:09	18:56	16:48	16:06			
3	08:34	08:02	07:04	06:51	05:44	04:58	05:28 (B 06)	04:58	05:30 (B 06)	05:38	06:31	07:23	07:20	08:13			
	16:14	17:06	18:00	19:57	20:50	21:38	05:44 (B 03)	21:49	05:43 (B 06)	21:12	20:06	18:54	16:46	16:05			
4	08:34	08:00	07:02	06:48	05:42	04:57	05:28 (B 06)	04:59	05:31 (B 06)	05:40	06:33	07:25	07:22	08:14			
	16:15	17:08	18:02	19:58	20:52	21:39	05:45 (B 03)	21:49	05:43 (B 06)	21:10	20:04	18:51	16:44	16:05			
5	08:33	07:58	07:00	06:46	05:40	04:57	05:27 (B 06)	04:59	05:32 (B 06)	05:41	06:34	07:26	07:24	08:15			
	16:16	17:10	18:04	20:00	20:54	21:40	05:43 (B 03)	21:48	05:43 (B 06)	21:09	20:01	18:49	16:42	16:04			
6	08:33	07:57	06:58	06:44	05:38	04:56	05:26 (B 06)	05:00	05:32 (B 06)	05:43	06:36	07:28	07:25	08:17			
	16:18	17:12	18:06	20:02	20:56	21:41	05:42 (B 03)	21:48	05:42 (B 06)	21:07	19:59	18:47	16:40	16:04			
7	08:32	07:55	06:55	06:41	05:36	04:55	05:26 (B 06)	05:01	05:33 (B 06)	05:45	06:38	07:30	07:27	08:18			
	16:19	17:13	18:07	20:04	20:57	21:42	05:37 (B 06)	21:47	05:49 (B 03)	21:05	19:57	18:44	16:38	16:03			
8	08:32	07:53	06:53	06:39	05:34	04:55	05:26 (B 06)	05:02	05:34 (B 06)	05:46	06:40	07:32	07:29	08:19			
	16:20	17:15	18:09	20:06	20:59	21:43	05:38 (B 06)	21:46	05:51 (B 03)	21:03	19:54	18:42	16:37	16:03			
9	08:31	07:51	06:51	06:37	05:32	04:54	05:25 (B 06)	05:03	05:35 (B 06)	05:48	06:41	07:34	07:31	08:20			
	16:22	17:17	18:11	20:07	21:01	21:44	05:38 (B 06)	21:45	05:52 (B 03)	21:01	19:52	18:40	16:35	16:02			
10	08:31	07:49	06:48	06:34	05:31	04:54	05:25 (B 06)	05:04	05:36 (B 06)	05:50	06:43	07:35	07:33	08:22			
	16:23	17:19	18:13	20:09	21:02	21:44	05:39 (B 06)	21:45	05:52 (B 03)	20:59	19:49	18:37	16:33	16:02			
11	08:30	07:47	06:46	06:32	05:29	04:53	05:24 (B 06)	05:05	05:42 (B 03)	05:52	06:45	07:37	07:35	08:23			
	16:25	17:21	18:15	20:11	21:04	21:45	05:38 (B 06)	21:44	05:53 (B 03)	20:57	19:47	18:35	16:31	16:02			
12	08:29	07:45	06:43	06:30	05:27	04:53	05:24 (B 06)	05:06	05:42 (B 03)	05:53	06:46	07:39	07:37	08:24			
	16:26	17:23	18:17	20:13	21:06	21:46	05:39 (B 06)	21:43	05:54 (B 03)	20:55	19:45	18:33	16:30	16:02			
13	08:29	07:43	06:41	06:27	05:25	04:53	05:24 (B 06)	05:08	05:42 (B 03)	05:55	06:48	07:41	07:39	08:25			
	16:28	17:25	18:19	20:15	21:07	21:47	05:40 (B 06)	21:42	05:54 (B 03)	20:53	19:42	18:30	16:28	16:02			
14	08:28	07:41	06:39	06:25	05:24	04:52	05:24 (B 06)	05:09	05:41 (B 03)	05:57	06:50	07:43	07:40	08:26			
	16:29	17:27	18:20	20:16	21:09	21:47	05:40 (B 06)	21:41	05:54 (B 03)	20:51	19:40	18:28	16:27	16:02			
15	08:27	07:39	06:36	06:23	05:22	04:52	05:24 (B 06)	05:10	05:42 (B 03)	05:58	06:52	07:44	07:42	08:27			
	16:31	17:29	18:22	20:18	21:11	21:48	05:41 (B 06)	21:40	05:55 (B 03)	20:49	19:37	18:26	16:25	16:02			
16	08:26	07:37	06:34	06:20	05:20	04:52	05:24 (B 06)	05:11	05:43 (B 03)	06:00	06:53	07:46	07:44	08:28			
	16:33	17:31	18:24	20:20	21:12	21:48	05:41 (B 06)	21:39	05:56 (B 03)	20:47	19:35	18:24	16:24	16:02			
17	08:25	07:35	06:32	06:18	05:19	04:52	05:24 (B 06)	05:13	05:44 (B 03)	06:02	06:55	07:48	07:46	08:29			
	16:34	17:33	18:26	20:22	21:14	21:49	05:41 (B 06)	21:38	05:56 (B 03)	20:45	19:33	18:21	16:22	16:02			
18	08:24	07:33	06:29	06:16	05:17	04:52	05:24 (B 06)	05:14	05:45 (B 03)	06:03	06:57	07:50	07:48	08:29			
	16:36	17:35	18:28	20:24	21:16	21:49	05:42 (B 06)	21:37	05:55 (B 03)	20:42	19:30	18:19	16:21	16:02			
19	08:23	07:31	06:27	06:14	05:16	04:52	05:24 (B 06)	05:15	05:47 (B 03)	06:05	06:58	07:52	07:50	08:30			
	16:38	17:37	18:29	20:25	21:17	21:50	05:42 (B 06)	21:35	05:56 (B 03)	20:40	19:28	18:17	16:19	16:02			
20	08:22	07:29	06:24	06:11	05:14	04:52	05:24 (B 06)	05:17	05:48 (B 03)	06:07	07:00	07:54	07:51	08:31			
	16:39	17:39	18:31	20:27	21:19	2	05:44 (B 03)	21:50	05:56 (B 03)	20:38	19:25	18:15	16:18	16:03			
21	08:21	07:27	06:22	06:09	05:13	04:52	05:41 (B 03)	04:52	05:49 (B 03)	06:09	07:02	07:55	07:53	08:31			
	16:41	17:41	18:33	20:29	21:20	4	05:45 (B 03)	21:50	05:42 (B 06)	21:33	6	05:55 (B 03)	20:36	19:23	18:12	16:17	16:03
22	08:20	07:25	06:20	06:07	05:11	04:52	05:40 (B 03)	04:52	05:24 (B 06)	05:19	05:50 (B 03)	06:10	07:04	07:57	07:55	08:32	
	16:43	17:43	18:35	20:31	21:22	6	05:46 (B 03)	21:50	05:42 (B 06)	21:31	5	05:55 (B 03)	20:34	19:20	18:10	16:16	16:04
23	08:18	07:22	06:17	06:05	05:10	04:52	05:39 (B 03)	04:52	05:25 (B 06)	05:21	05:52 (B 03)	06:12	07:05	07:59	07:57	08:32	
	16:45	17:45	18:37	20:33	21:23	7	05:46 (B 03)	21:51	05:43 (B 06)	21:30	3	05:55 (B 03)	20:31	19:18	18:08	16:14	16:04
24	08:17	07:20	06:15	06:03	05:09	04:53	05:37 (B 03)	04:53	05:25 (B 06)	05:22	05:53 (B 03)	06:14	07:07	08:01	07:58	08:33	
	16:47	17:47	18:39	20:34	21:25	9	05:46 (B 03)	21:51	05:43 (B 06)	21:29	1	05:54 (B 03)	20:29	19:16	18:06	16:13	16:05
25	08:16	07:18	06:12	06:00	05:08	04:53	05:36 (B 03)	04:53	05:25 (B 06)	05:24	06:15	07:09	07:03	08:00	08:33		
	16:49	17:48	18:40	20:36	21:26	10	05:46 (B 03)	21:51	05:42 (B 06)	21:27	20:27	19:13	17:04	16:12	16:05		
26	08:14	07:16	06:10	05:58	05:06	04:53	05:35 (B 03)	04:53	05:26 (B 06)	05:25	06:17	07:11	07:05	08:02	08:33		
	16:50	17:50	18:42	20:38	21:28	11	05:46 (B 03)	21:51	05:43 (B 06)	21:26	20:25	19:11	17:02	16:11	16:06		
27	08:13	07:14	06:08	05:56	05:05	04:54	05:34 (B 03)	04:54	05:26 (B 06)	05:27	06:19	07:12	07:07	08:03	08:34		
	16:52	17:52	18:44	20:40	21:29	12	05:46 (B 03)	21:51	05:43 (B 06)	21:24	20:22	19:08	17:00	16:10	16:07		
28	08:11	07:11	06:05	05:54	05:04	04:54	05:33 (B 03)	04:54	05:27 (B 06)	05:29	06:21	07:14	07:08	08:05	08:34		
	16:54	17:54	18:46	20:41	21:30	13	05:46 (B 03)	21:51	05:43 (B 06)	21:22	20:20	19:06	16:58	16:09	16:08		
29	08:10	07:03	05:52	05:40	04:55	04:55	05:33 (B 03)	04:55	05:27 (B 06)	05:30	06:22	07:16	07:10	08:06	08:34		
	16:56	17:56	18:48	20:43	21:32	13	05:46 (B 03)	21:50	05:43 (B 06)	21:21	20:18	19:03	16:56	16:08	16:09		
30	08:08	07:00	05:50	05:40	04:55	04:56	05:33 (B 03)	04:56	05:28 (B 06)	05:32	06:24	07:18	07:12	08:08	08:34		
	16:58	17:59	18:49	20:45	21:33	13	05:46 (B 03)	21:50	05:43 (B 06)	21:19	20:16	19:01	16:54	16:07	16:09		
31	08:07	06:58	05:50	05:41	05:01	05:01	05:34 (B 03)	05:01	05:26 (B 06)	05:33	06:26	07:14	07:14	08:04	08:34		
	17:00	17:51	18:41	20:34	21:24	12	05:46 (B 03)	21:50	05:43 (B 06)	21:18	20:13	19:01	16:52	16:07	16:10		
Sonnenscheinstunden	253	275	367	419	491	506		509	458	382	329	262	237				
astr.max.mögl.Beschattung					112	459		256									

**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)

## SHADOW - Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s70 - Wetzen, Zum Lerchenberg 37

### Annahmen für Schattenwurfberechnung

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

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

	Januar	Februar	März	April		Mai		Juni				
1	08:34	08:05	07:09	06:56		05:48	06:13 (B 06)	05:00	05:33 (B 05)			
	16:12	17:02	17:56	19:53		20:47	14	06:27 (B 06)	21:35	16	05:49 (B 05)	
2	08:34	08:03	07:07	06:53		05:46	06:11 (B 06)	04:59	05:34 (B 05)			
	16:13	17:04	17:58	19:55		20:49	17	06:28 (B 07)	21:37	15	05:49 (B 05)	
3	08:34	08:02	07:05	06:51		05:44	06:11 (B 06)	04:58	05:34 (B 05)			
	16:14	17:06	18:00	19:57		20:50	20	06:31 (B 07)	21:38	14	05:48 (B 05)	
4	08:34	08:00	07:02	06:48		05:42	06:11 (B 06)	04:57	05:35 (B 05)			
	16:15	17:08	18:02	19:58		20:52	21	06:32 (B 07)	21:39	14	05:49 (B 05)	
5	08:33	07:58	07:00	06:46		05:40	06:12 (B 06)	04:57	05:35 (B 05)			
	16:16	17:10	18:04	20:00		20:54	22	06:34 (B 07)	21:40	13	05:48 (B 05)	
6	08:33	07:57	06:58	06:44		05:38	06:12 (B 07)	04:56	05:36 (B 05)			
	16:18	17:12	18:06	20:02		20:56	23	06:35 (B 07)	21:41	13	05:49 (B 05)	
7	08:32	07:55	06:55	06:41		05:36	06:11 (B 07)	04:55	05:36 (B 05)			
	16:19	17:13	18:07	20:04		20:57	24	06:35 (B 07)	21:42	12	05:48 (B 05)	
8	08:32	07:53	06:53	06:39		05:34	06:10 (B 07)	04:55	05:37 (B 05)			
	16:20	17:15	18:09	20:06		20:59	25	06:35 (B 07)	21:43	11	05:48 (B 05)	
9	08:31	07:51	06:51	06:37		05:32	06:10 (B 07)	04:54	05:37 (B 05)			
	16:22	17:17	18:11	20:07		21:01	26	06:36 (B 07)	21:44	11	05:48 (B 05)	
10	08:31	07:49	06:48	06:34		05:31	05:57 (B 04)	04:54	05:38 (B 05)			
	16:23	17:19	18:13	20:09		21:02	29	06:36 (B 07)	21:44	10	05:48 (B 05)	
11	08:30	07:47	06:46	06:32		05:29	05:55 (B 04)	04:53	05:38 (B 05)			
	16:25	17:21	18:15	20:11		21:04	32	06:36 (B 07)	21:45	9	05:47 (B 05)	
12	08:29	07:45	06:44	06:30		05:27	05:54 (B 04)	04:53	05:39 (B 05)			
	16:26	17:23	18:17	20:13		21:06	34	06:37 (B 07)	21:46	8	05:47 (B 05)	
13	08:29	07:43	06:41	06:27		05:25	05:52 (B 04)	04:53	05:40 (B 05)			
	16:28	17:25	18:19	20:15		21:08	36	06:37 (B 07)	21:47	7	05:47 (B 05)	
14	08:28	07:41	06:39	06:25		05:24	05:51 (B 04)	04:52	05:41 (B 05)			
	16:29	17:27	18:20	20:16		21:09	38	06:37 (B 07)	21:47	5	05:46 (B 05)	
15	08:27	07:39	06:36	06:23		05:22	05:49 (B 04)	04:52	05:42 (B 05)			
	16:31	17:29	18:22	20:18		21:11	39	06:37 (B 07)	21:48	4	05:46 (B 05)	
16	08:26	07:37	06:34	06:20		05:20	05:48 (B 04)	04:52	05:43 (B 05)			
	16:33	17:31	18:24	20:20		21:12	40	06:37 (B 07)	21:48	3	05:46 (B 05)	
17	08:25	07:35	06:32	06:18		05:19	05:48 (B 04)	04:52				
	16:34	17:33	18:26	20:22		21:14	38	06:36 (B 07)	21:49			
18	08:24	07:33	06:29	06:16		05:17	05:49 (B 04)	04:52				
	16:36	17:35	18:28	20:24		21:16	35	06:36 (B 07)	21:49			
19	08:23	07:31	06:27	06:14		05:16	05:50 (B 04)	04:52				
	16:38	17:37	18:30	20:25		21:17	33	06:36 (B 07)	21:50			
20	08:22	07:29	06:24	06:11		05:14	05:42 (B 05)	04:52				
	16:40	17:39	18:31	20:27		21:19	31	06:35 (B 07)	21:50			
21	08:21	07:27	06:22	06:09		05:13	05:41 (B 05)	04:52				
	16:41	17:41	18:33	20:29		21:20	29	06:35 (B 07)	21:50			
22	08:20	07:25	06:20	06:07		05:11	05:40 (B 05)	04:52				
	16:43	17:43	18:35	20:31		21:22	30	06:35 (B 07)	21:51			
23	08:18	07:22	06:17	06:05		05:10	05:39 (B 05)	04:52				
	16:45	17:45	18:37	20:33		21:23	30	06:34 (B 07)	21:51			
24	08:17	07:20	06:15	06:03		05:09	05:37 (B 05)	04:53				
	16:47	17:47	18:39	20:34		21:25	30	06:33 (B 07)	21:51			
25	08:16	07:18	06:12	06:00		05:08	05:36 (B 05)	04:53				
	16:49	17:48	18:40	20:36		21:26	30	06:32 (B 07)	21:51			
26	08:14	07:16	06:10	05:58		05:06	05:35 (B 05)	04:53	05:45 (B 05)			
	16:50	17:50	18:42	20:38		21:28	29	06:31 (B 07)	21:51	2	05:47 (B 05)	
27	08:13	07:14	06:08	05:56	06:21 (B 06)	05:05	05:34 (B 05)	04:54	05:44 (B 05)			
	16:52	17:52	18:44	20:40	4	06:25 (B 06)	21:29	28	06:30 (B 07)	21:51	4	05:48 (B 05)
28	08:11	07:11	06:05	05:54	06:19 (B 06)	05:04	05:33 (B 05)	04:54	05:44 (B 05)			
	16:54	17:54	18:46	20:41	7	06:26 (B 06)	21:30	28	06:29 (B 07)	21:51	5	05:49 (B 05)
29	08:10		07:03	05:52	06:17 (B 06)	05:03	05:32 (B 05)	04:55	05:43 (B 05)			
	16:56		19:48	20:43	10	06:27 (B 06)	21:32	25	06:27 (B 07)	21:50	7	05:50 (B 05)
30	08:08		07:00	05:50	06:15 (B 06)	05:02	05:32 (B 05)	04:56	05:43 (B 05)			
	16:58		19:49	20:45	12	06:27 (B 06)	21:33	16	05:48 (B 05)	21:50	8	05:51 (B 05)
31	08:07		06:58			05:01	05:33 (B 05)					
	17:00		19:51			21:34	16	05:49 (B 05)				
Sonnenscheinstunden	253	275	367	419		491		506				
astr.max.mögl.Beschattung				33		868		191				

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

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

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand **Schattenrezeptor:** s70 - Wetzen, Zum Lerchenberg 37

### Annahmen für Schattenwurfberechnung

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

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

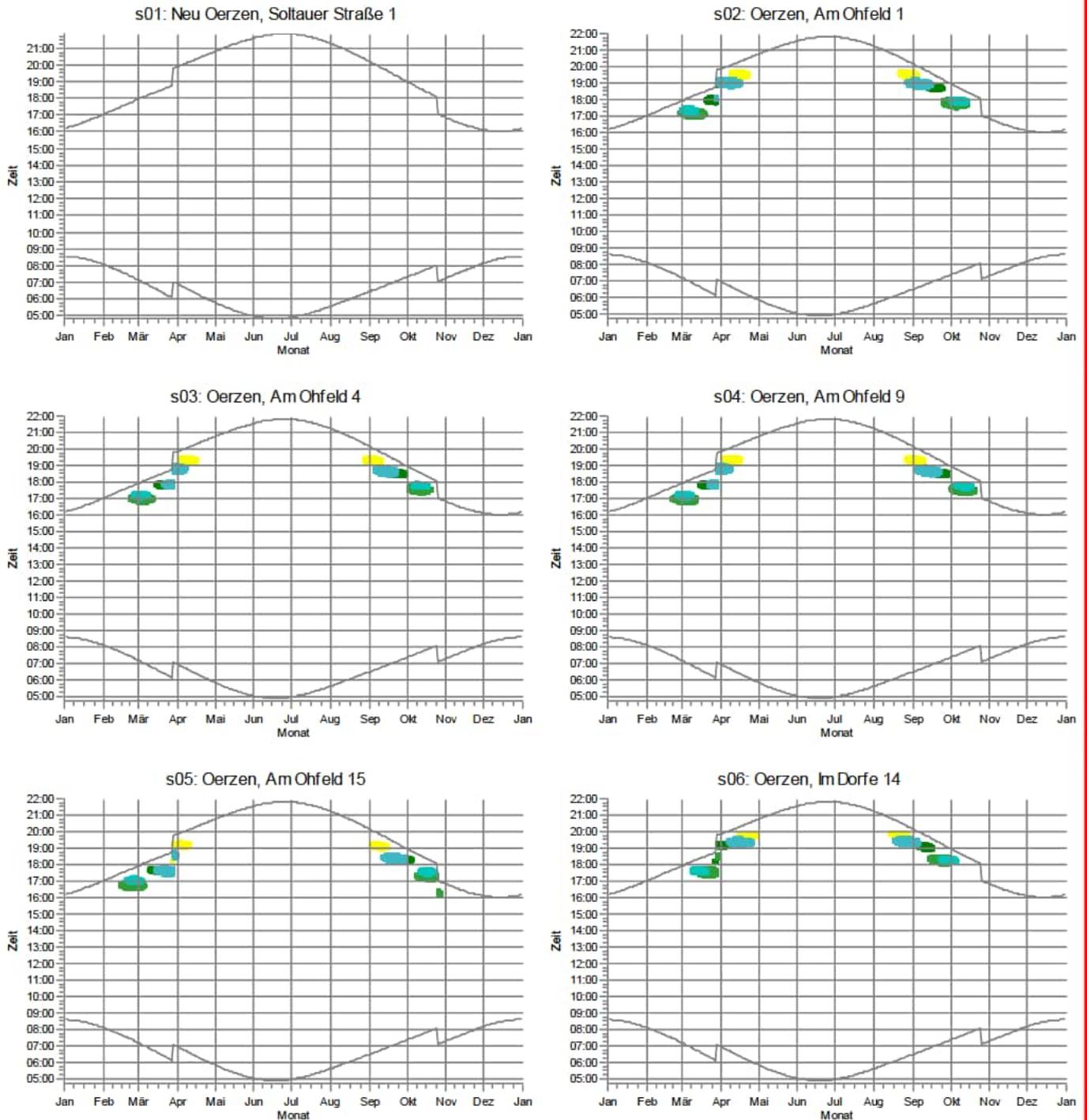
Juli		August		September		Oktober		November		Dezember	
1	04:56										
	21:50	9	05:43 (B 05)	05:35	06:05 (B 04)	06:28	07:19	07:16	08:10		
2	04:57		05:52 (B 05)	21:16	33	06:47 (B 07)	20:11	18:59	16:50	16:07	
	21:50	10	05:42 (B 05)	05:37		06:06 (B 04)	06:29	07:21	07:18	08:11	
3	04:58		05:52 (B 05)	21:14	32	06:47 (B 07)	20:09	18:56	16:48	16:06	
	21:49	11	05:42 (B 05)	05:38		06:08 (B 04)	06:31	07:23	07:20	08:13	
4	04:59		05:53 (B 05)	21:12	29	06:47 (B 07)	20:06	18:54	16:46	16:05	
	21:49	11	05:42 (B 05)	05:40		06:20 (B 07)	06:33	07:25	07:22	08:14	
5	04:59		05:53 (B 05)	21:11	26	06:46 (B 07)	20:04	18:51	16:44	16:05	
	21:48	12	05:42 (B 05)	05:41		06:21 (B 07)	06:34	07:26	07:24	08:15	
6	05:00		05:54 (B 05)	21:09	25	06:46 (B 07)	20:01	18:49	16:42	16:04	
	21:48	13	05:41 (B 05)	05:43		06:22 (B 07)	06:36	07:28	07:25	08:17	
7	05:01		05:54 (B 05)	21:07	23	06:45 (B 07)	19:59	18:47	16:40	16:04	
	21:47	14	05:41 (B 05)	05:45		06:22 (B 07)	06:38	07:30	07:27	08:18	
8	05:02		05:55 (B 05)	21:05	22	06:44 (B 07)	19:57	18:44	16:38	16:03	
	21:46	14	05:41 (B 05)	05:46		06:21 (B 06)	06:40	07:32	07:29	08:19	
9	05:03		05:55 (B 05)	21:03	22	06:43 (B 07)	19:54	18:42	16:37	16:03	
	21:45	15	05:41 (B 05)	05:48		06:20 (B 06)	06:41	07:34	07:31	08:21	
10	05:04		05:56 (B 05)	21:01	21	06:41 (B 07)	19:52	18:40	16:35	16:02	
	21:45	15	05:41 (B 05)	05:50		06:20 (B 06)	06:43	07:35	07:33	08:22	
11	05:05		05:56 (B 05)	20:59	19	06:39 (B 07)	19:49	18:37	16:33	16:02	
	21:44	15	05:41 (B 05)	05:52		06:20 (B 06)	06:45	07:37	07:35	08:23	
12	05:06		05:56 (B 05)	20:57	16	06:36 (B 06)	19:47	18:35	16:31	16:02	
	21:43	16	05:41 (B 05)	05:53		06:22 (B 06)	06:46	07:39	07:37	08:24	
13	05:08		05:57 (B 05)	20:55	14	06:36 (B 06)	19:45	18:33	16:30	16:02	
	21:42	16	05:41 (B 05)	05:55		06:24 (B 06)	06:48	07:41	07:39	08:25	
14	05:09		05:57 (B 05)	20:53	12	06:36 (B 06)	19:42	18:30	16:28	16:02	
	21:41	22	05:41 (B 05)	05:57		06:25 (B 06)	06:50	07:43	07:40	08:26	
15	05:10		06:35 (B 07)	20:51	9	06:34 (B 06)	19:40	18:28	16:27	16:02	
	21:40	26	05:42 (B 05)	05:58		06:27 (B 06)	06:52	07:44	07:42	08:27	
16	05:11		06:38 (B 07)	20:49	7	06:34 (B 06)	19:37	18:26	16:25	16:02	
	21:39	28	05:43 (B 05)	06:00		06:28 (B 06)	06:53	07:46	07:44	08:28	
17	05:13		06:39 (B 07)	20:47	4	06:32 (B 06)	19:35	18:24	16:24	16:02	
	21:38	29	05:44 (B 05)	06:02			06:55	07:48	07:46	08:29	
18	05:14		06:40 (B 07)	20:45			19:33	18:21	16:22	16:02	
	21:37	30	05:45 (B 05)	06:03			06:57	07:50	07:48	08:29	
19	05:15		06:41 (B 07)	20:42			19:30	18:19	16:21	16:02	
	21:35	30	05:47 (B 05)	06:05			06:58	07:52	07:50	08:30	
20	05:17		06:43 (B 07)	20:40			19:28	18:17	16:19	16:02	
	21:34	31	05:48 (B 05)	06:07			07:00	07:54	07:51	08:31	
21	05:18		06:44 (B 07)	20:38			19:25	18:15	16:18	16:03	
	21:33	30	05:49 (B 05)	06:09			07:02	07:55	07:53	08:31	
22	05:20		06:44 (B 07)	20:36			19:23	18:12	16:17	16:03	
	21:31	29	05:50 (B 05)	06:10			07:04	07:57	07:55	08:32	
23	05:21		06:44 (B 07)	20:34			19:20	18:10	16:16	16:04	
	21:30	29	05:52 (B 05)	06:12			07:05	07:59	07:57	08:32	
24	05:22		06:46 (B 07)	20:32			19:18	18:08	16:14	16:04	
	21:29	34	05:53 (B 05)	06:14			07:07	08:01	07:58	08:33	
25	05:24		06:46 (B 07)	20:29			19:16	18:06	16:13	16:05	
	21:27	35	06:00 (B 04)	06:16			07:09	07:03	08:00	08:33	
26	05:25		06:47 (B 07)	20:27			19:13	17:04	16:12	16:05	
	21:26	37	05:59 (B 04)	06:17			07:11	07:05	08:02	08:34	
27	05:27		06:47 (B 07)	20:25			19:11	17:02	16:11	16:06	
	21:24	39	05:58 (B 04)	06:19			07:12	07:07	08:03	08:34	
28	05:29		06:47 (B 07)	20:22			19:08	17:00	16:10	16:07	
	21:23	38	06:47 (B 07)	06:21			07:14	07:08	08:05	08:34	
29	05:30		06:47 (B 07)	20:20			19:06	16:58	16:09	16:08	
	21:21	38	06:00 (B 04)	06:22			07:16	07:10	08:07	08:34	
30	05:32		06:47 (B 07)	20:18			19:03	16:56	16:08	16:09	
	21:19	37	06:02 (B 04)	06:24			07:18	07:12	08:08	08:34	
31	05:33		06:48 (B 07)	20:16			19:01	16:54	16:07	16:09	
	21:18	35	06:03 (B 04)	06:26				07:14		08:34	
			06:47 (B 07)	20:13				16:52		16:10	
	Sonnenscheinstunden	509		458			382	329	262	237	
	astr.max.mögl.Beschattung	748		314							

**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)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
	Sonnenuntergang (SS:MM)			

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



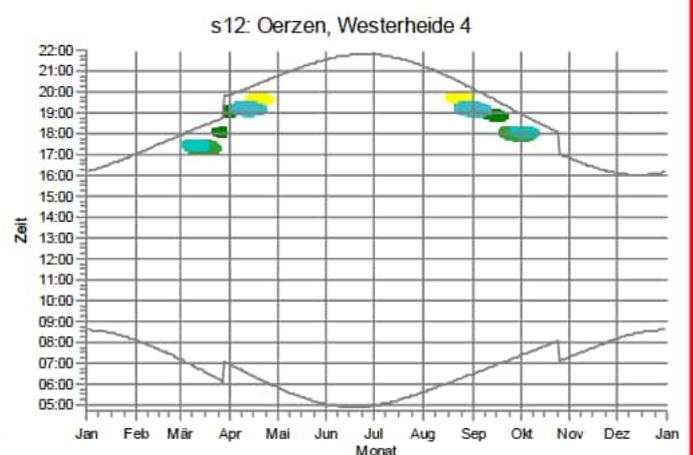
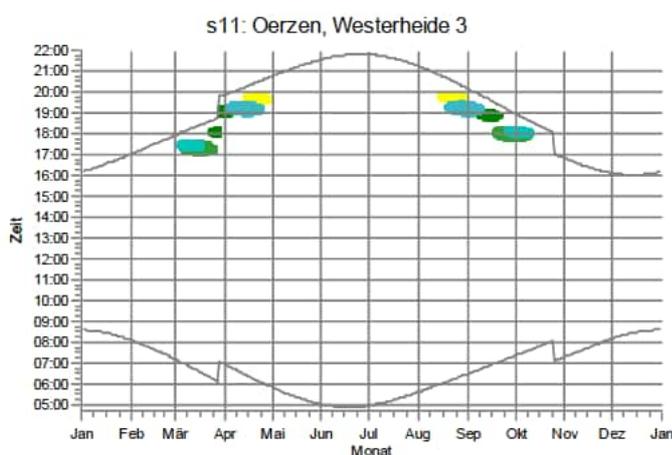
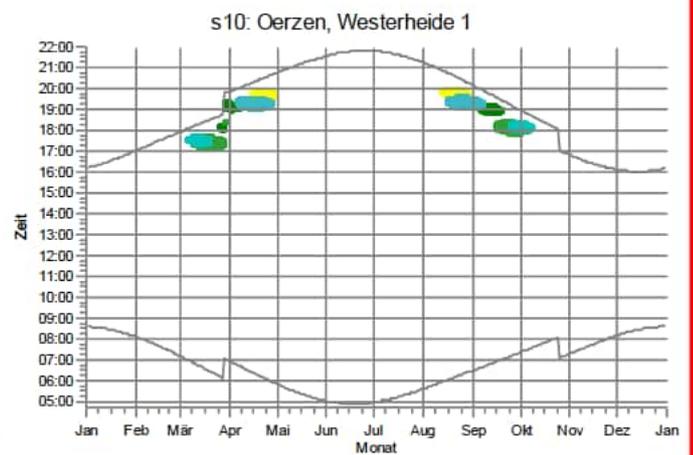
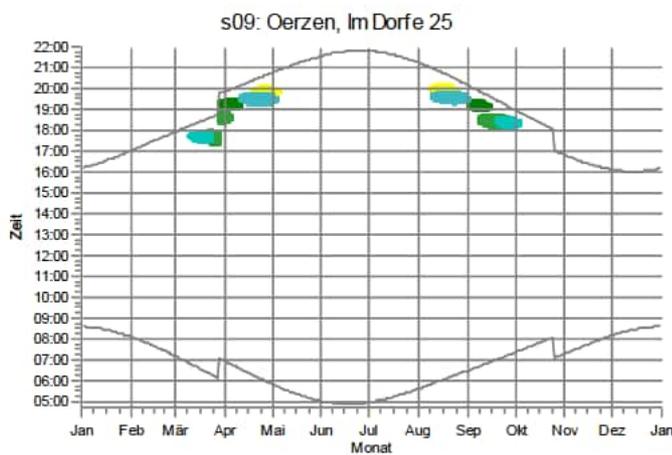
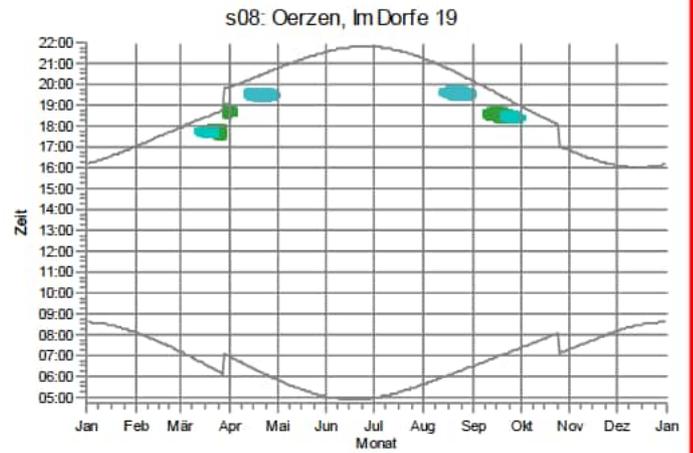
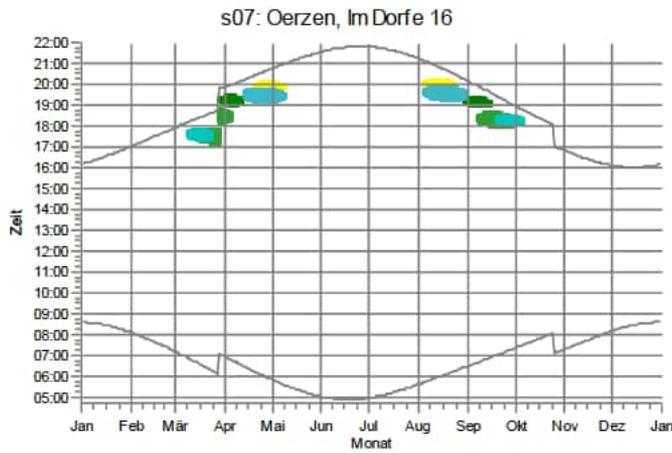
WEA

Rep 10: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (332)  
Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)  
Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)  
Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



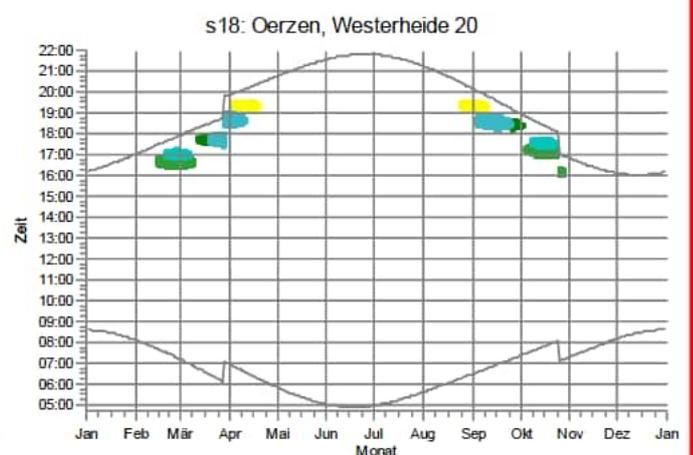
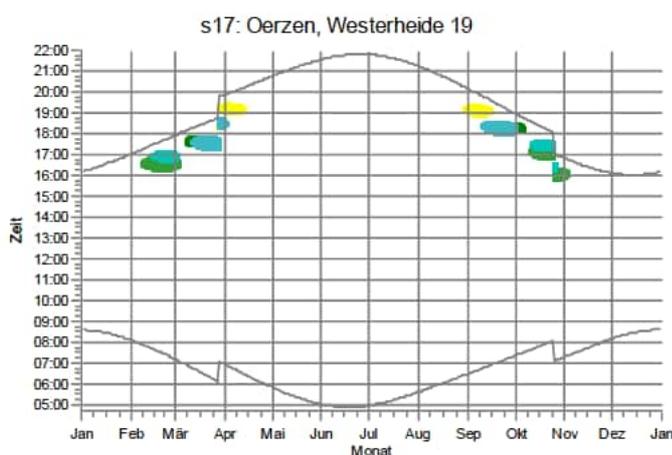
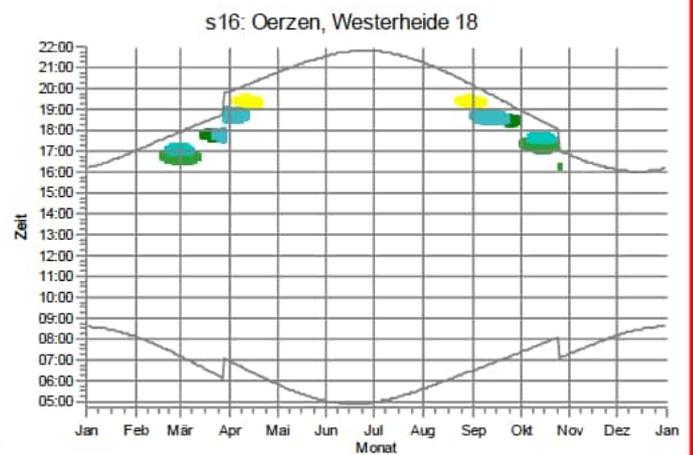
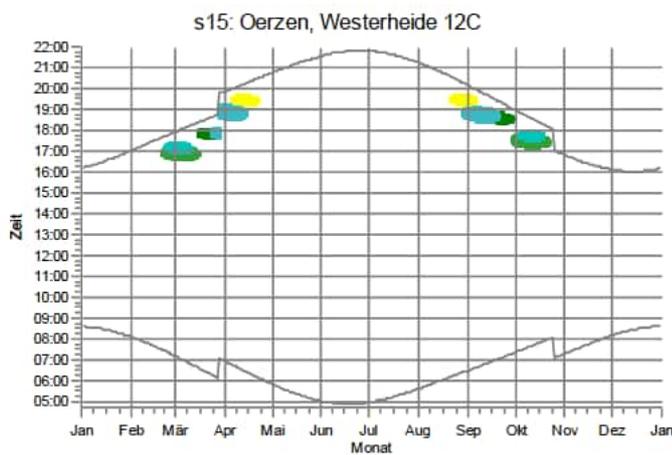
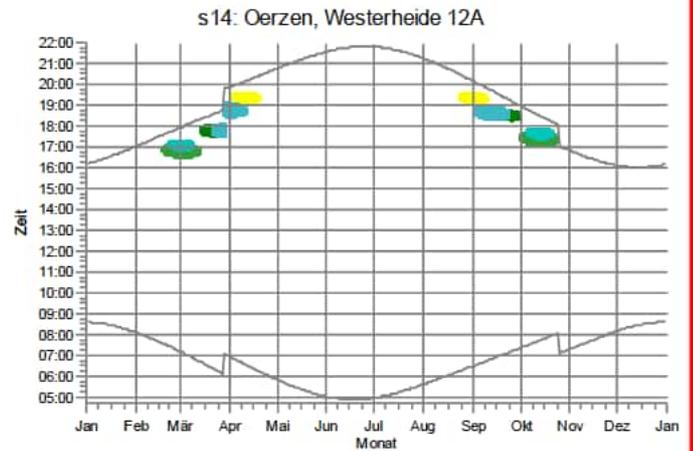
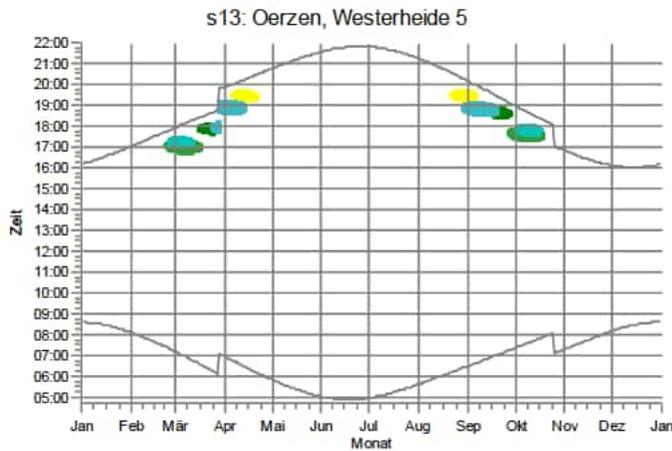
WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)
- Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

- Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)
- Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



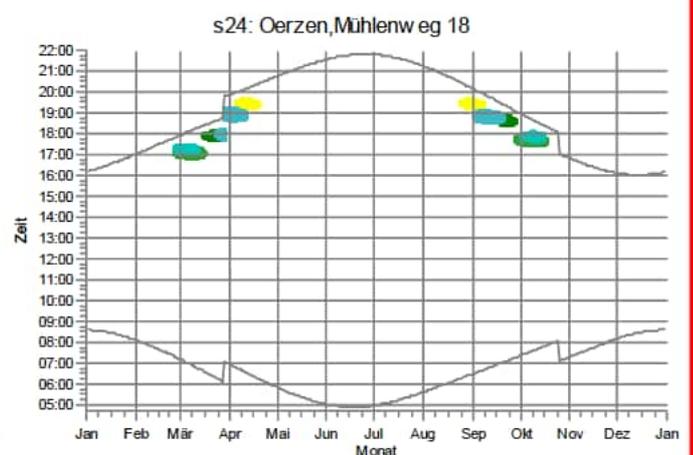
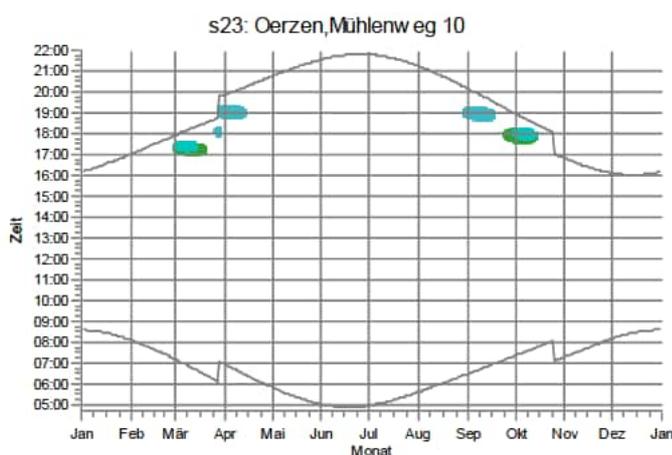
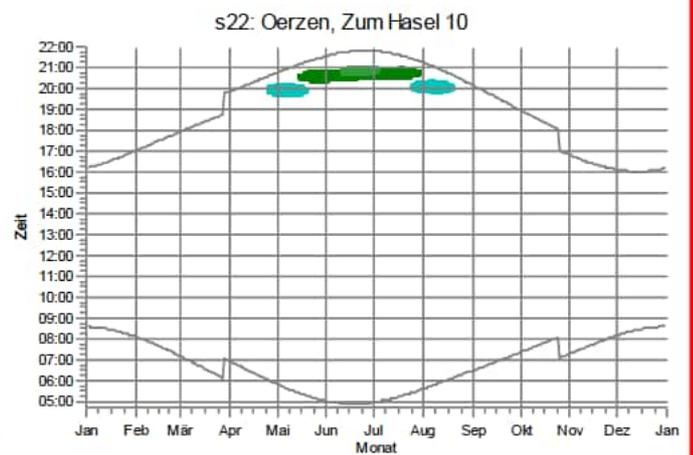
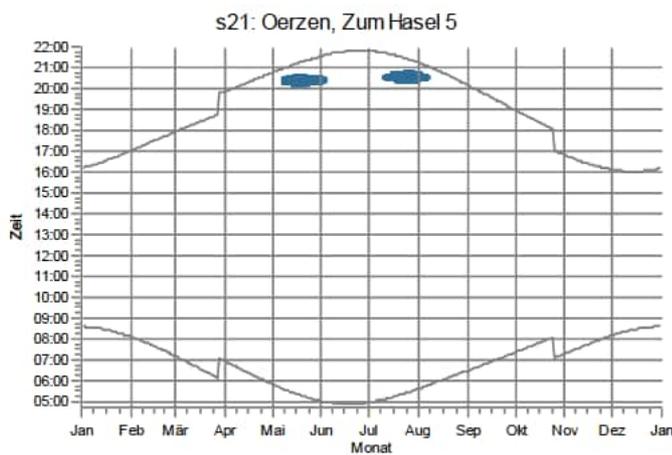
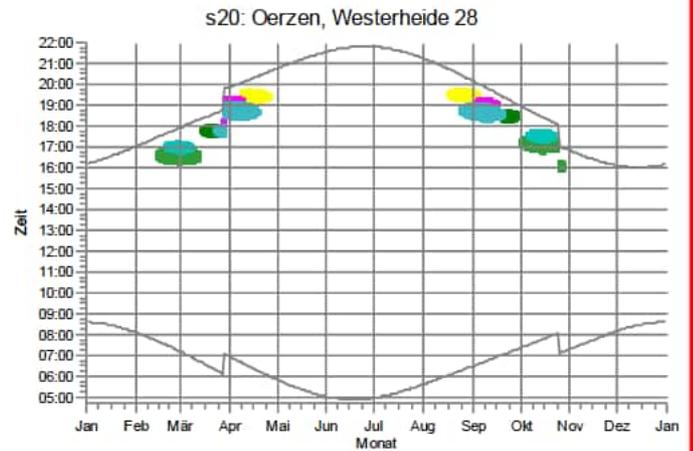
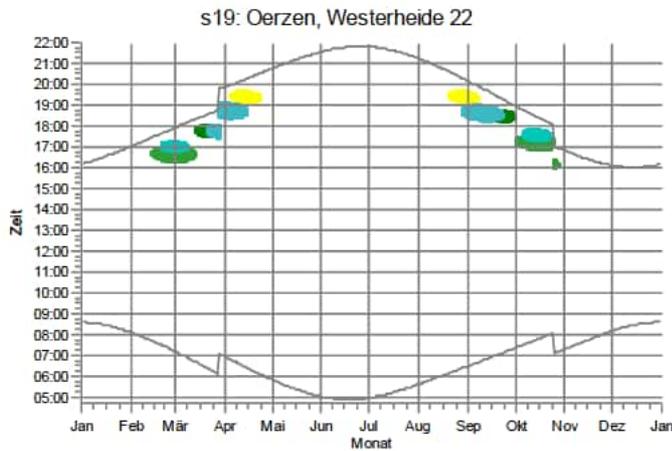
WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)
- Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

- Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)
- Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



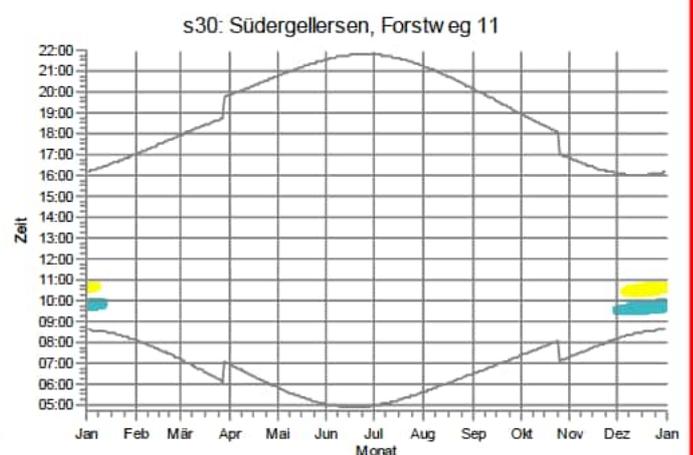
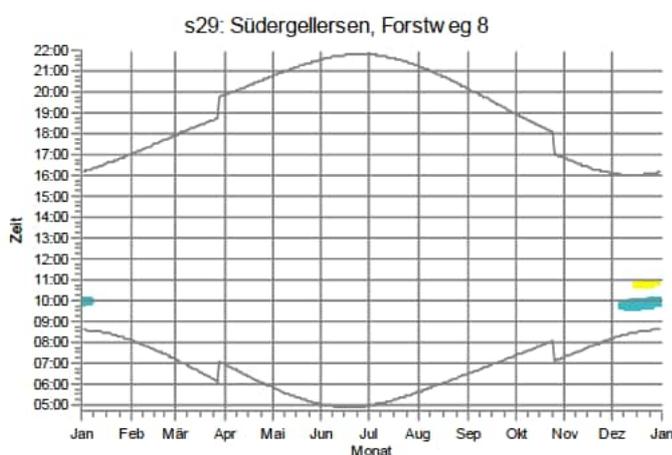
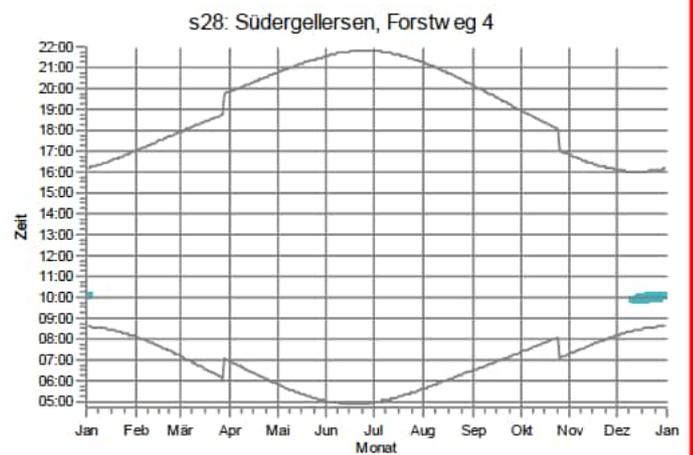
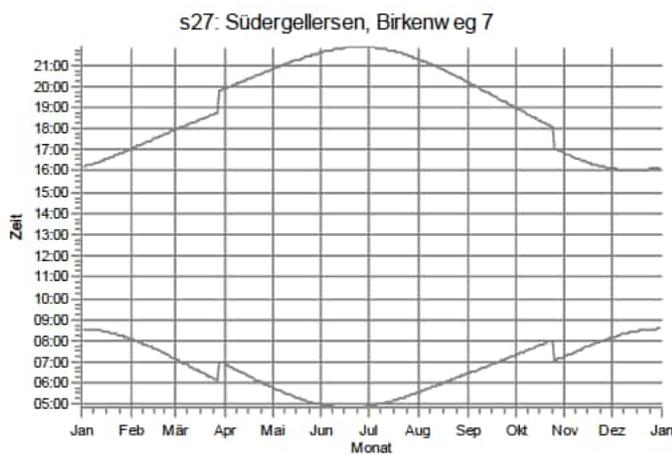
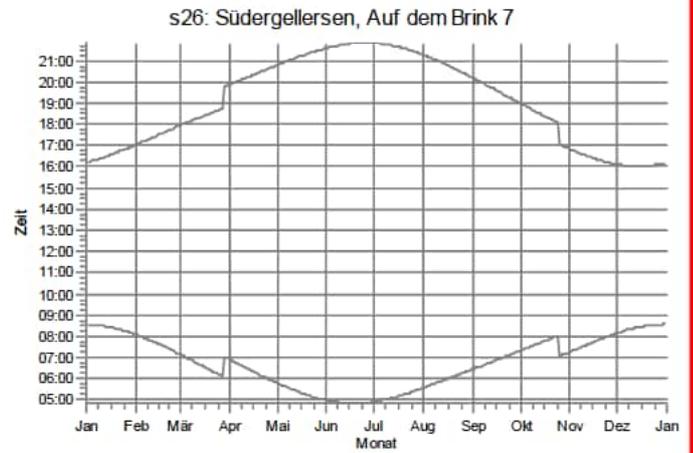
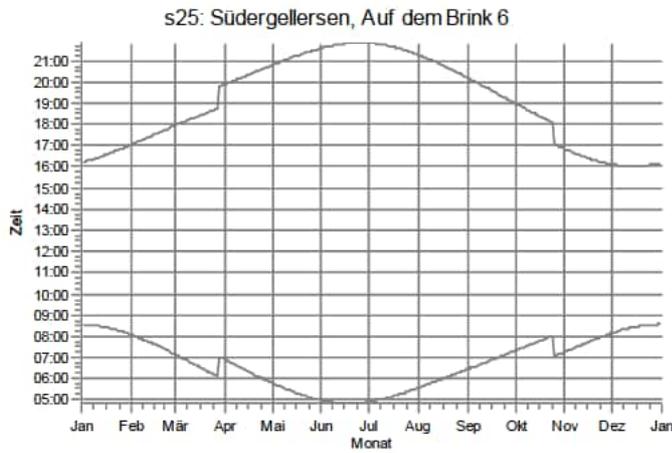
WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)
- Rep 9: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (331)
- Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

- Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)
- Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)
- Oerzen 4: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (82)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



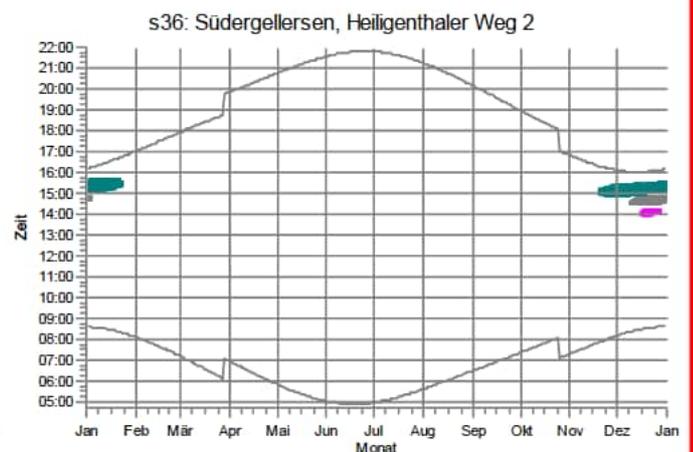
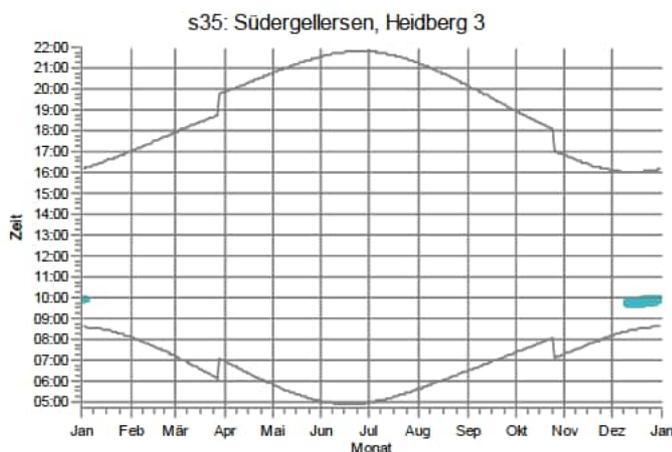
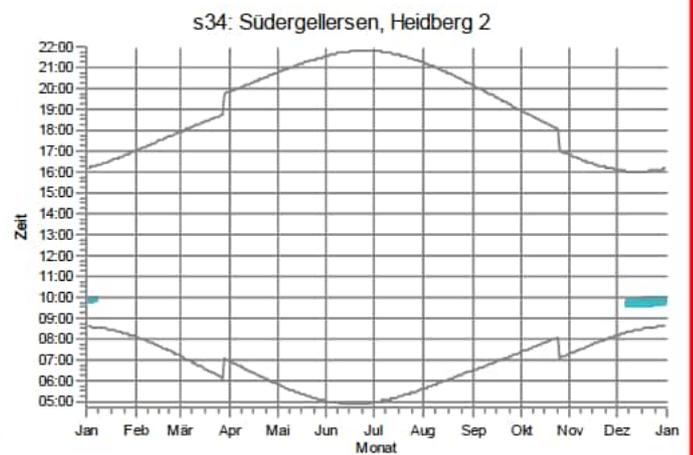
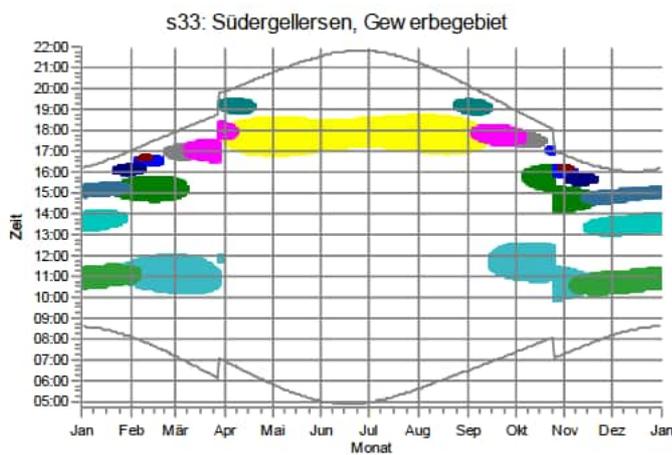
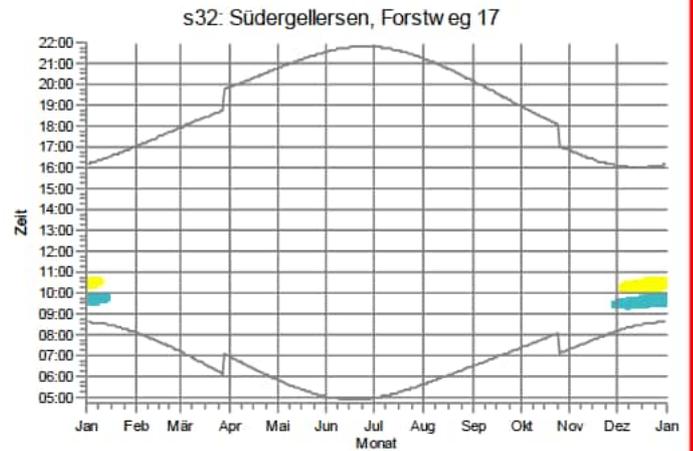
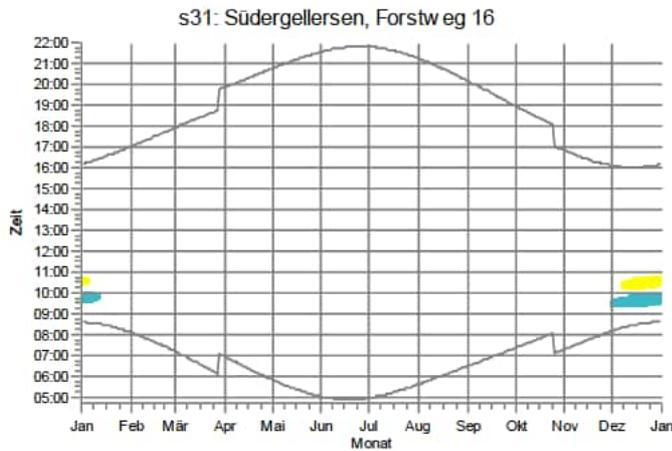
WEA

Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)

Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



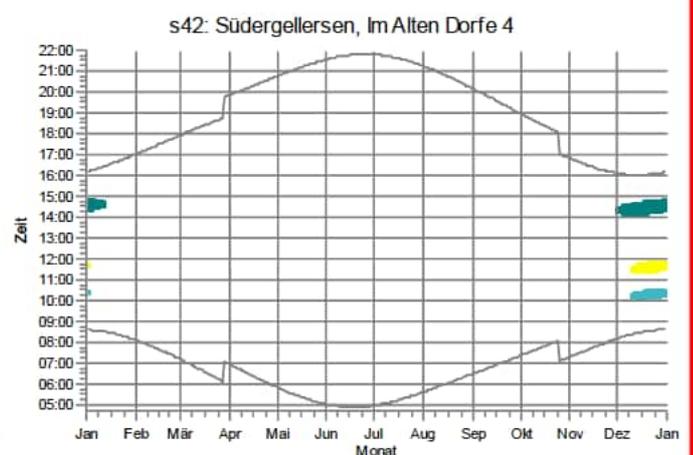
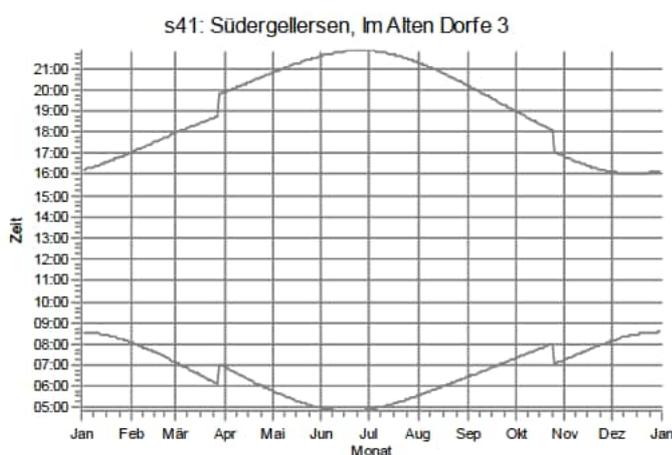
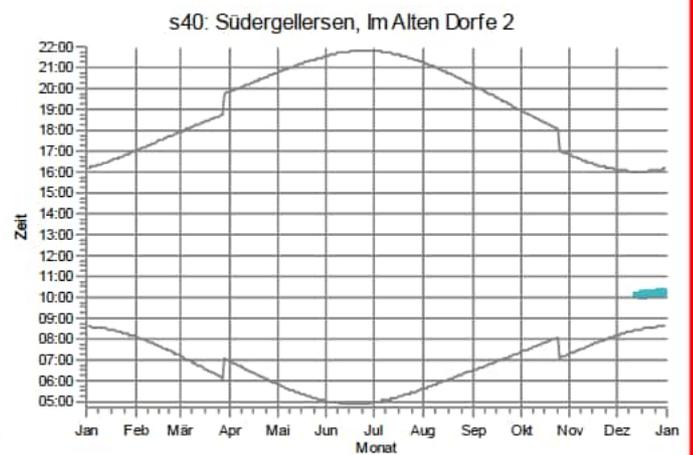
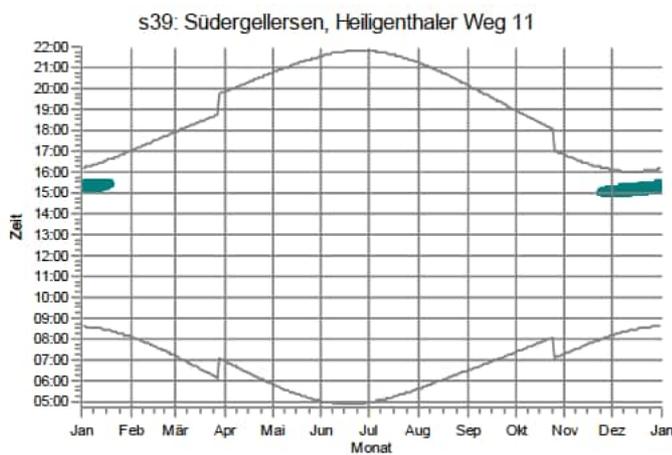
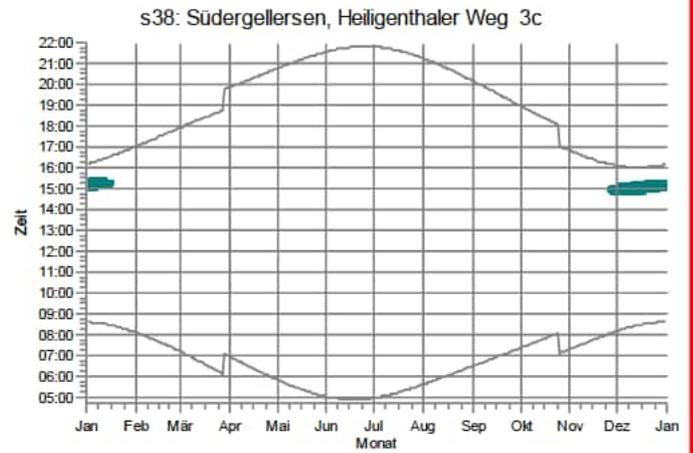
**WEA**

- Rep 10: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)
- Rep 5: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (329)
- Rep 8: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (330)
- Rep 9: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (331)
- B 01: NORDEX N149/4.0-4.5 4500 149.0 IOI NH: 125,0 m (Ges:199,5 m) (101)

- B 02: NORDEX N131/3300 DE 3300 131.0 I-I NH: 134,0 m (Ges:199,5 m) (120)
- B 03: GE WIND ENERGY GE 2.75-120 2750 120.0 IOI NH: 139,0 m (Ges:199,0 m) (94)
- Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)
- Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)
- Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)
- Oerzen 4: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (82)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



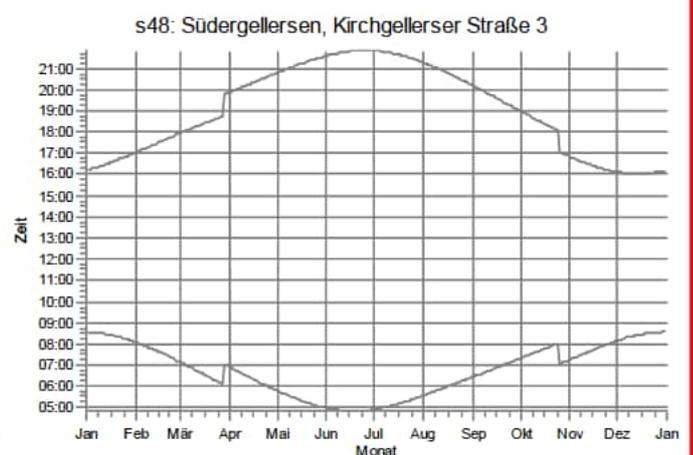
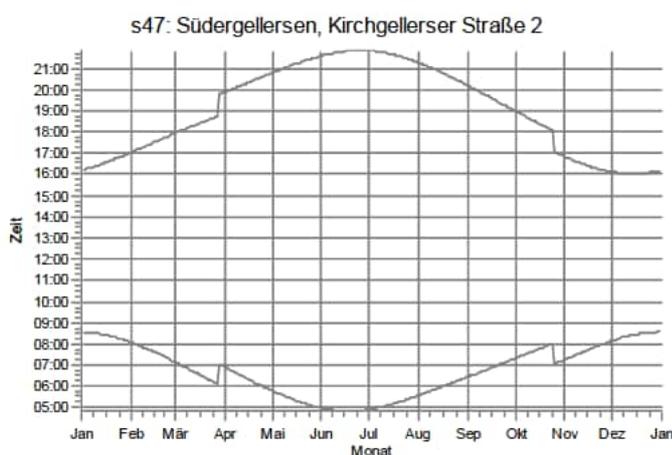
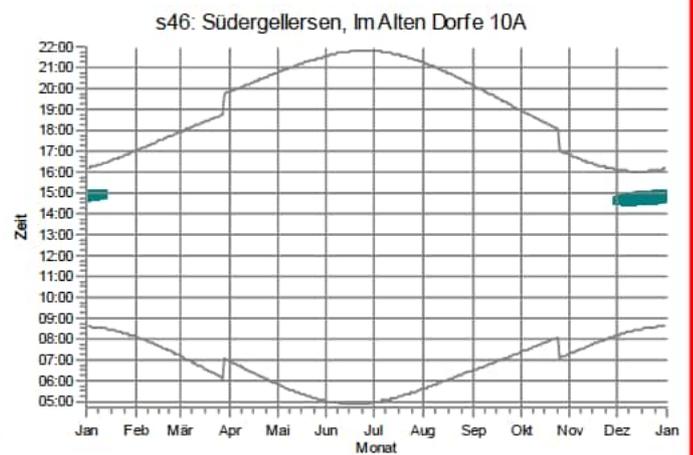
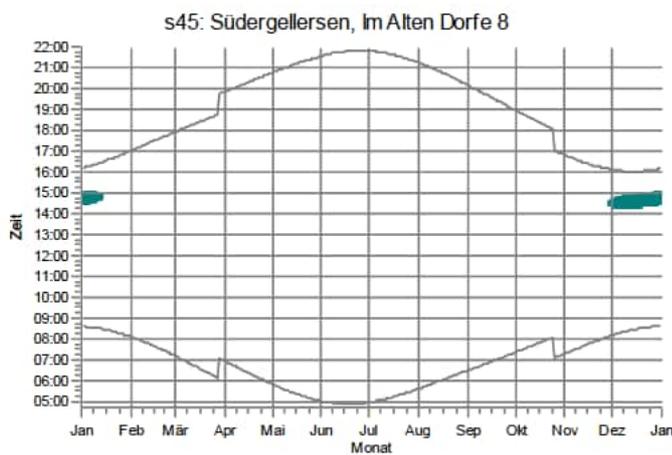
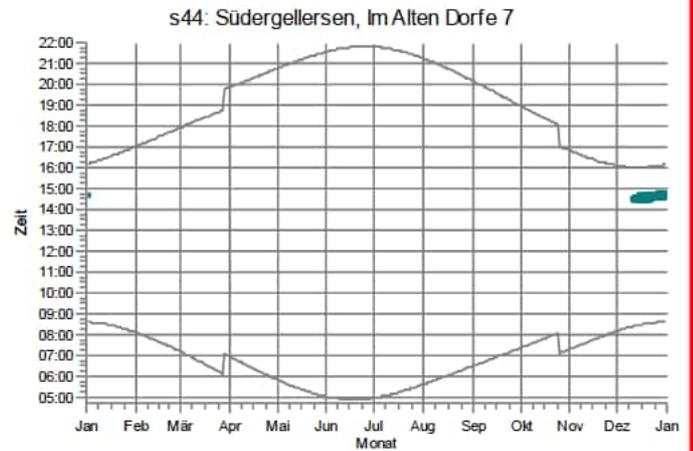
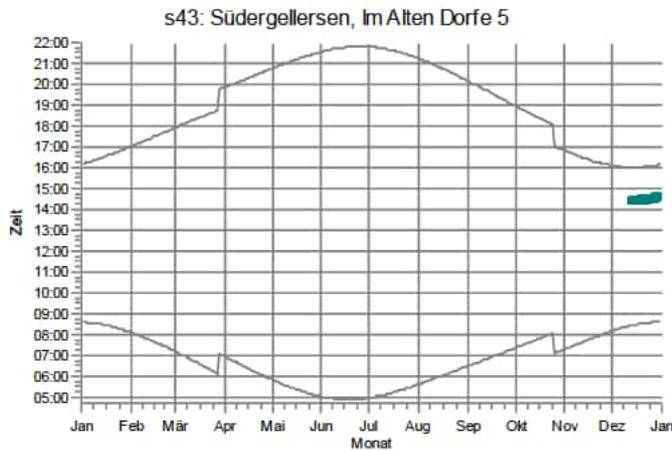
WEA

Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)  
B 01: NORDEX N149/4.0-4.5 4500 149.0 I01 NH: 125,0 m (Ges:199,5 m) (101)

Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand

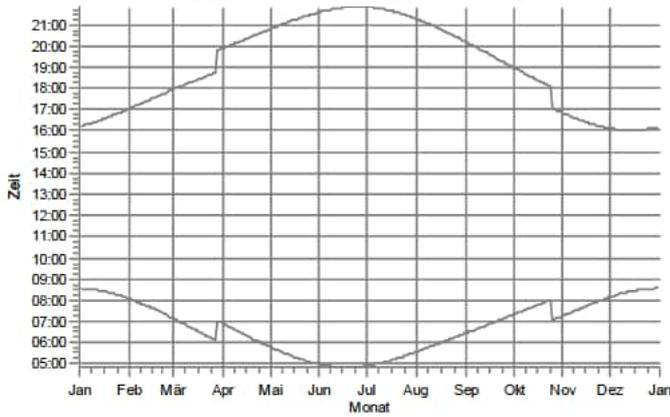


WEA  
B 01: NORDEX N149/4.0-4.5 4500 149.0 I01 NH: 125,0 m (Ges:199,5 m) (101)

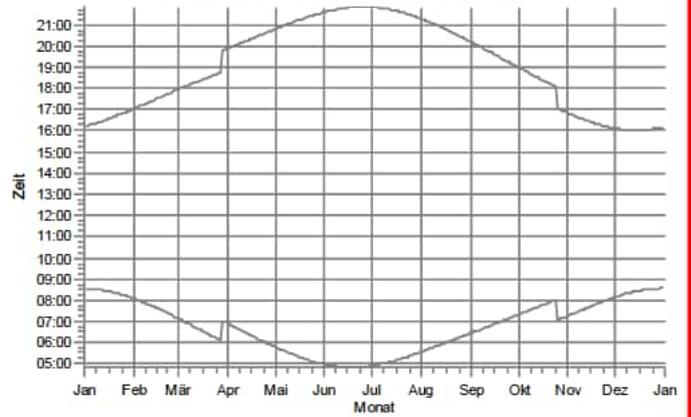
## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand

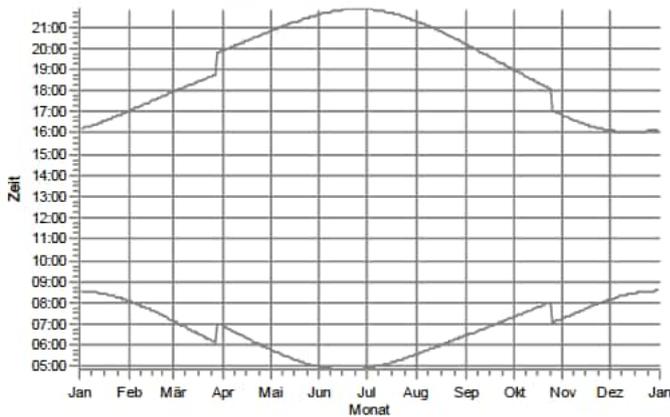
s49: Südergellersen, Kirchgellerser Straße 6



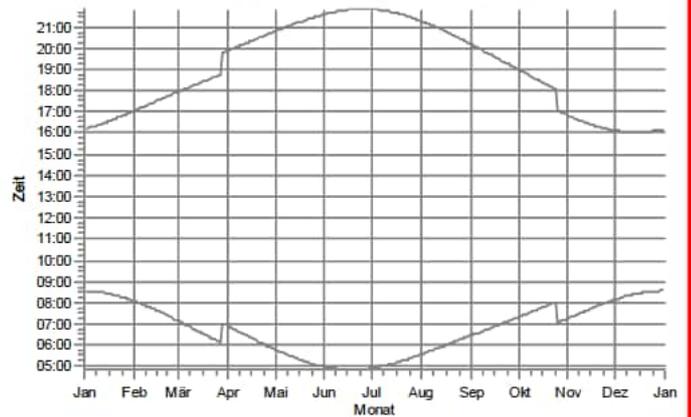
s50: Südergellersen, Kirchgellerser Straße 9



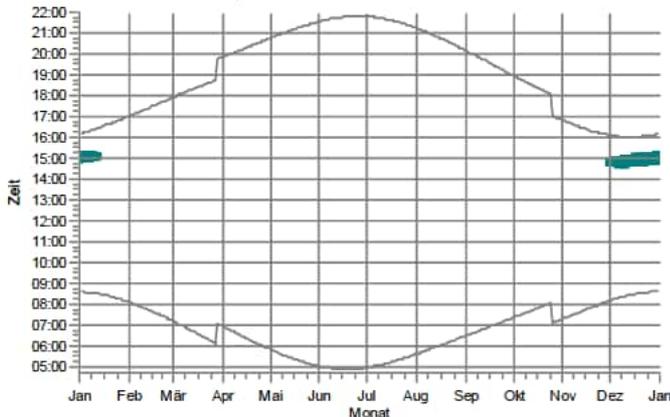
s51: Südergellersen, Kirchgellerser Straße 10



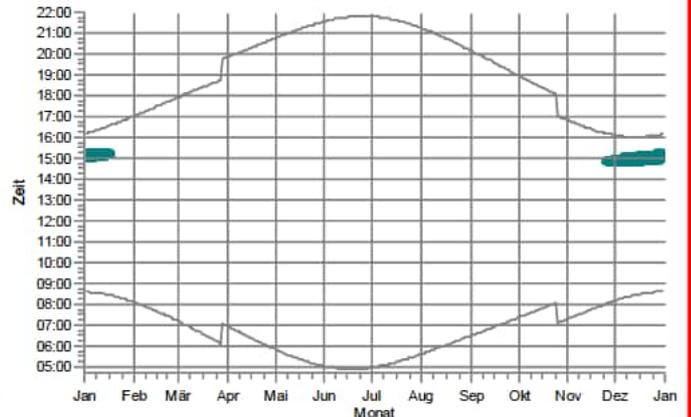
s52: Südergellersen, Kirchgellerser Straße 13



s53: Südergellersen, Kirchgellerser Straße 15



s54: Südergellersen, Kirchgellerser Straße 16

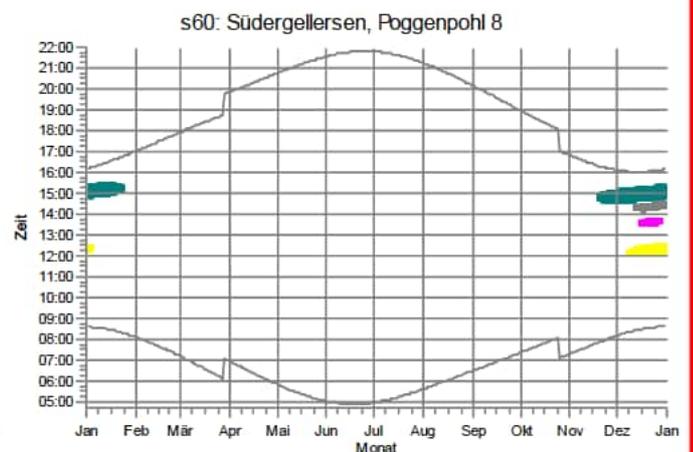
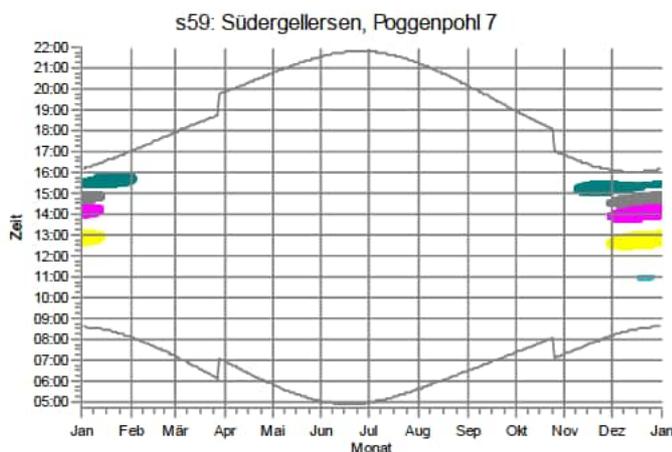
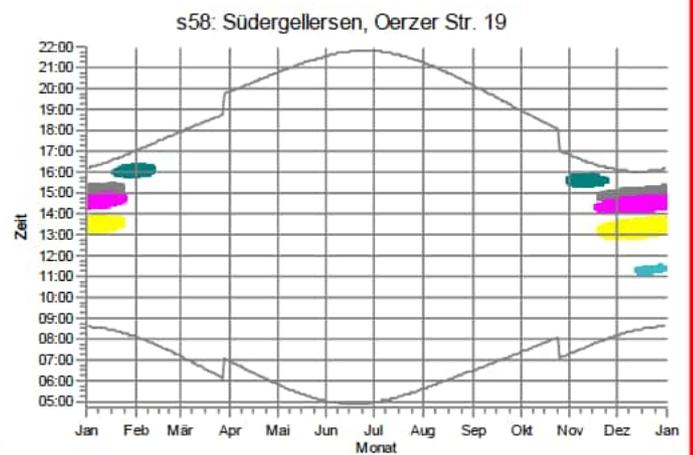
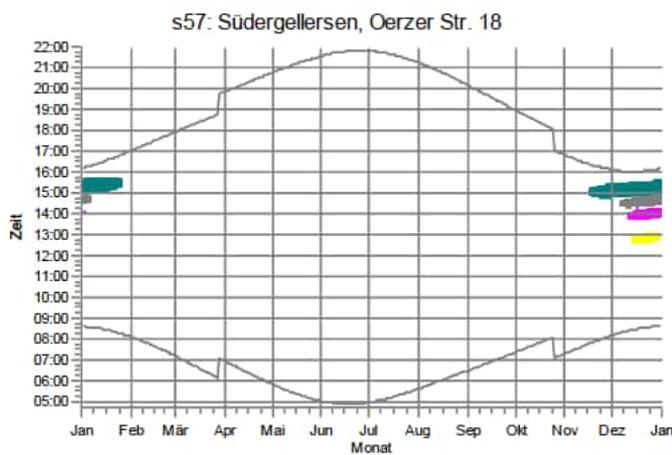
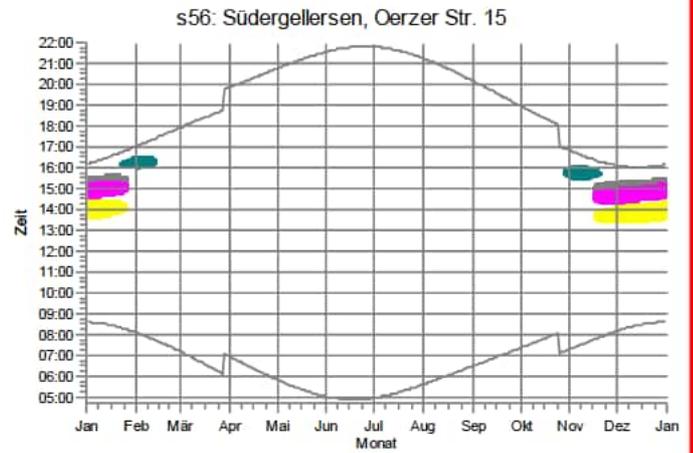
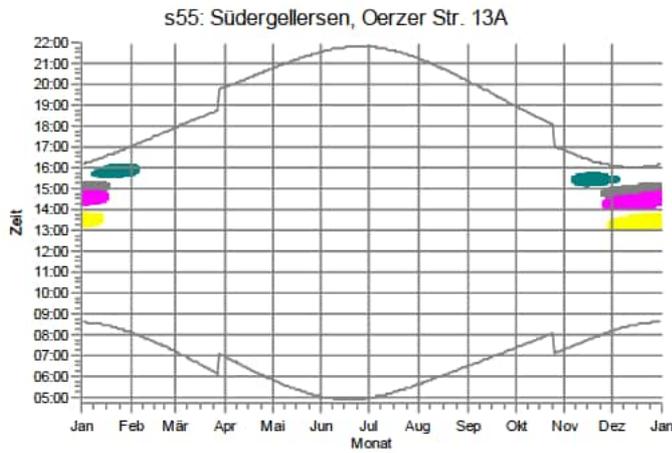


WEA

B 01: NORDEX N149/4.0-4.5 4500 149.0 I01 NH: 125,0 m (Ges:199,5 m) (101)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



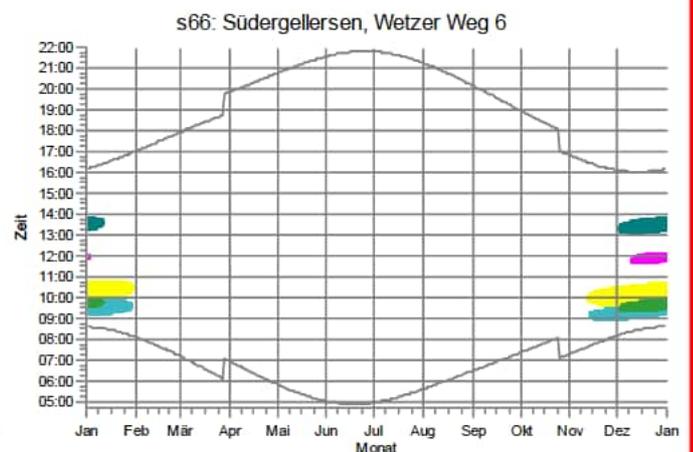
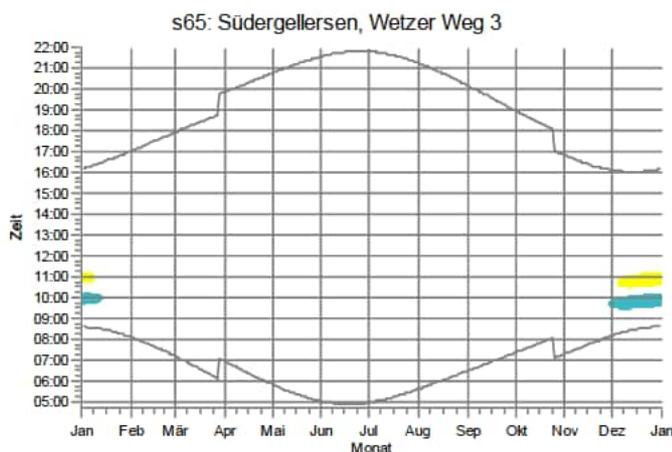
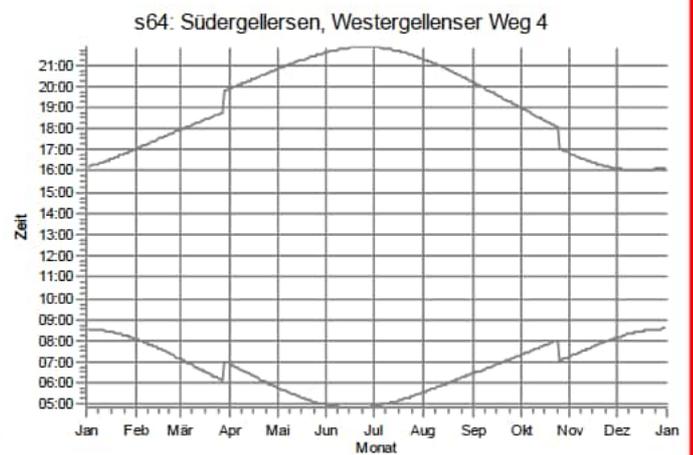
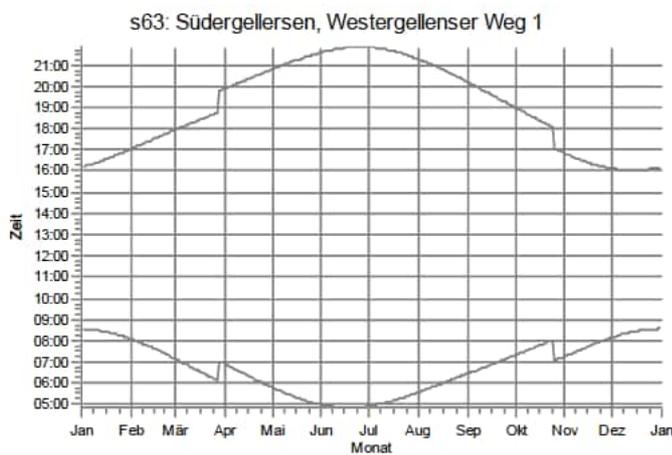
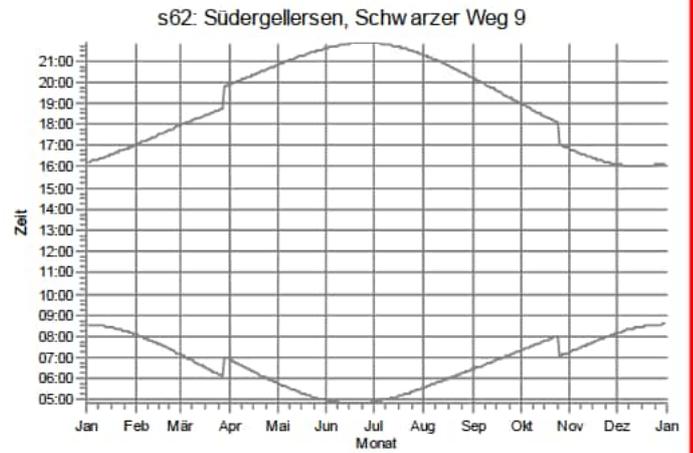
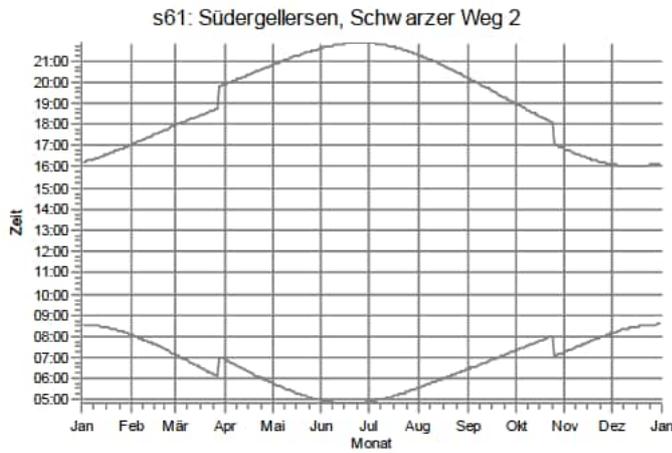
**WEA**

- Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)
- Rep 8: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (330)
- Rep 9: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (331)

- B 01: NORDEX N149/4.0-4.5 4500 149.0 IOI NH: 125,0 m (Ges:199,5 m) (101)
- Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



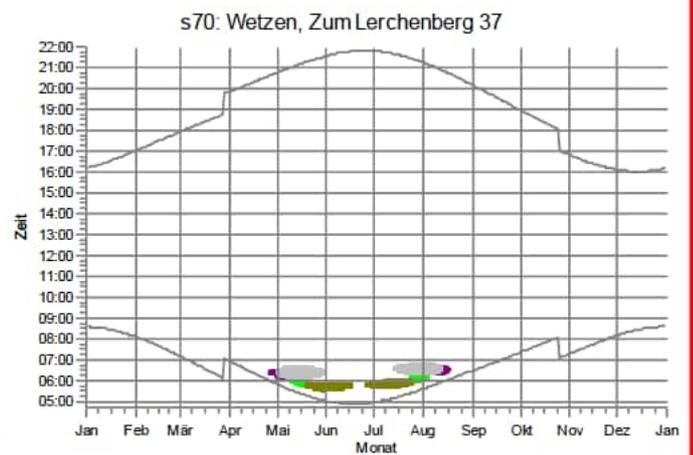
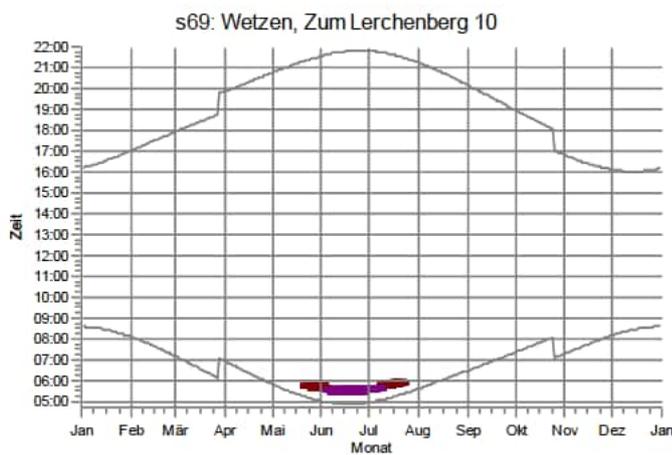
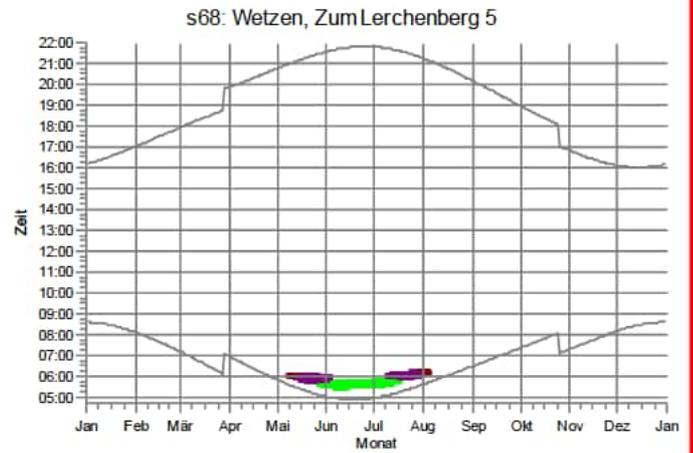
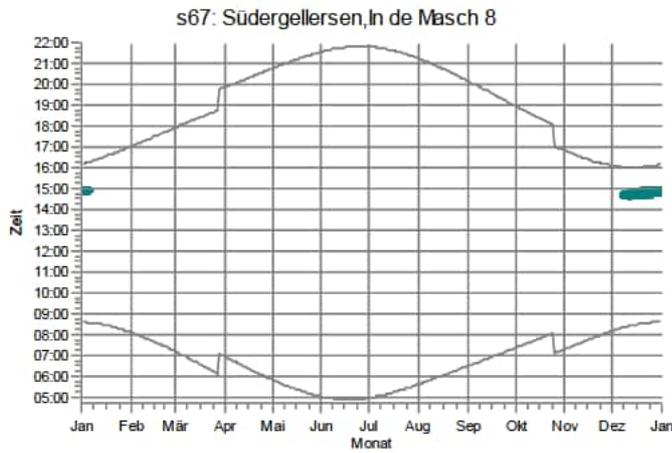
WEA

- Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)
- Rep 9: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (331)
- B 01: NORDEX N149/4.0-4.5 4500 149.0 I01 NH: 125,0 m (Ges:199,5 m) (101)

- Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)
- Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)

## SHADOW - Grafischer Kalender

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



WEA

- B 01: NORDEX N149/4.0-4.5 4500 149.0 IOI NH: 125,0 m (Ges:199,5 m) (101)
- B 03: GE WIND ENERGY GE 2.75-120 2750 120.0 IOI NH: 139,0 m (Ges:199,0 m) (94)
- B 04: GE WIND ENERGY GE 2.75-120 2750 120.0 IOI NH: 139,0 m (Ges:199,0 m) (95)

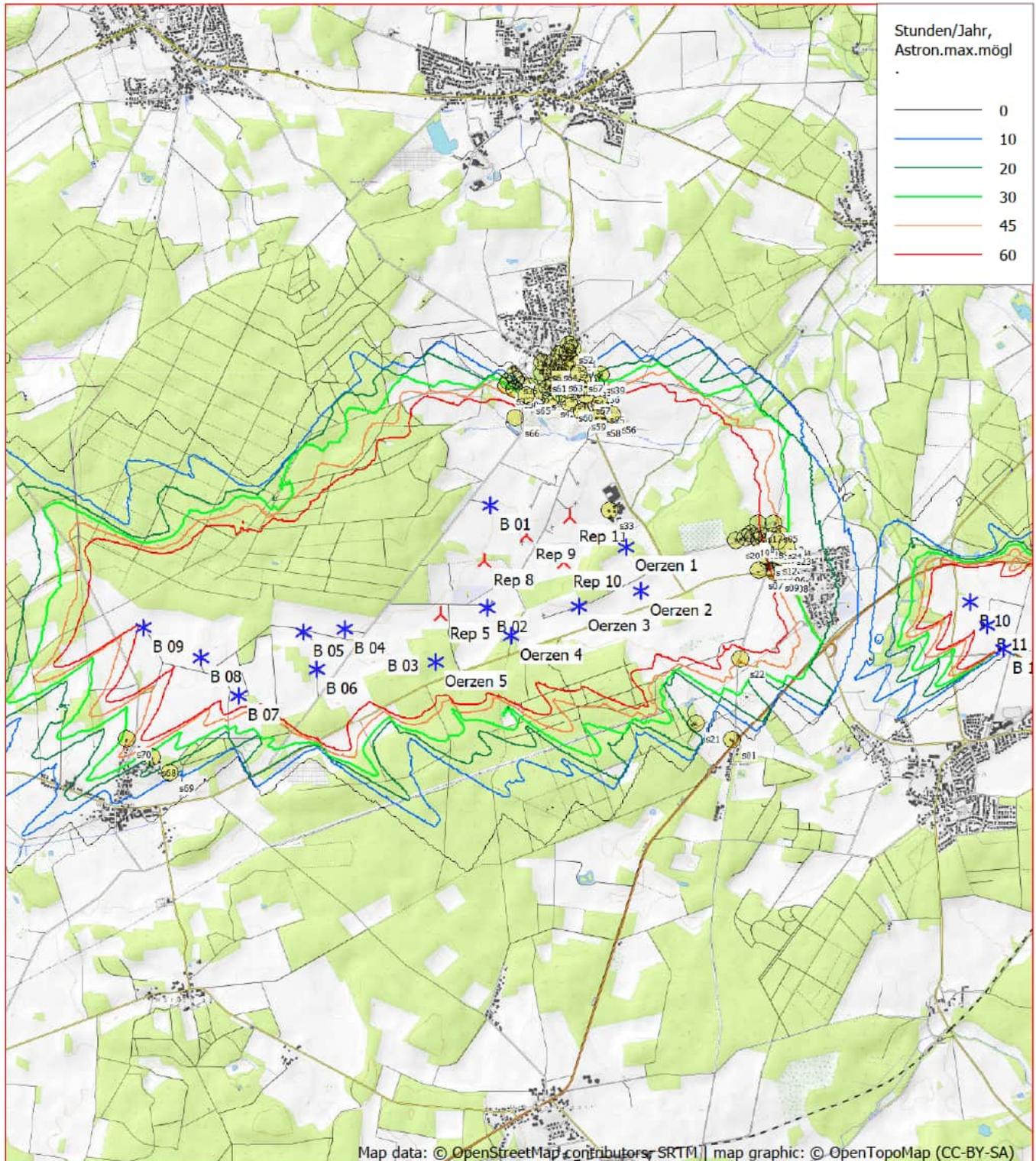
- B 05: GE WIND ENERGY GE 2.75-120 2750 120.0 IOI NH: 139,0 m (Ges:199,0 m) (96)
- B 06: GE WIND ENERGY GE 2.75-120 2750 120.0 IOI NH: 139,0 m (Ges:199,0 m) (97)
- B 07: GE WIND ENERGY GE 2.75-120 2750 120.0 IOI NH: 139,0 m (Ges:199,0 m) (98)

Projekt:  
**Süderheide**

Lizenzierter Anwender:  
**SOWIWAS - Energie GmbH**  
Watenstedter Straße 11  
DE-38384 Gevensleben  
+49 0 53 54 / 99 06 - 235  
[Redacted] / gutachten@sowiwas.de  
Berechnet:  
21.07.2025 15:59/4.1.287

## SHADOW - Karte

**Berechnung:** Gesamtbelastung Repowering 5x N175 +18 Bestand



0 500 1000 1500 2000 m

Karte: OpenTopoMap.org , Maßstab 1:50.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 586.120,0 Nord: 5.894.340,0

▲ Neue WEA    \* Existierende WEA    ● Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)

Zeitschritt: 2 Minuten, Schrittweite: 2 Tag(e), Kartenaufösung: 20 m, Sichtbarkeit Auflösung: 5 m, Augenhöhe: 1,5 m

## **Berechnung: Zusatzbelastung Repowering 5x N175**

Hauptergebnis

4 Seiten

Grafischer Kalender

12 Seiten

Karte

1 Seite

## SHADOW - Hauptergebnis

**Berechnung:** Zusatzbelastung Repowering 5x N175

### Annahmen für Schattenwurfberechnung

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

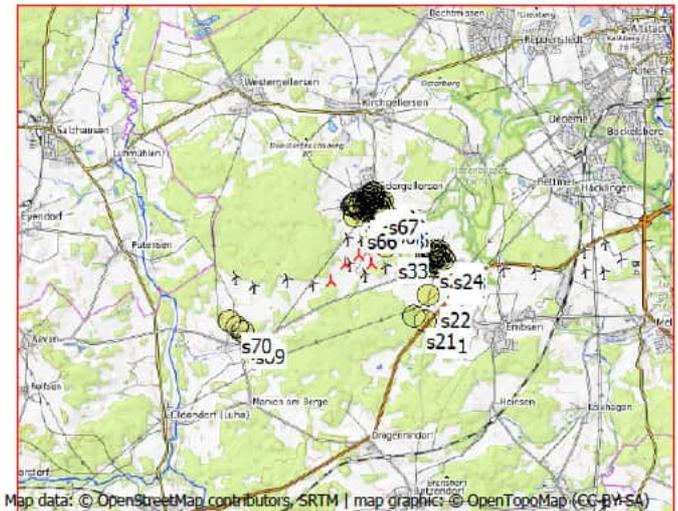
Minimale relevante Sonnenhöhe über Horizont 3 °  
Tage zwischen Berechnungen 1 Tag(e)  
Berechnungszeitsprung 1 Minuten

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

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

DHM: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)  
Rasterauflösung: 1,0 m

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



Map data: © OpenStreetMap contributors, SRTM | map graphics: © OpenTopoMap (CC-BY-SA)  
Maßstab 1:200.000  
▲ Neue WEA      ● Schattenrezeptor

### WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ			Nennleistung	Rotor-durchmesser	NH	Schattendaten	
					Aktuell	Hersteller	Typ				Beschatt.-Bereich	U/min
Rep 10	586.619,0	5.894.596,4	42,4	NORDEX N175/6.X 6800 1... Ja	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 11	586.661,3	5.895.000,3	44,3	NORDEX N175/6.X 6800 1... Ja	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 5	585.563,4	5.894.124,0	45,0	NORDEX N175/6.X 6800 1... Ja	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 8	585.927,2	5.894.596,0	48,8	NORDEX N175/6.X 6800 1... Ja	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Rep 9	586.287,4	5.894.833,5	45,0	NORDEX N175/6.X 6800 1... Ja	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8

### Schattenrezeptor-Eingabe

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
s01	Neu Oerzen, Soltauer Straße 1	588.101,7	5.893.084,2	46,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s02	Oerzen, Am Ohfeld 1	588.404,8	5.894.762,2	45,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s03	Oerzen, Am Ohfeld 4	588.478,4	5.894.877,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s04	Oerzen, Am Ohfeld 9	588.431,5	5.894.865,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s05	Oerzen, Am Ohfeld 15	588.429,4	5.894.972,8	43,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s06	Oerzen, Im Dorfe 14	588.496,1	5.894.607,3	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s07	Oerzen, Im Dorfe 16	588.303,1	5.894.557,6	47,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s08	Oerzen, Im Dorfe 19	588.526,8	5.894.534,4	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s09	Oerzen, Im Dorfe 25	588.443,9	5.894.543,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s10	Oerzen, Westerheide 1	588.389,1	5.894.636,1	49,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s11	Oerzen, Westerheide 3	588.370,1	5.894.675,9	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s12	Oerzen, Westerheide 4	588.427,4	5.894.685,8	48,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s13	Oerzen, Westerheide 5	588.381,0	5.894.813,7	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s14	Oerzen, Westerheide 12A	588.325,0	5.894.865,9	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s15	Oerzen, Westerheide 12C	588.306,5	5.894.823,7	44,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s16	Oerzen, Westerheide 18	588.256,0	5.894.856,0	45,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s17	Oerzen, Westerheide 19	588.291,4	5.894.974,5	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s18	Oerzen, Westerheide 20	588.229,9	5.894.881,8	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s19	Oerzen, Westerheide 22	588.185,2	5.894.847,2	46,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s20	Oerzen, Westerheide 28	588.102,7	5.894.823,3	42,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s21	Oerzen, Zum Hasel 5	587.786,3	5.893.215,0	57,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s22	Oerzen, Zum Hasel 10	588.158,0	5.893.781,7	45,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s23	Oerzen, Mühlenweg 10	588.545,4	5.894.776,2	44,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s24	Oerzen, Mühlenweg 18	588.468,7	5.894.823,3	42,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s25	Südergellersen, Auf dem Brink 6	586.477,5	5.896.246,7	67,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0

(Fortsetzung nächste Seite)...

**SHADOW - Hauptergebnis****Berechnung: Zusatzbelastung Repowering 5x N175**

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
s26	Südergellersen, Auf dem Brink 7	586.498,2	5.896.189,4	65,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s27	Südergellersen, Birkenweg 7	586.547,8	5.896.410,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s28	Südergellersen, Forstweg 4	586.302,3	5.896.127,2	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s29	Südergellersen, Forstweg 8	586.230,1	5.896.140,7	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s30	Südergellersen, Forstweg 11	586.166,4	5.896.101,6	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s31	Südergellersen, Forstweg 16	586.112,1	5.896.167,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s32	Südergellersen, Forstweg 17	586.094,1	5.896.128,7	62,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s33	Südergellersen, Gewerbegebiet	587.007,3	5.895.062,8	43,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s34	Südergellersen, Heidberg 2	586.177,4	5.896.183,9	66,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s35	Südergellersen, Heidberg 3	586.154,2	5.896.223,0	66,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s36	Südergellersen, Heiligenthaler Weg 2	586.863,9	5.896.155,5	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s37	Südergellersen, Heiligenthaler Weg 3	586.792,8	5.896.190,0	58,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s38	Südergellersen, Heiligenthaler Weg 3c	586.833,1	5.896.217,7	58,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s39	Südergellersen, Heiligenthaler Weg 11	586.911,1	5.896.239,1	52,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s40	Südergellersen, Im Alten Dorfe 2	586.402,6	5.896.082,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s41	Südergellersen, Im Alten Dorfe 3	586.453,7	5.896.115,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s42	Südergellersen, Im Alten Dorfe 4	586.480,0	5.896.021,4	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s43	Südergellersen, Im Alten Dorfe 5	586.561,2	5.896.156,3	63,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s44	Südergellersen, Im Alten Dorfe 7	586.616,6	5.896.197,1	62,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s45	Südergellersen, Im Alten Dorfe 8	586.561,9	5.896.067,6	60,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s46	Südergellersen, Im Alten Dorfe 10A	586.625,5	5.896.101,5	60,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s47	Südergellersen, Kirchgellerser Straße 2	586.638,0	5.896.277,9	62,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s48	Südergellersen, Kirchgellerser Straße 3	586.594,8	5.896.327,3	63,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s49	Südergellersen, Kirchgellerser Straße 6	586.637,2	5.896.375,2	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s50	Südergellersen, Kirchgellerser Straße 9	586.617,5	5.896.432,1	64,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s51	Südergellersen, Kirchgellerser Straße 10	586.660,0	5.896.465,5	63,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s52	Südergellersen, Kirchgellerser Straße 13	586.632,2	5.896.499,1	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s53	Südergellersen, Kirchgellerser Straße 15	586.747,3	5.896.191,6	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s54	Südergellersen, Kirchgellerser Straße 16	586.731,0	5.896.121,0	59,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s55	Südergellersen, Oerzer Str. 13A	586.909,5	5.895.981,7	53,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s56	Südergellersen, Oerzer Str. 15	587.010,6	5.895.899,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s57	Südergellersen, Oerzer Str. 18	586.781,3	5.896.062,2	56,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s58	Südergellersen, Oerzer Str. 19	586.879,7	5.895.864,2	49,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s59	Südergellersen, Poggenpohl 7	586.751,1	5.895.922,0	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s60	Südergellersen, Poggenpohl 8	586.640,6	5.895.995,8	58,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s61	Südergellersen, Schwarzer Weg 2	586.403,0	5.896.246,5	71,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s62	Südergellersen, Schwarzer Weg 9	586.404,8	5.896.338,8	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s63	Südergellersen, Westergellerser Weg 1	586.545,3	5.896.256,4	63,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s64	Südergellersen, Westergellerser Weg 4	586.498,9	5.896.338,8	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s65	Südergellersen, Wetzter Weg 3	586.268,4	5.896.052,0	63,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s66	Südergellersen, Wetzter Weg 6	586.172,4	5.895.854,5	57,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s67	Südergellersen, In de Masch 8	586.717,4	5.896.250,8	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s68	Wetzen, Zum Lerchenberg 5	583.085,3	5.892.839,1	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s69	Wetzen, Zum Lerchenberg 10	583.242,4	5.892.711,0	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s70	Wetzen, Zum Lerchenberg 37	582.866,7	5.892.994,9	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0

**Berechnungsergebnisse**

Schattenrezeptor

**astron. max. mögl. Beschattungsdauer**

Nr.	Name	Stunden/Jahr	Schattentage/Jahr	Max.Schattendauer/Tag
		[h/a]	[d/a]	[h/d]
s01	Neu Oerzen, Soltauer Straße 1	0:00	0	0:00
s02	Oerzen, Am Ohfeld 1	17:41	61	0:23
s03	Oerzen, Am Ohfeld 4	15:56	56	0:22
s04	Oerzen, Am Ohfeld 9	16:55	58	0:23
s05	Oerzen, Am Ohfeld 15	16:19	57	0:23
s06	Oerzen, Im Dorfe 14	16:02	59	0:22
s07	Oerzen, Im Dorfe 16	21:28	69	0:24
s08	Oerzen, Im Dorfe 19	0:00	0	0:00
s09	Oerzen, Im Dorfe 25	17:24	63	0:23
s10	Oerzen, Westerheide 1	18:20	64	0:23

(Fortsetzung nächste Seite)...

**SHADOW - Hauptergebnis****Berechnung: Zusatzbelastung Repowering 5x N175**

...(Fortsetzung von vorheriger Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr [h/a]	Schattentage/Jahr [d/a]	Max.Schattendauer/Tag [h/d]
s11	Oerzen, Westerheide 3	18:45	63	0:24
s12	Oerzen, Westerheide 4	17:14	60	0:23
s13	Oerzen, Westerheide 5	18:04	61	0:23
s14	Oerzen, Westerheide 12A	19:12	62	0:24
s15	Oerzen, Westerheide 12C	19:42	63	0:24
s16	Oerzen, Westerheide 18	20:59	66	0:25
s17	Oerzen, Westerheide 19	19:07	63	0:25
s18	Oerzen, Westerheide 20	21:24	65	0:25
s19	Oerzen, Westerheide 22	23:01	68	0:27
s20	Oerzen, Westerheide 28	33:57	88	0:30
s21	Oerzen, Zum Hasel 5	0:00	0	0:00
s22	Oerzen, Zum Hasel 10	26:11	76	0:25
s23	Oerzen, Mühlenweg 10	0:00	0	0:00
s24	Oerzen, Mühlenweg 18	16:11	58	0:22
s25	Südergellersen, Auf dem Brink 6	0:00	0	0:00
s26	Südergellersen, Auf dem Brink 7	0:00	0	0:00
s27	Südergellersen, Birkenweg 7	0:00	0	0:00
s28	Südergellersen, Forstweg 4	0:00	0	0:00
s29	Südergellersen, Forstweg 8	2:23	15	0:12
s30	Südergellersen, Forstweg 11	12:28	36	0:26
s31	Südergellersen, Forstweg 16	7:51	28	0:21
s32	Südergellersen, Forstweg 17	14:18	39	0:28
s33	Südergellersen, Gewerbegebiet	377:57	307	1:43
s34	Südergellersen, Heidberg 2	0:00	0	0:00
s35	Südergellersen, Heidberg 3	0:00	0	0:00
s36	Südergellersen, Heiligenthaler Weg 2	6:38	26	0:24
s37	Südergellersen, Heiligenthaler Weg 3	0:00	0	0:00
s38	Südergellersen, Heiligenthaler Weg 3c	0:00	0	0:00
s39	Südergellersen, Heiligenthaler Weg 11	0:00	0	0:00
s40	Südergellersen, Im Alten Dorfe 2	0:00	0	0:00
s41	Südergellersen, Im Alten Dorfe 3	0:00	0	0:00
s42	Südergellersen, Im Alten Dorfe 4	6:22	24	0:20
s43	Südergellersen, Im Alten Dorfe 5	0:00	0	0:00
s44	Südergellersen, Im Alten Dorfe 7	0:00	0	0:00
s45	Südergellersen, Im Alten Dorfe 8	0:00	0	0:00
s46	Südergellersen, Im Alten Dorfe 10A	0:00	0	0:00
s47	Südergellersen, Kirchgellerser Straße 2	0:00	0	0:00
s48	Südergellersen, Kirchgellerser Straße 3	0:00	0	0:00
s49	Südergellersen, Kirchgellerser Straße 6	0:00	0	0:00
s50	Südergellersen, Kirchgellerser Straße 9	0:00	0	0:00
s51	Südergellersen, Kirchgellerser Straße 10	0:00	0	0:00
s52	Südergellersen, Kirchgellerser Straße 13	0:00	0	0:00
s53	Südergellersen, Kirchgellerser Straße 15	0:00	0	0:00
s54	Südergellersen, Kirchgellerser Straße 16	0:00	0	0:00
s55	Südergellersen, Oerzer Str. 13A	66:04	54	1:34
s56	Südergellersen, Oerzer Str. 15	102:41	72	1:38
s57	Südergellersen, Oerzer Str. 18	15:37	30	0:50
s58	Südergellersen, Oerzer Str. 19	107:22	68	1:51
s59	Südergellersen, Poggenpohl 7	62:25	48	1:38
s60	Südergellersen, Poggenpohl 8	14:55	28	0:49
s61	Südergellersen, Schwarzer Weg 2	0:00	0	0:00
s62	Südergellersen, Schwarzer Weg 9	0:00	0	0:00
s63	Südergellersen, Westergellerser Weg 1	0:00	0	0:00
s64	Südergellersen, Westergellerser Weg 4	0:00	0	0:00
s65	Südergellersen, Wetzter Weg 3	12:22	34	0:27
s66	Südergellersen, Wetzter Weg 6	56:26	78	1:04
s67	Südergellersen, In de Masch 8	0:00	0	0:00
s68	Wetzen, Zum Lerchenberg 5	0:00	0	0:00
s69	Wetzen, Zum Lerchenberg 10	0:00	0	0:00
s70	Wetzen, Zum Lerchenberg 37	0:00	0	0:00

Projekt:

**Süderheide**

Lizenzierter Anwender:

**SOWIWAS - Energie GmbH**

Watenstedter Straße 11

DE-38384 Gevensleben

+49 0 53 54 / 99 06 - 235

██████████ / gutachten@sowibas.de

Berechnet

21.07.2025 16:04/4.1.287

## SHADOW - Hauptergebnis

### Berechnung: Zusatzbelastung Repowering 5x N175

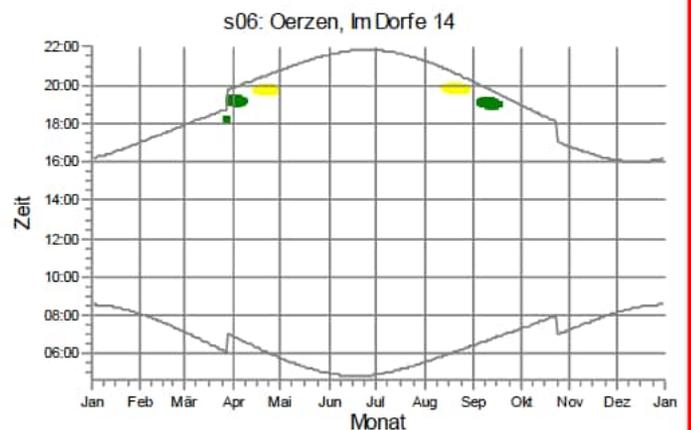
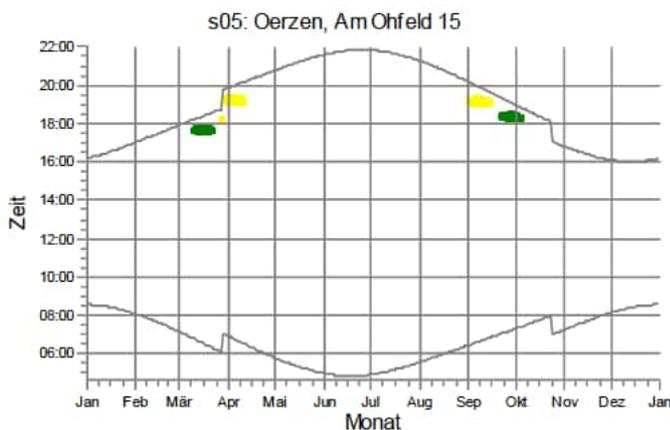
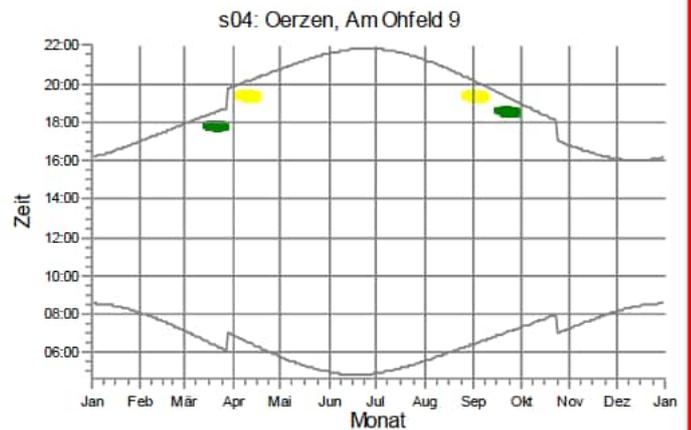
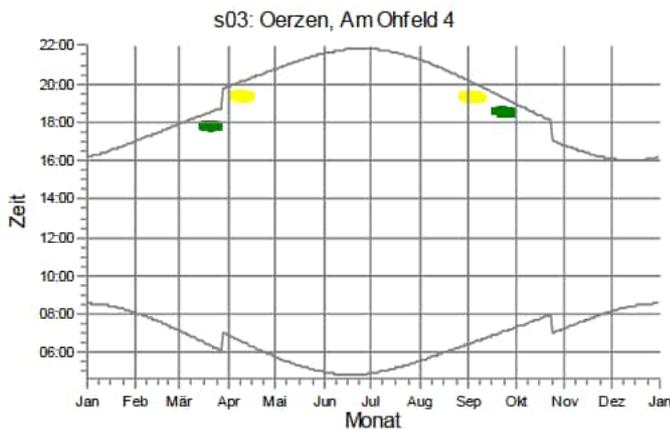
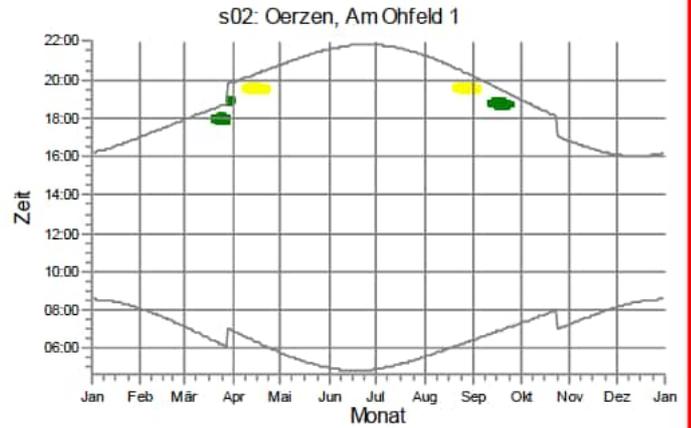
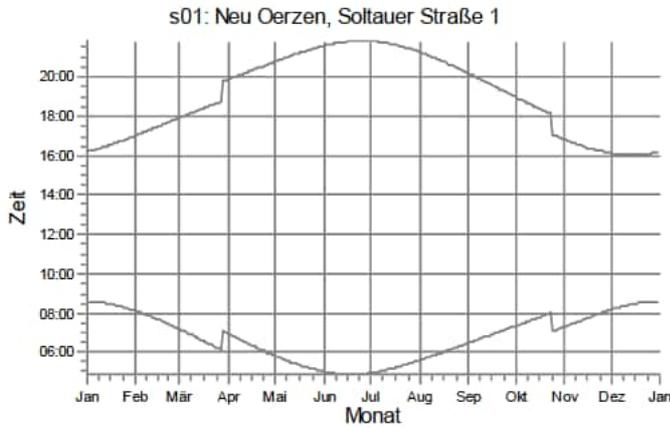
Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]
Rep 10	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)	142:32
Rep 11	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)	462:12
Rep 5	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (329)	10:50
Rep 8	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (330)	76:51
Rep 9	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (331)	134:59

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

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

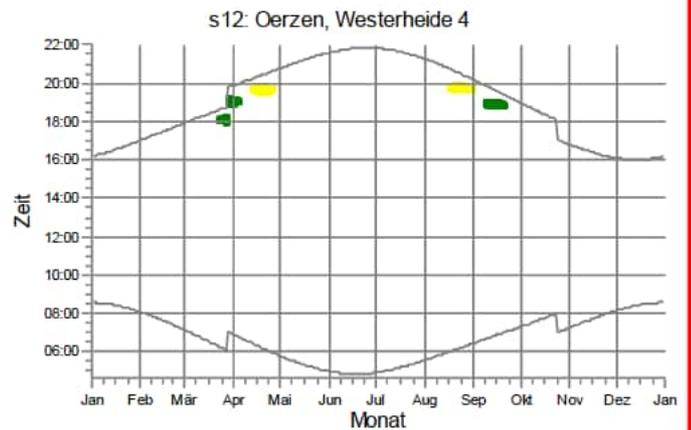
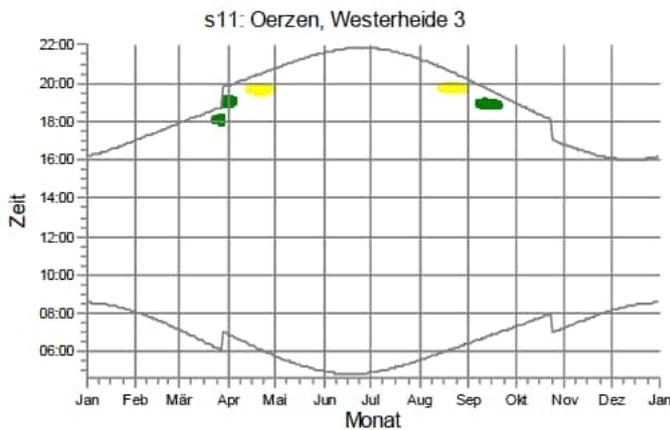
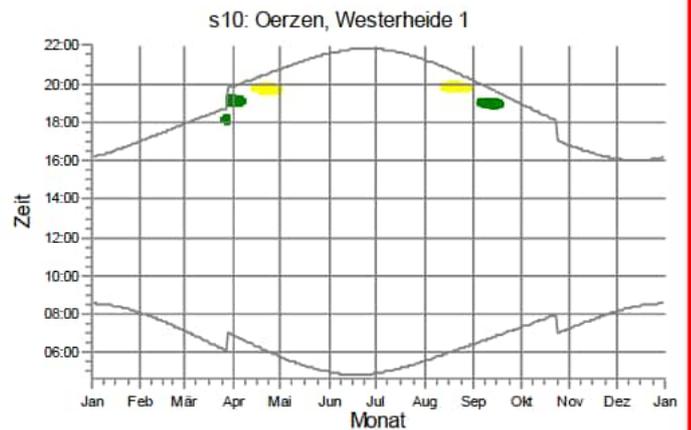
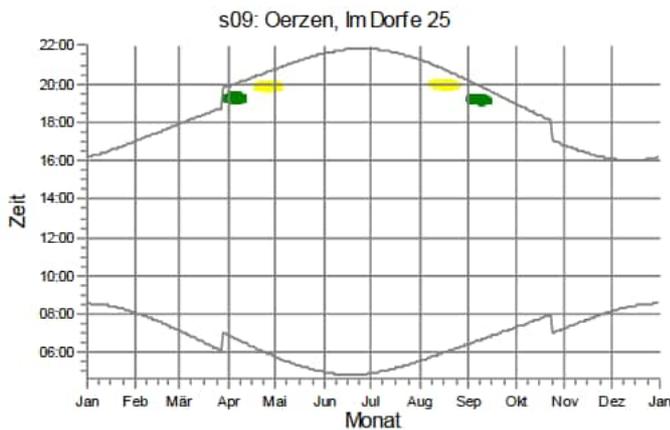
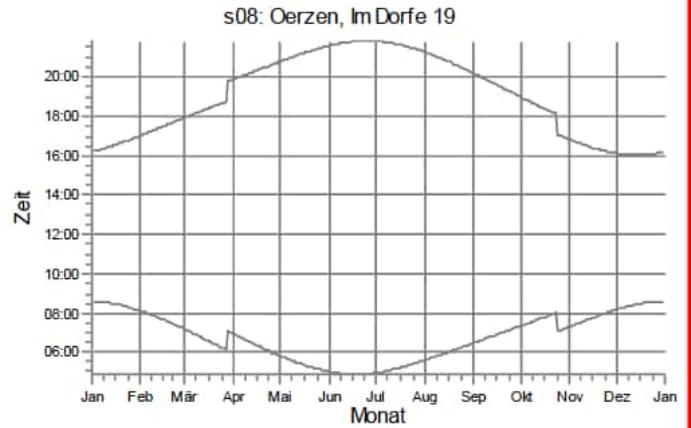
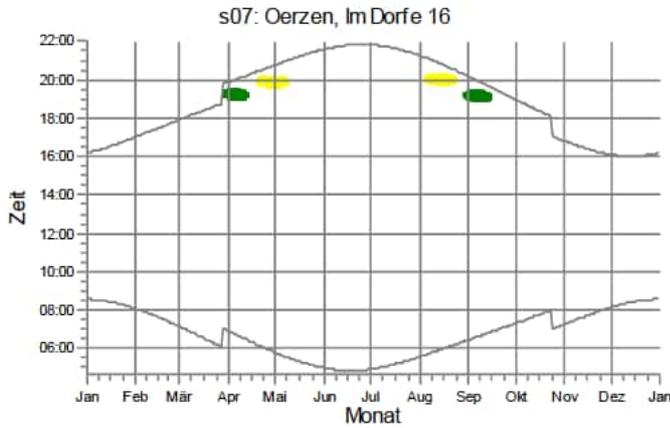


WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)

## SHADOW - Grafischer Kalender

Berechnung: Zusatzbelastung Repowering 5x N175

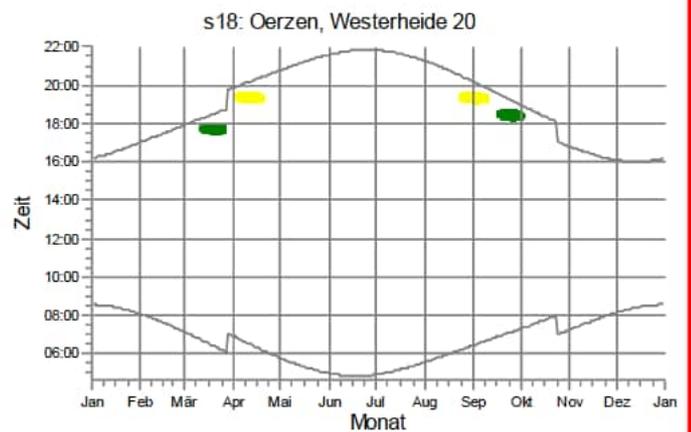
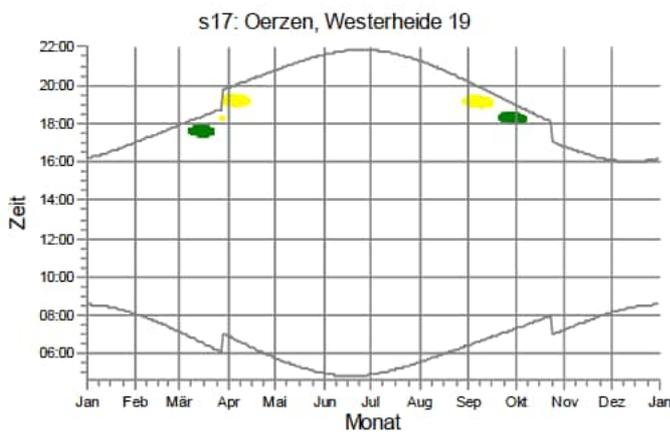
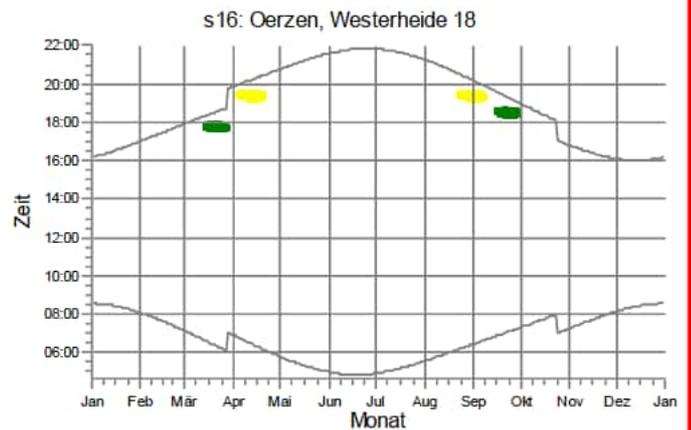
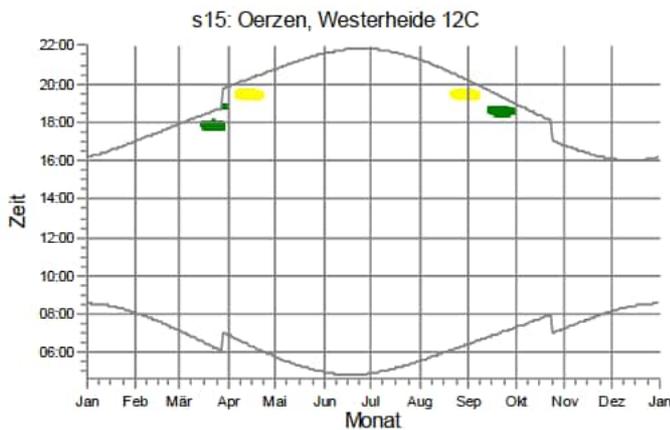
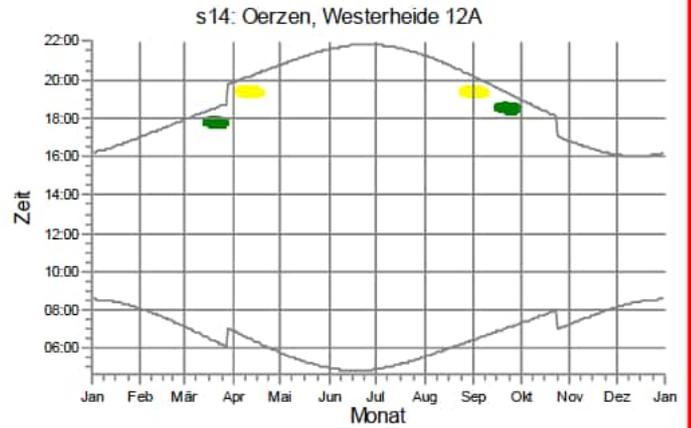
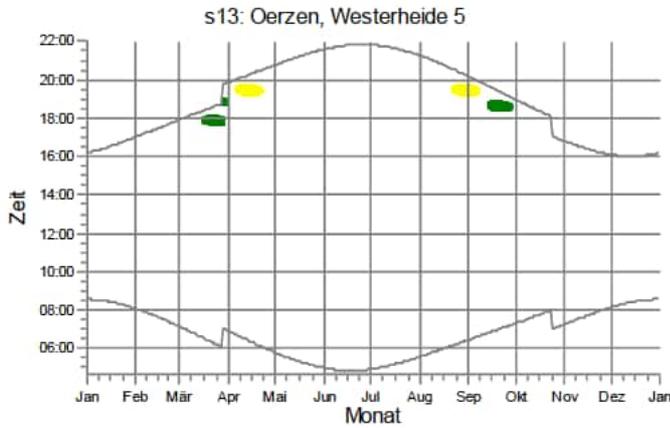


WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

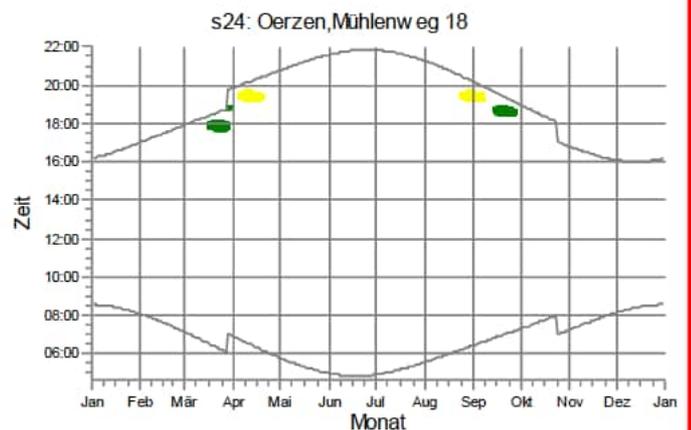
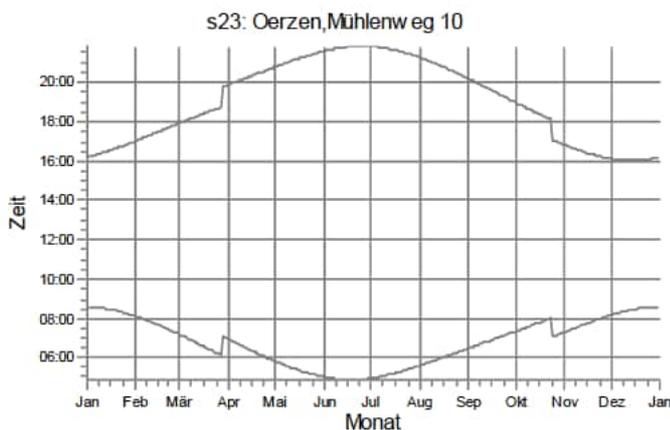
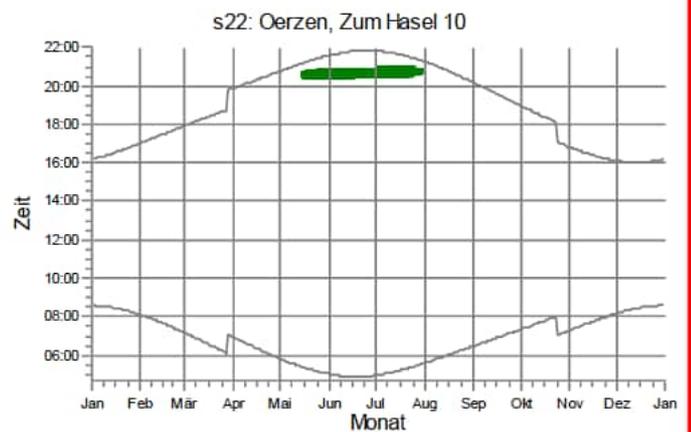
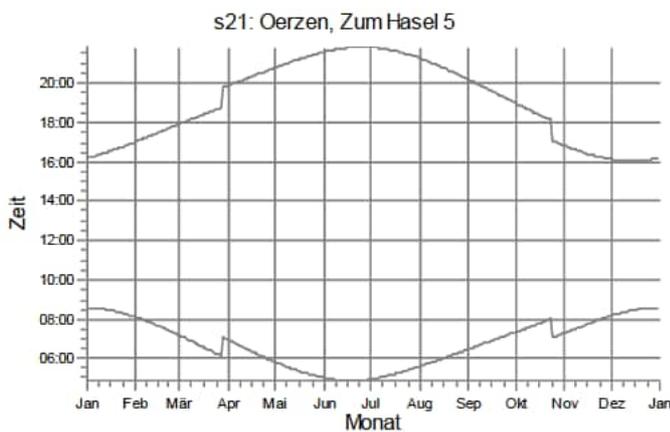
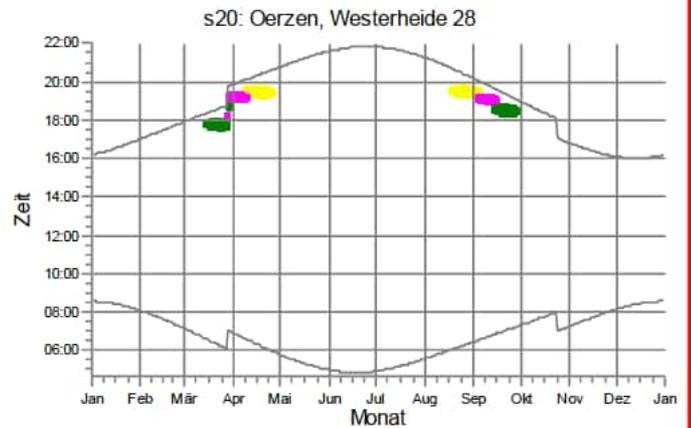
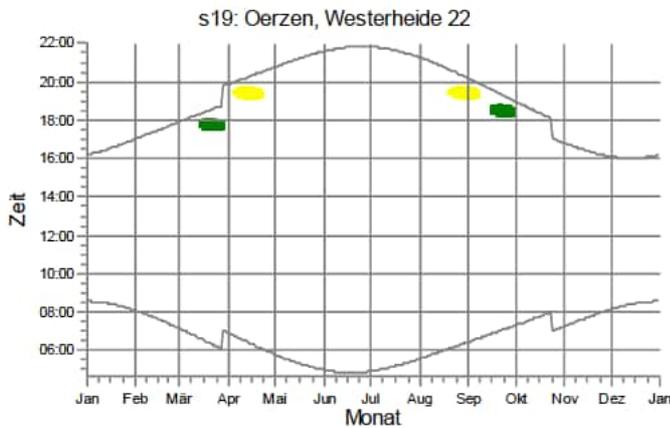


WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

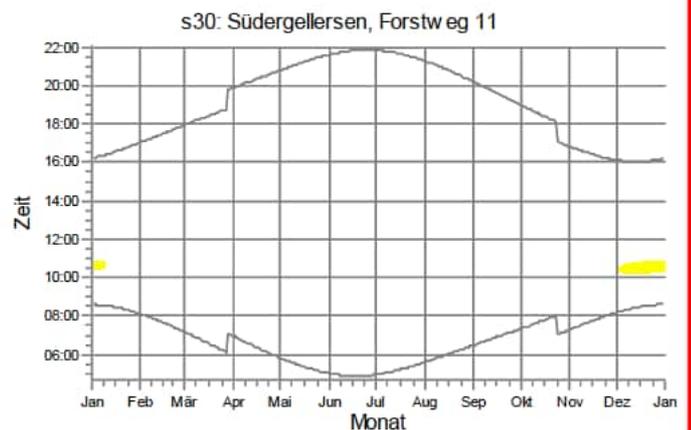
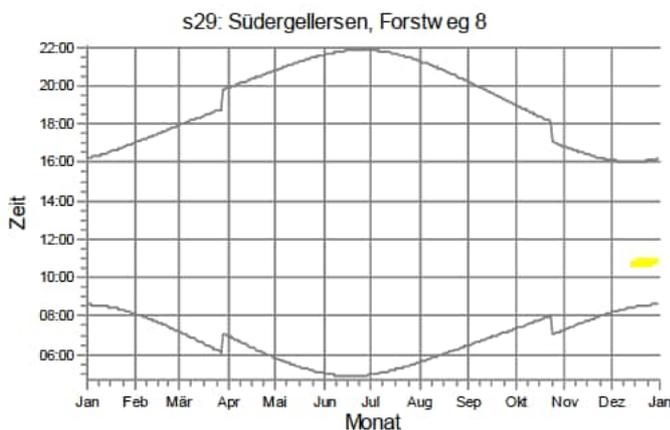
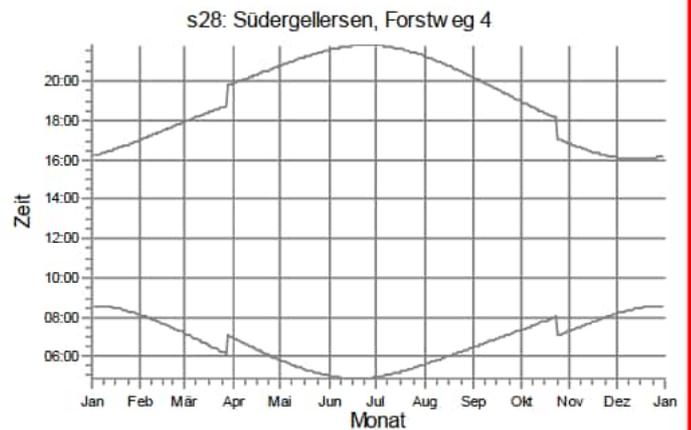
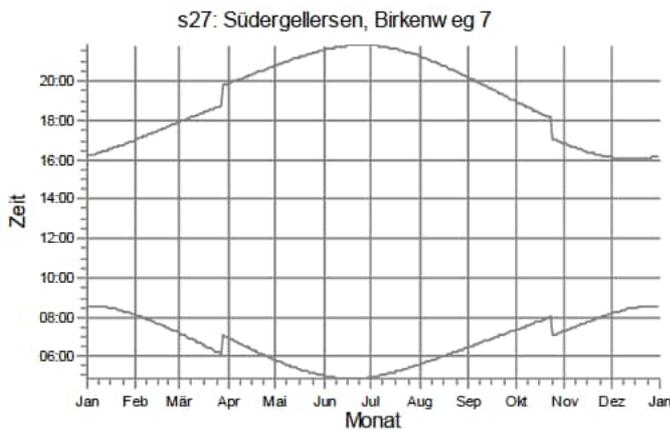
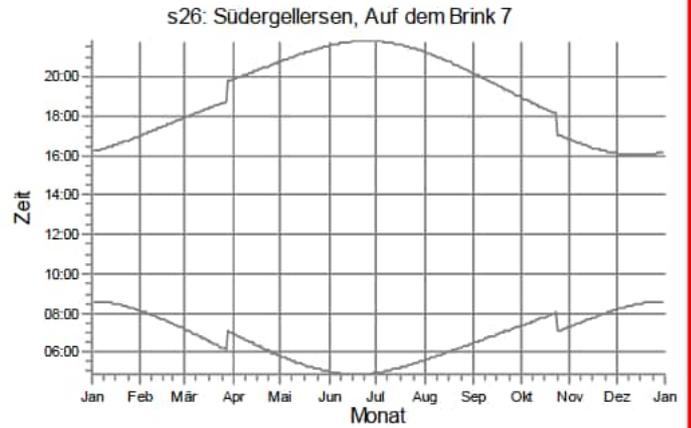
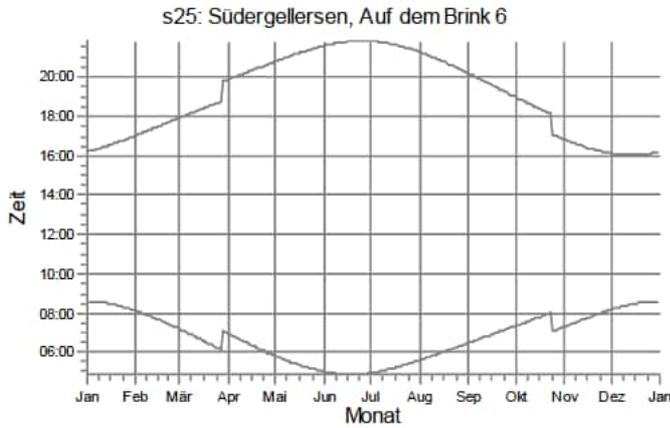


### WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)
- Rep 9: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (331)

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

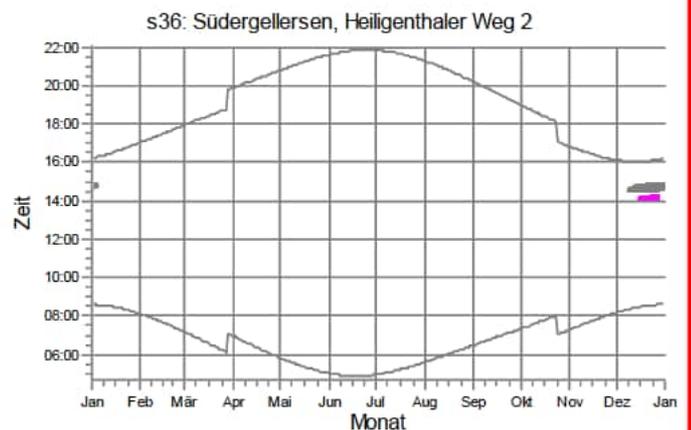
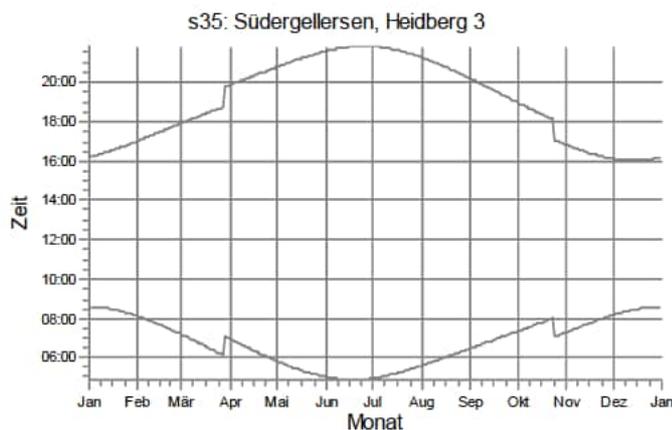
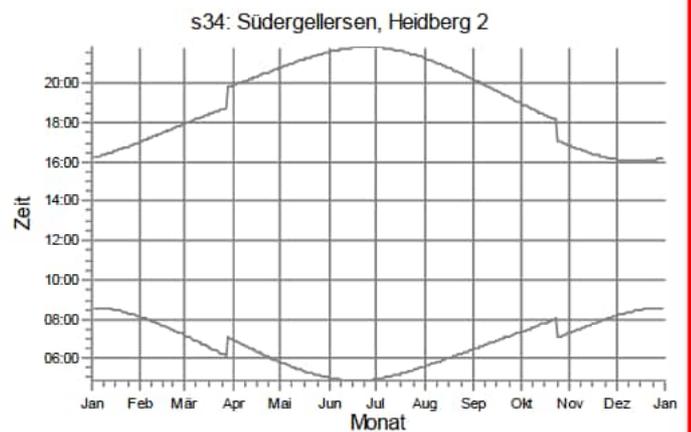
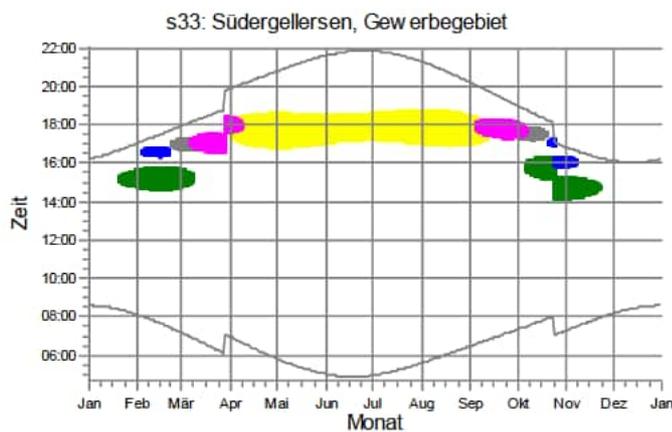
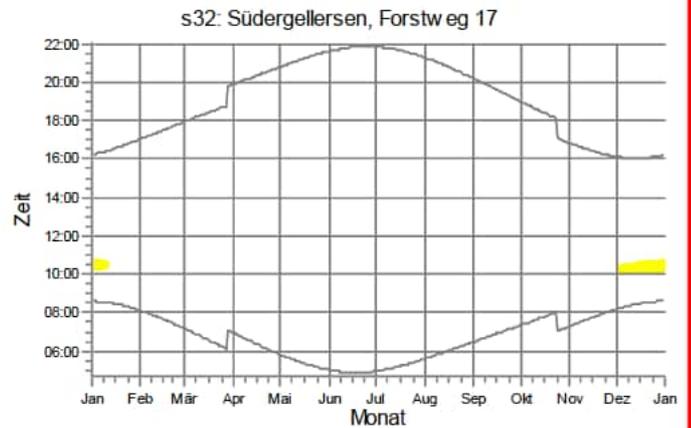
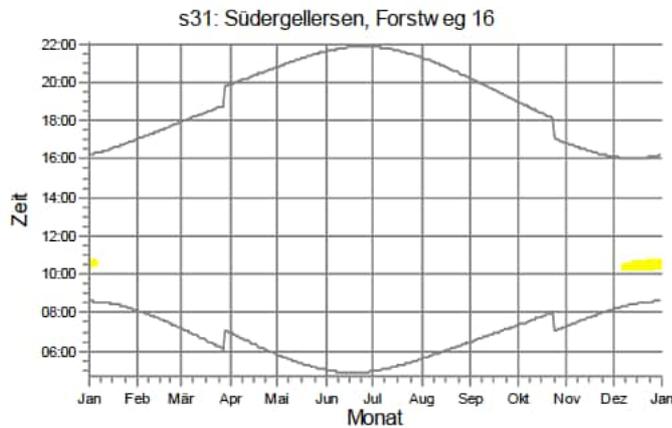


WEA

Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

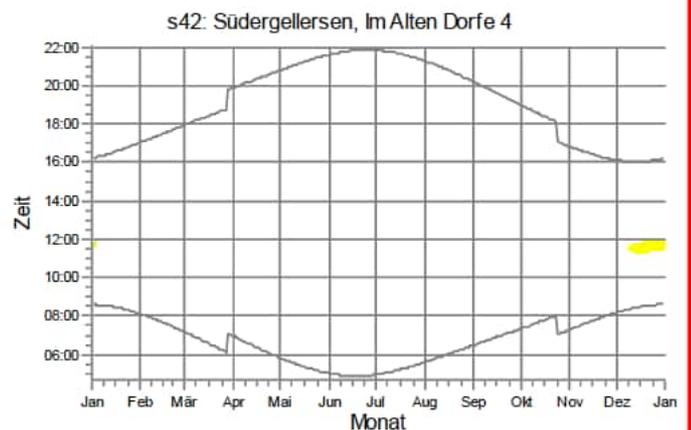
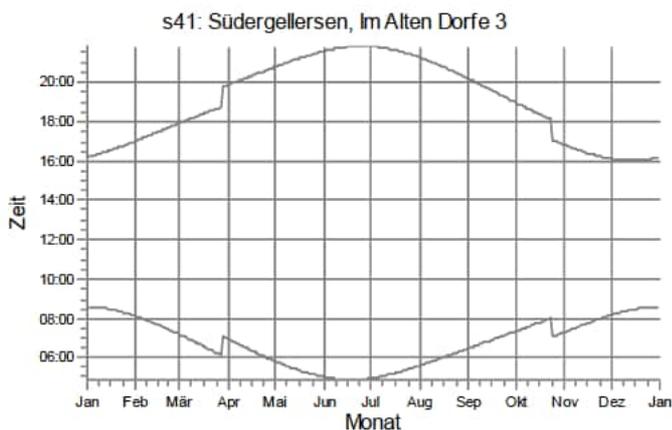
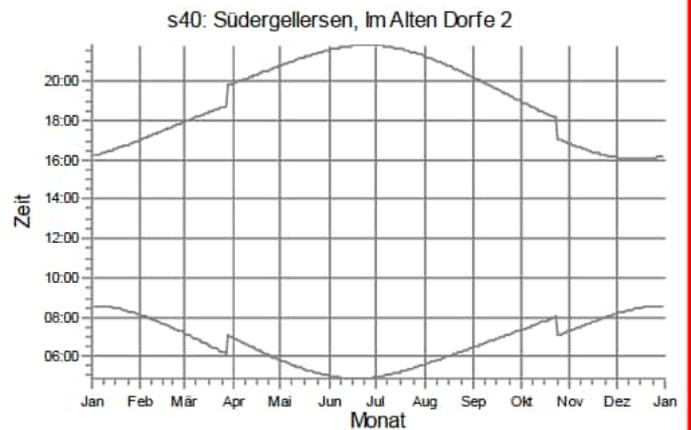
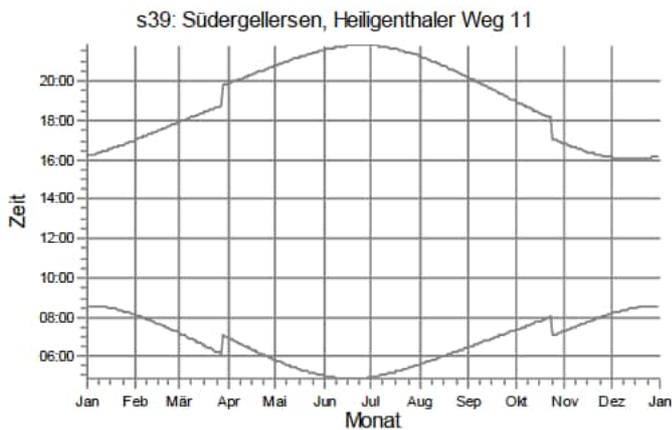
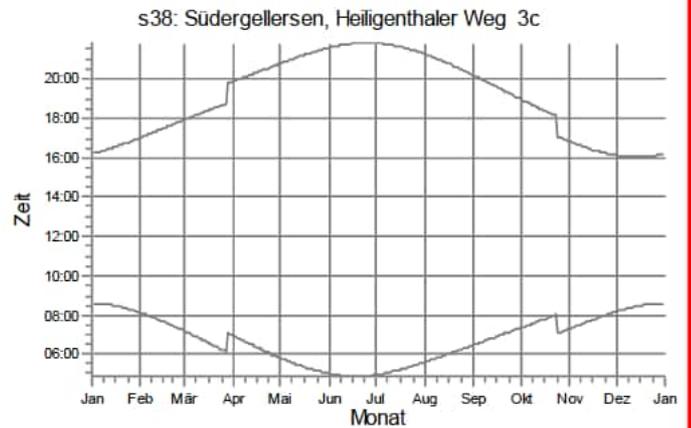
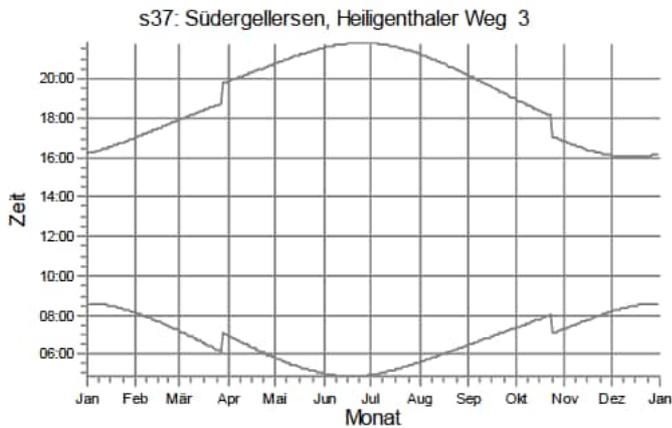


### WEA

- Rep 10: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (332)
- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)
- Rep 5: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (329)
- Rep 8: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (330)
- Rep 9: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (331)

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

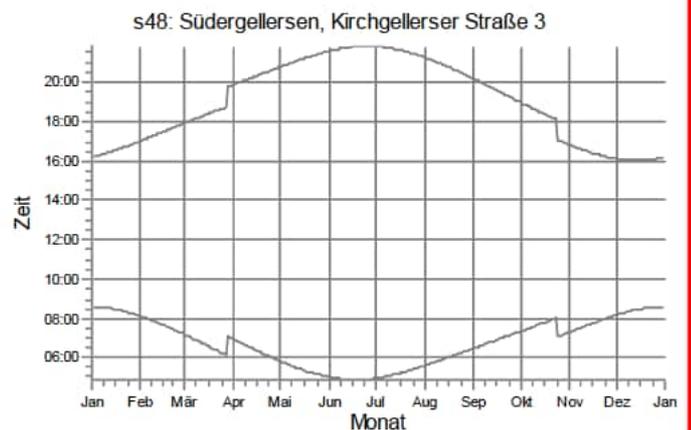
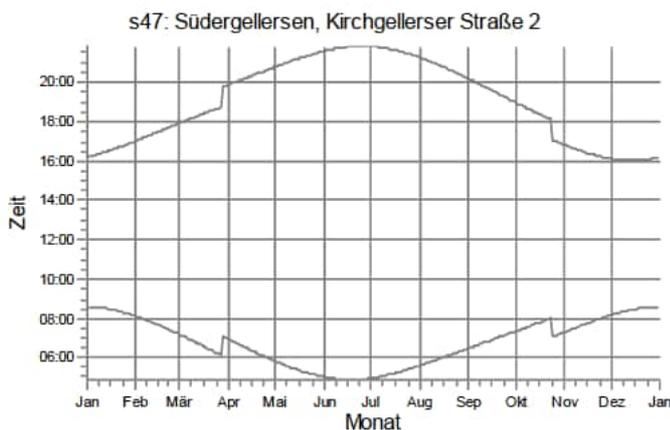
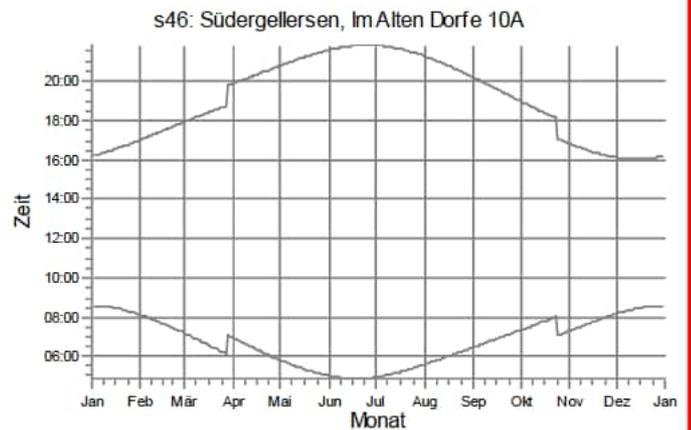
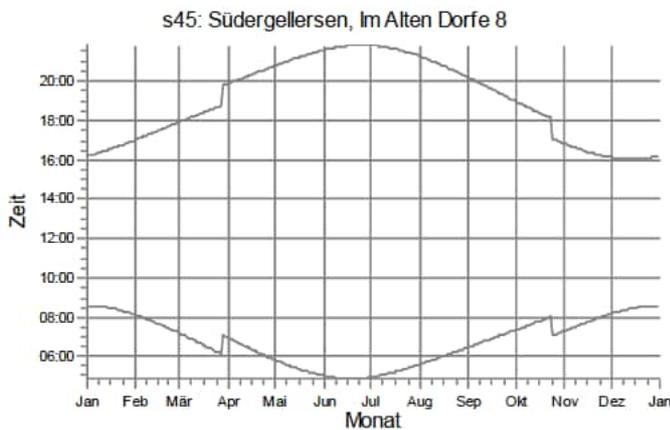
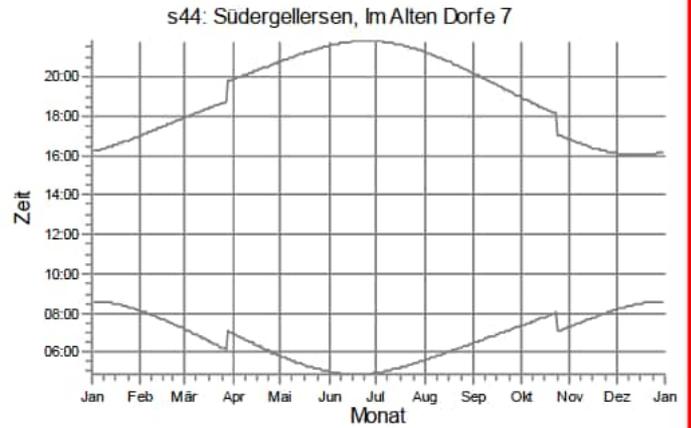
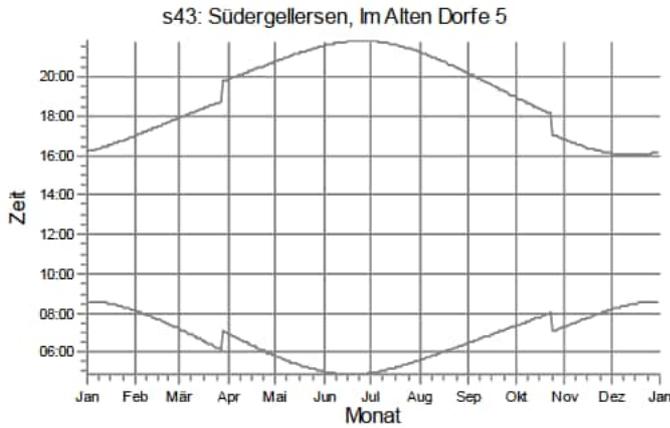


WEA

Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)

## SHADOW - Grafischer Kalender

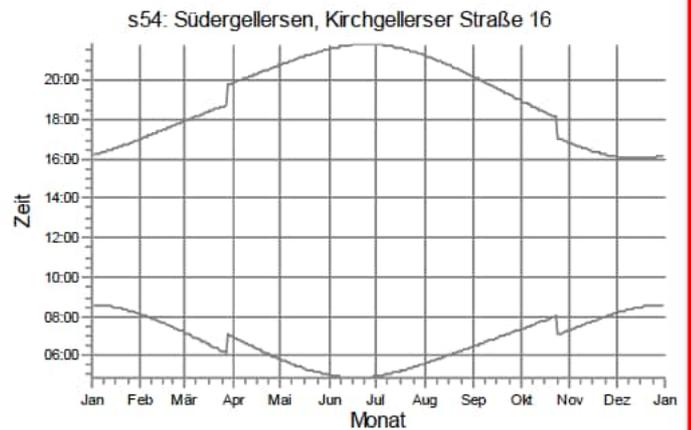
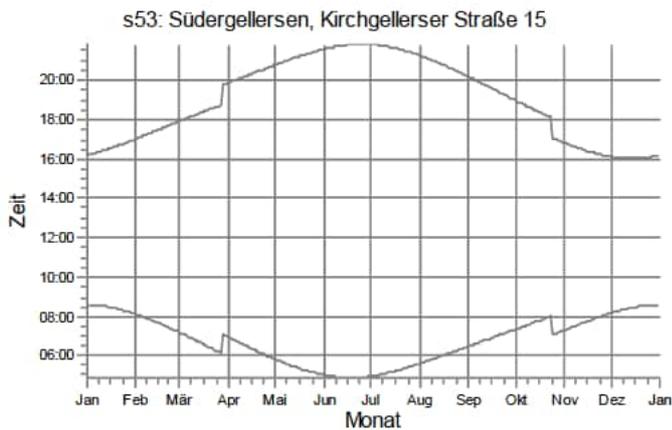
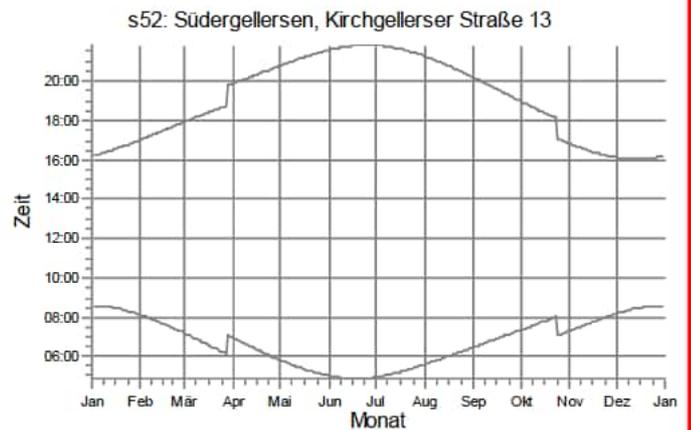
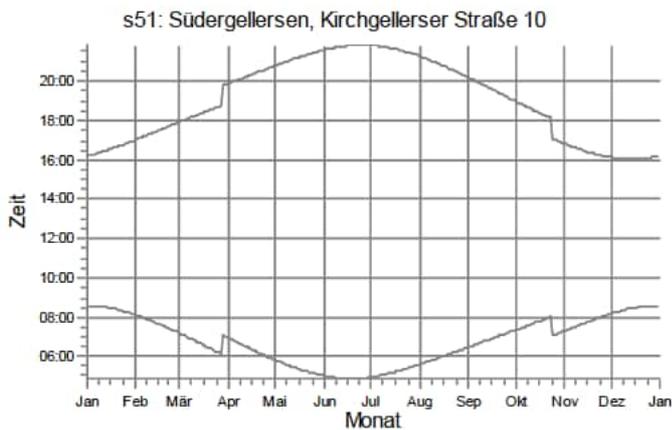
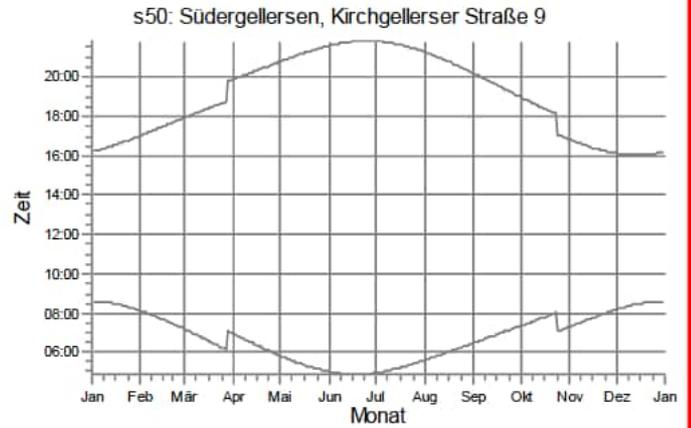
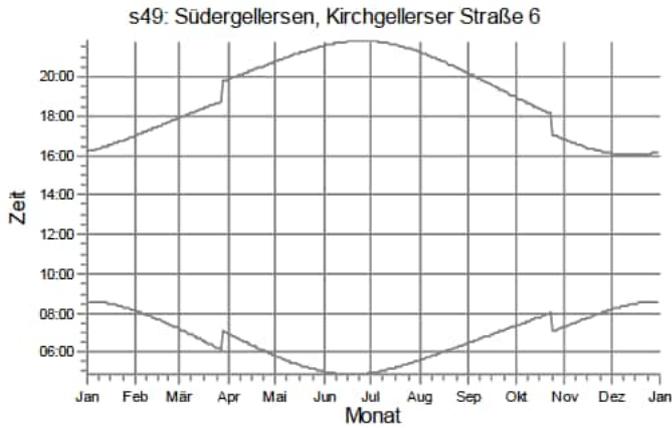
**Berechnung:** Zusatzbelastung Repowering 5x N175



WEA

## SHADOW - Grafischer Kalender

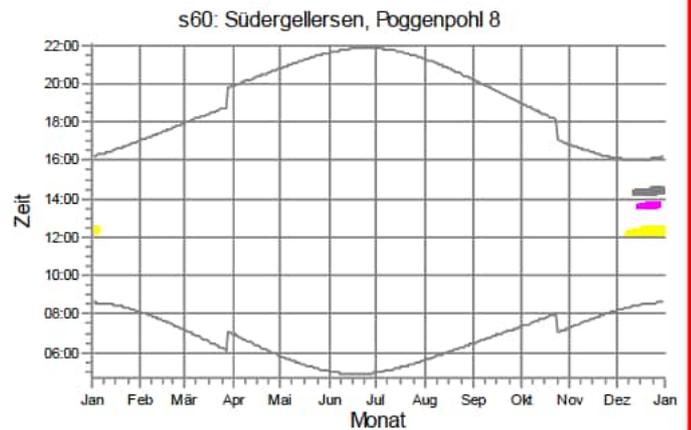
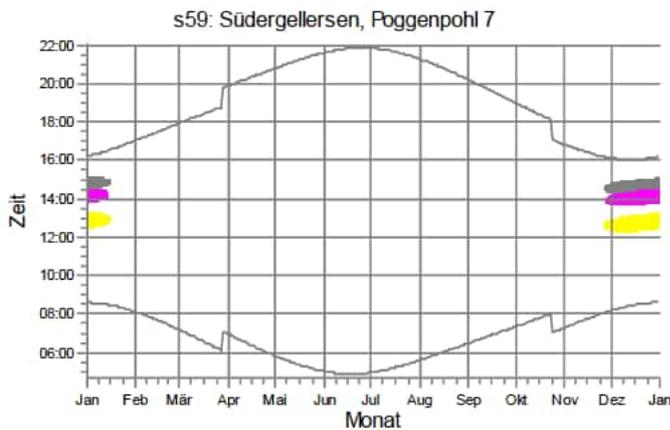
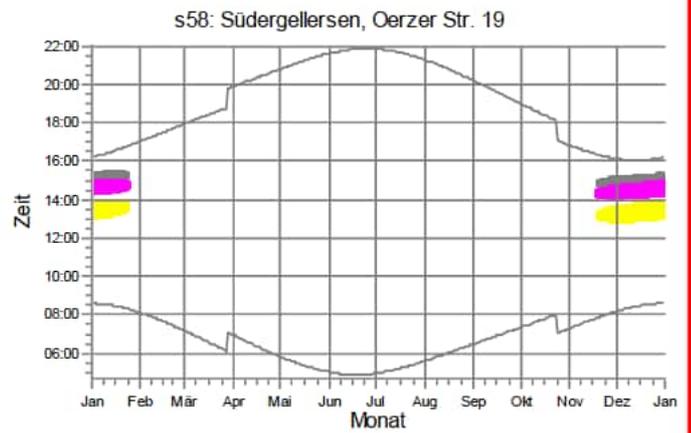
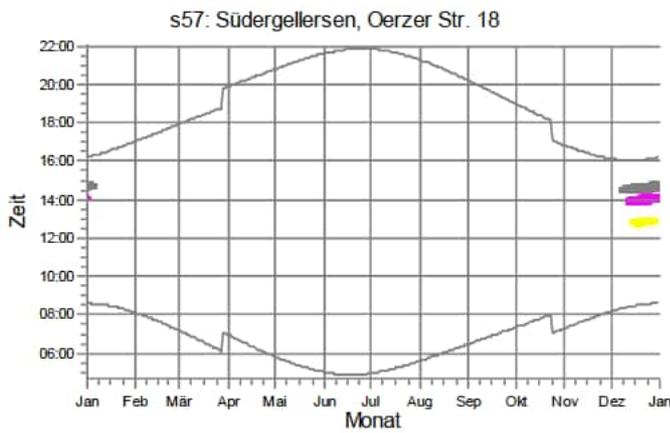
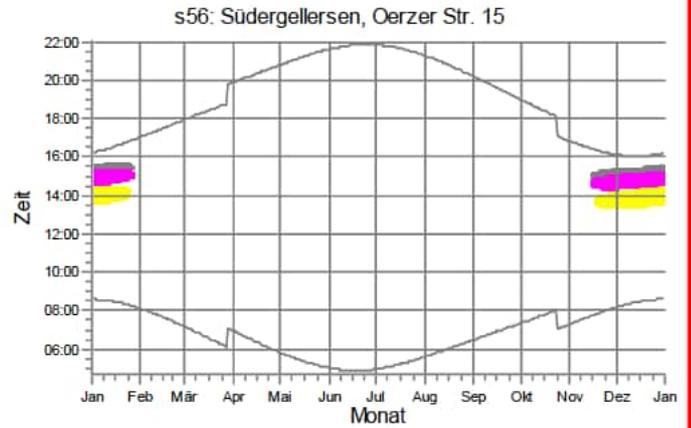
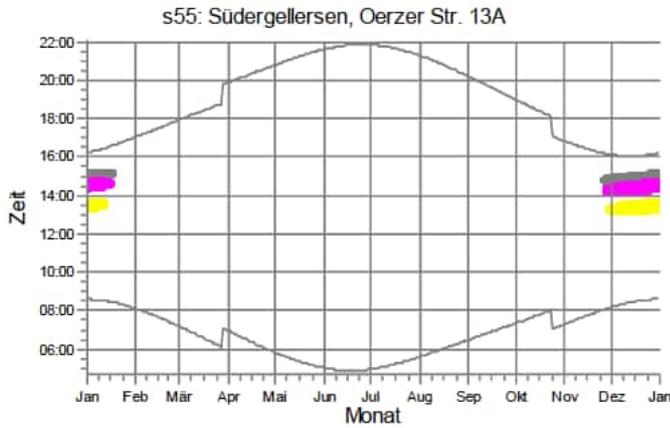
**Berechnung:** Zusatzbelastung Repowering 5x N175



WEA

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

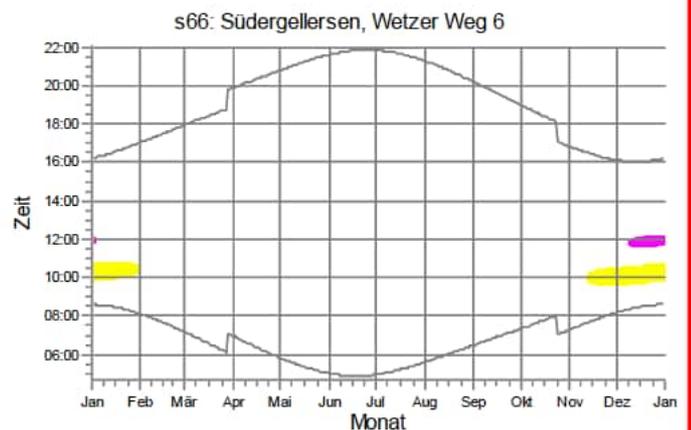
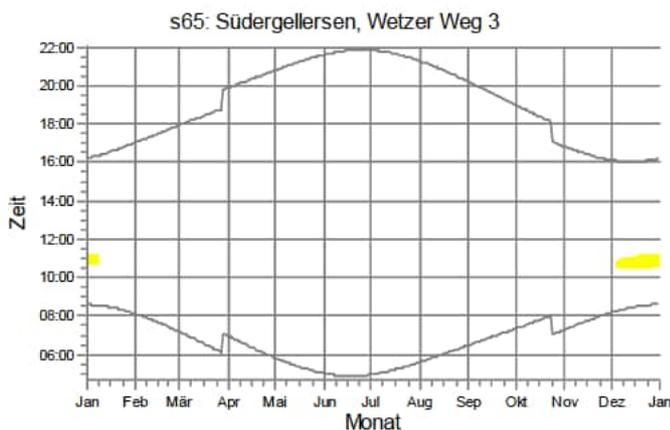
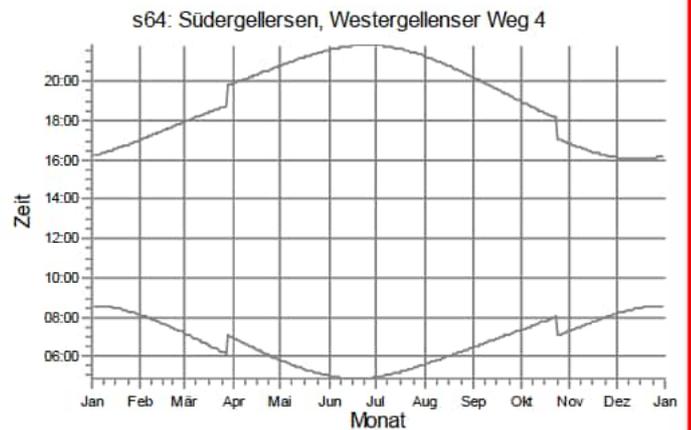
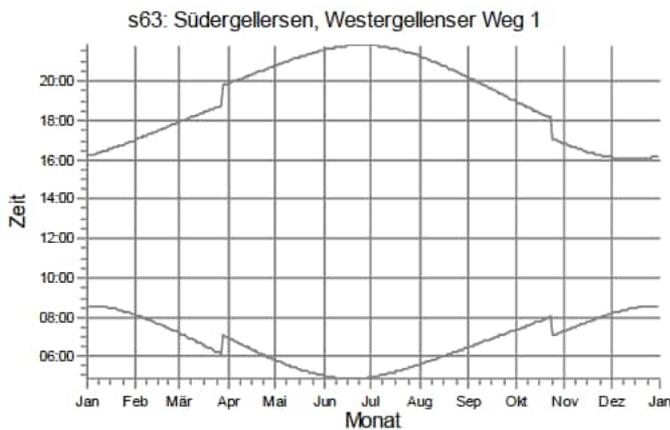
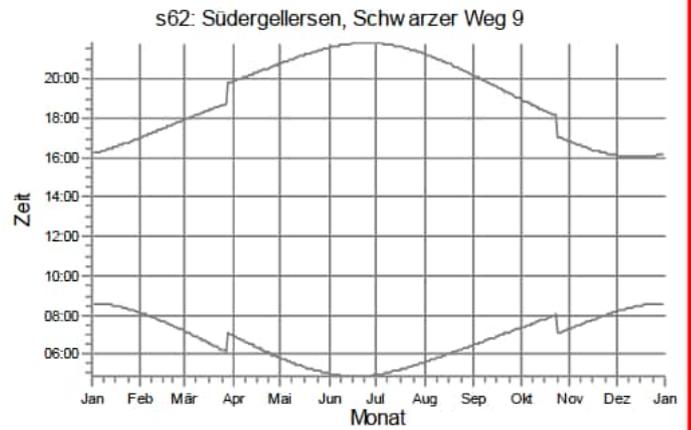
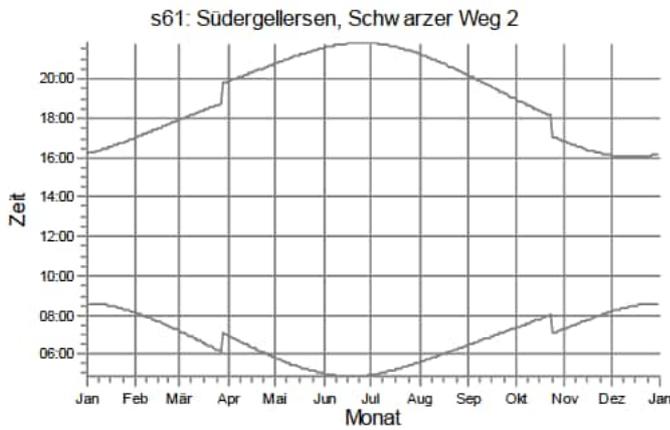


### WEA

- Rep 11: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (333)
- Rep 8: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (330)
- Rep 9: NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (331)

## SHADOW - Grafischer Kalender

**Berechnung:** Zusatzbelastung Repowering 5x N175

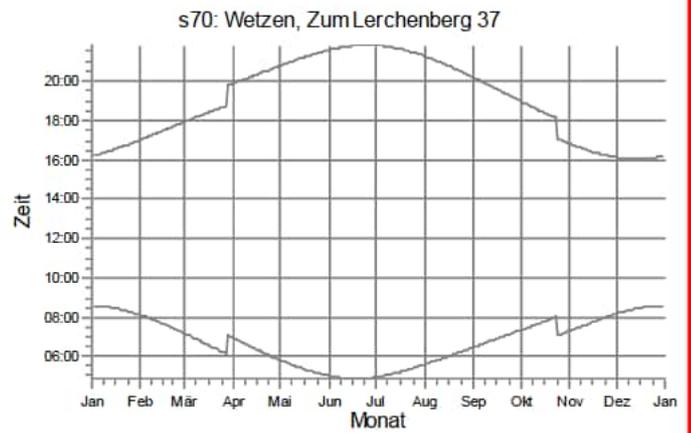
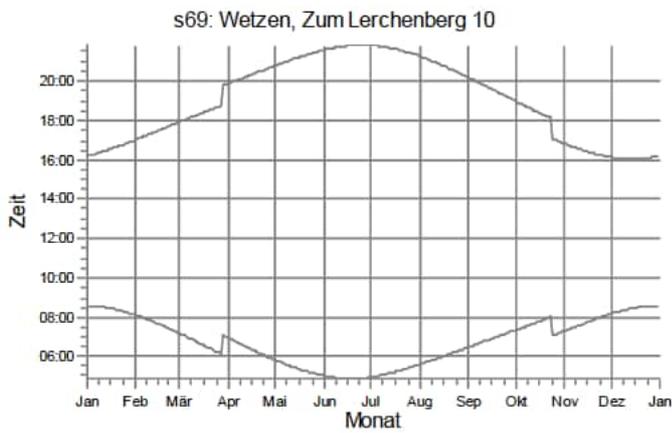
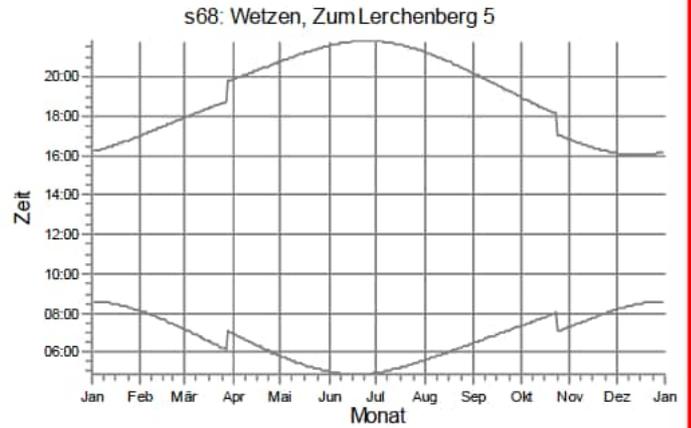
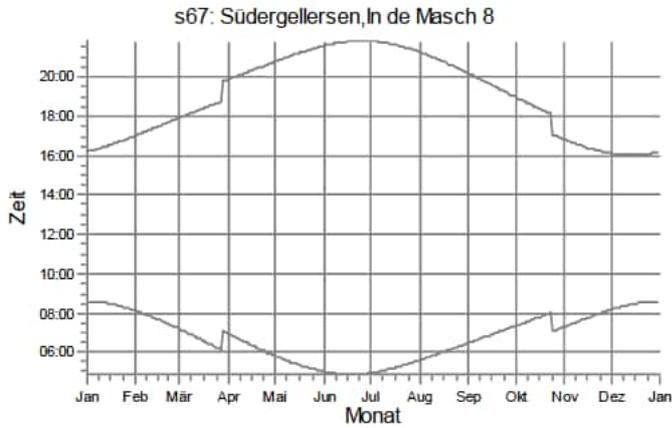


WEA

- Rep 11: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (333)
- Rep 9: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (331)

## SHADOW - Grafischer Kalender

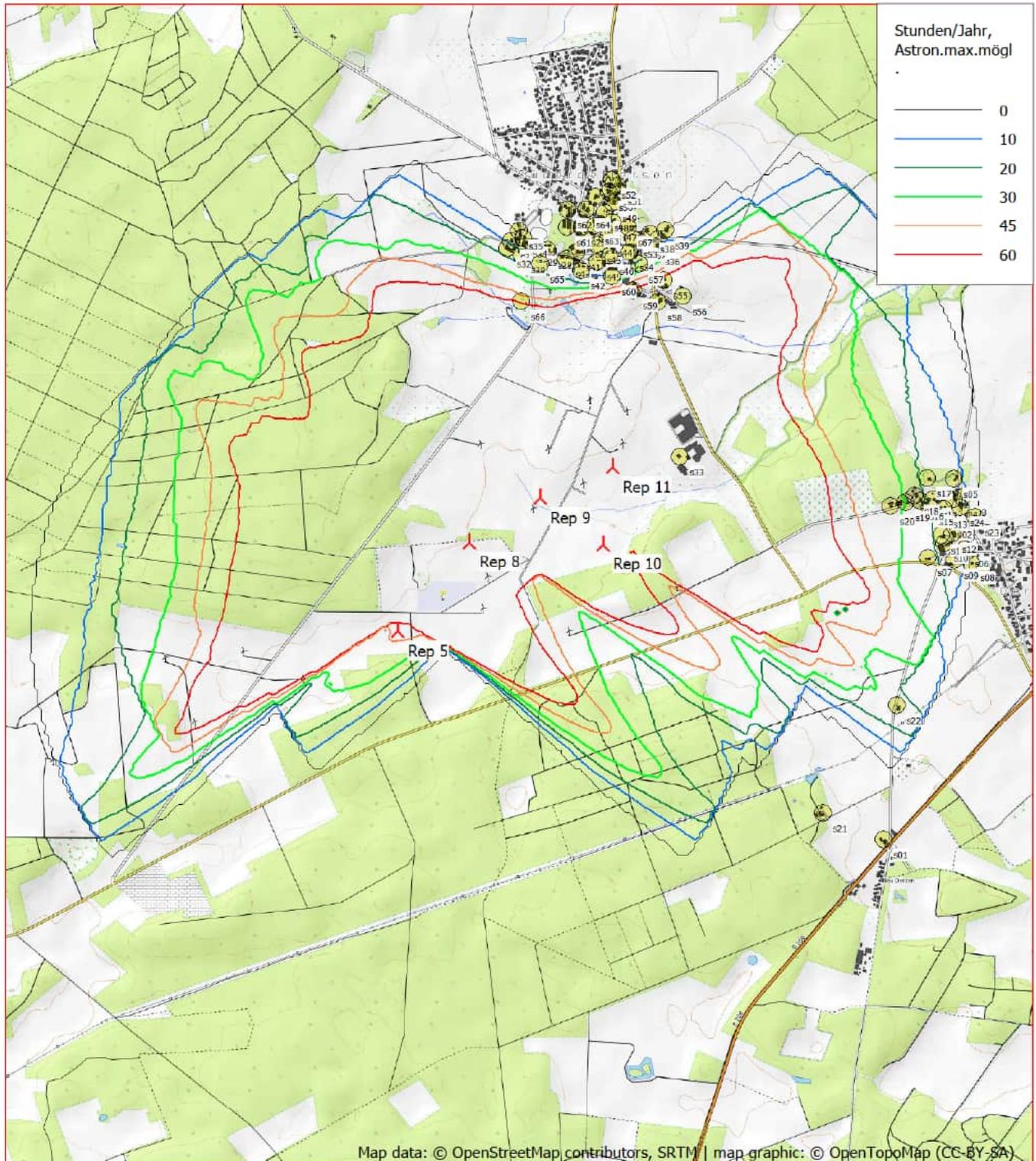
**Berechnung:** Zusatzbelastung Repowering 5x N175



WEA

## SHADOW - Karte

**Berechnung:** Zusatzbelastung Repowering 5x N175



0 500 1000 1500 2000 m

Karte: OpenTopoMap.org , Maßstab 1:30.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 586.120,0 Nord: 5.894.340,0

⚡ Neue WEA      📍 Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)

Zeitschritt: 2 Minuten, Schrittweite: 2 Tag(e), Kartenaufösung: 20 m, Sichtbarkeit Auflösung: 5 m, Augenhöhe: 1,5 m

## **Berechnung: Vorbelastung Repowering 18 Bestand**

Hauptergebnis	4 Seiten
Grafischer Kalender	12 Seiten
Karte	1 Seite

## SHADOW - Hauptergebnis

**Berechnung:** Vorbelastung Repowering 18 Bestand

### Annahmen für Schattenwurfberechnung

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

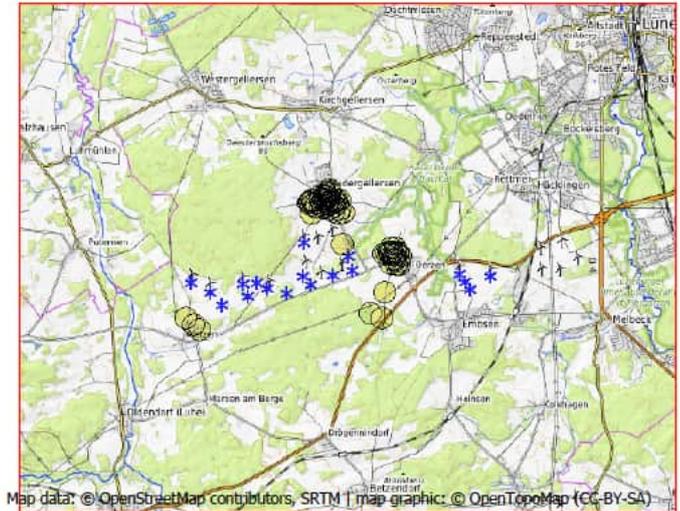
Minimale relevante Sonnenhöhe über Horizont 3 °  
Tage zwischen Berechnungen 1 Tag(e)  
Berechnungszeitsprung 1 Minuten

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

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

DHM: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)  
Rasterauflösung: 1,0 m

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



Map data: © OpenStreetMap contributors, SRTM | map graphic: © OpenTopoMap (CC-BY-SA)  
Maßstab 1:200.000  
\* Existierende WEA    Schattenrezeptor

### WEA

	Ost	Nord	Z	Beschreibung	WEA-Typ		Typ	Nennleistung	Rotor-durchmesser	NH	Schattendaten	
					Aktuell	Hersteller					Beschatt.-Bereich	U/min
			[m]					[kW]	[m]	[m]	[m]	[U/min]
B 01	585.971,6	5.895.090,6	50,0	NORDEX N1...	Ja	NORDEX	N149/4.0-4.5-4.500	4.500	149,0	125,0	1.822	10,7
B 02	585.959,5	5.894.188,5	45,0	NORDEX N1...	Ja	NORDEX	N131/3300 DE-3.300	3.300	131,0	134,0	1.722	10,9
B 03	585.020,8	5.893.835,6	50,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 04	584.733,6	5.893.984,8	50,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 05	584.375,7	5.893.950,2	55,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 06	584.497,2	5.893.629,8	56,7	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 07	583.821,9	5.893.385,7	64,4	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 08	583.491,9	5.893.713,6	60,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 09	582.991,2	5.893.966,5	55,0	GE WIND EN...	Nein	GE WIND ENERGY	GE 2.75-120-2.750	2.750	120,0	139,0	2.500	-
B 10	590.139,5	5.894.321,8	37,1	ENERCON E-...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 11	590.290,9	5.894.120,4	40,0	ENERCON E-...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 12	590.431,2	5.893.915,7	42,1	ENERCON E-...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
B 13	590.960,7	5.894.291,0	45,6	ENERCON E-...	Nein	ENERCON	E-66/18.70-1.800	1.800	70,0	65,0	1.487	22,0
Oerzen 1	587.151,9	5.894.746,2	45,6	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 2	587.284,9	5.894.361,9	40,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 3	586.751,2	5.894.214,7	49,2	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 4	586.171,4	5.893.951,1	50,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8
Oerzen 5	585.523,5	5.893.709,1	56,0	NORDEX N1...	Ja	NORDEX	N175/6.X-6.800	6.800	175,0	179,0	1.893	10,8

### Schattenrezeptor-Eingabe

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
s01	Neu Oerzen, Soltauer Straße 1	588.101,7	5.893.084,2	46,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s02	Oerzen, Am Ohfeld 1	588.404,8	5.894.762,2	45,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s03	Oerzen, Am Ohfeld 4	588.478,4	5.894.877,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s04	Oerzen, Am Ohfeld 9	588.431,5	5.894.865,5	40,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s05	Oerzen, Am Ohfeld 15	588.429,4	5.894.972,8	43,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s06	Oerzen, Im Dorfe 14	588.496,1	5.894.607,3	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s07	Oerzen, Im Dorfe 16	588.303,1	5.894.557,6	47,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s08	Oerzen, Im Dorfe 19	588.526,8	5.894.534,4	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s09	Oerzen, Im Dorfe 25	588.443,9	5.894.543,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s10	Oerzen, Westerheide 1	588.389,1	5.894.636,1	49,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s11	Oerzen, Westerheide 3	588.370,1	5.894.675,9	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s12	Oerzen, Westerheide 4	588.427,4	5.894.685,8	48,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s13	Oerzen, Westerheide 5	588.381,0	5.894.813,7	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0

(Fortsetzung nächste Seite)...

**SHADOW - Hauptergebnis****Berechnung: Vorbelastung Repowering 18 Bestand**

...(Fortsetzung von vorheriger Seite)

Nr.	Name	Ost	Nord	Z	Breite	Höhe	Höhe ü.Gr.	Neigung des Fensters	Ausrichtungsmodus	Augenhöhe (ZVI) ü.Gr.
				[m]	[m]	[m]	[m]	[°]		[m]
s14	Oerzen, Westerheide 12A	588.325,0	5.894.865,9	42,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s15	Oerzen, Westerheide 12C	588.306,5	5.894.823,7	44,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s16	Oerzen, Westerheide 18	588.256,0	5.894.856,0	45,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s17	Oerzen, Westerheide 19	588.291,4	5.894.974,5	48,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s18	Oerzen, Westerheide 20	588.229,9	5.894.881,8	47,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s19	Oerzen, Westerheide 22	588.185,2	5.894.847,2	46,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s20	Oerzen, Westerheide 28	588.102,7	5.894.825,3	47,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s21	Oerzen, Zum Hasel 5	587.786,3	5.893.215,0	57,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s22	Oerzen, Zum Hasel 10	588.158,0	5.893.781,7	45,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s23	Oerzen,Mühlenweg 10	588.545,4	5.894.776,2	44,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s24	Oerzen,Mühlenweg 18	588.468,7	5.894.823,3	42,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s25	Südergellersen, Auf dem Brink 6	586.477,5	5.896.246,7	67,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s26	Südergellersen, Auf dem Brink 7	586.498,2	5.896.189,4	65,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s27	Südergellersen, Birkenweg 7	586.547,8	5.896.410,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s28	Südergellersen, Forstweg 4	586.302,3	5.896.127,2	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s29	Südergellersen, Forstweg 8	586.230,1	5.896.140,7	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s30	Südergellersen, Forstweg 11	586.166,4	5.896.101,6	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s31	Südergellersen, Forstweg 16	586.112,1	5.896.167,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s32	Südergellersen, Forstweg 17	586.094,1	5.896.128,7	62,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s33	Südergellersen, Gewerbegebiet	587.007,3	5.895.062,8	43,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s34	Südergellersen, Heidberg 2	586.177,4	5.896.183,9	66,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s35	Südergellersen, Heidberg 3	586.154,2	5.896.223,0	66,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s36	Südergellersen, Heiligenthaler Weg 2	586.863,9	5.896.155,5	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s37	Südergellersen, Heiligenthaler Weg 3	586.792,8	5.896.190,0	58,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s38	Südergellersen, Heiligenthaler Weg 3c	586.833,1	5.896.217,7	58,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s39	Südergellersen, Heiligenthaler Weg 11	586.911,1	5.896.239,1	52,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s40	Südergellersen, Im Alten Dorfe 2	586.402,6	5.896.082,0	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s41	Südergellersen, Im Alten Dorfe 3	586.453,7	5.896.115,5	65,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s42	Südergellersen, Im Alten Dorfe 4	586.480,0	5.896.021,4	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s43	Südergellersen, Im Alten Dorfe 5	586.561,2	5.896.156,3	63,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s44	Südergellersen, Im Alten Dorfe 7	586.616,6	5.896.197,1	62,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s45	Südergellersen, Im Alten Dorfe 8	586.561,9	5.896.067,6	60,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s46	Südergellersen, Im Alten Dorfe 10A	586.625,5	5.896.101,5	60,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s47	Südergellersen, Kirchgellerser Straße 2	586.638,0	5.896.277,9	62,7	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s48	Südergellersen, Kirchgellerser Straße 3	586.594,8	5.896.327,3	63,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s49	Südergellersen, Kirchgellerser Straße 6	586.637,2	5.896.375,2	63,6	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s50	Südergellersen, Kirchgellerser Straße 9	586.617,5	5.896.432,1	64,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s51	Südergellersen, Kirchgellerser Straße 10	586.660,0	5.896.465,5	63,2	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s52	Südergellersen, Kirchgellerser Straße 13	586.632,2	5.896.499,1	64,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s53	Südergellersen, Kirchgellerser Straße 15	586.747,3	5.896.191,6	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s54	Südergellersen, Kirchgellerser Straße 16	586.731,0	5.896.121,0	59,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s55	Südergellersen, Oerzer Str. 13A	586.909,5	5.895.981,7	53,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s56	Südergellersen, Oerzer Str. 15	587.010,6	5.895.899,8	50,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s57	Südergellersen, Oerzer Str. 18	586.781,3	5.896.062,2	56,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s58	Südergellersen, Oerzer Str. 19	586.879,7	5.895.864,2	49,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s59	Südergellersen, Poggenpohl 7	586.751,1	5.895.922,0	55,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s60	Südergellersen, Poggenpohl 8	586.640,6	5.895.995,8	58,5	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s61	Südergellersen, Schwarzer Weg 2	586.403,0	5.896.246,5	71,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s62	Südergellersen, Schwarzer Weg 9	586.404,8	5.896.338,8	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s63	Südergellersen, Westergellerser Weg 1	586.545,3	5.896.256,4	63,9	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s64	Südergellersen, Westergellerser Weg 4	586.498,9	5.896.338,8	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s65	Südergellersen, Wetzzer Weg 3	586.268,4	5.896.052,0	63,3	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s66	Südergellersen, Wetzzer Weg 6	586.172,4	5.895.854,5	57,8	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s67	Südergellersen, In de Masch 8	586.717,4	5.896.250,8	61,1	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s68	Wetzen, Zum Lerchenberg 5	583.085,3	5.892.839,1	65,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s69	Wetzen, Zum Lerchenberg 10	583.242,4	5.892.711,0	60,0	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0
s70	Wetzen, Zum Lerchenberg 37	582.866,7	5.892.994,9	69,4	0,1	0,1	2,0	0,0	"Gewächshaus-Modus"	2,0

## SHADOW - Hauptergebnis

**Berechnung:** Vorbelastung Repowering 18 Bestand

### Berechnungsergebnisse

Schattenrezeptor

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr [h/a]	Schattentage/Jahr [d/a]	Max.Schattendauer/Tag [h/d]
s01	Neu Oerzen, Soltauer Straße 1	0:00	0	0:00
s02	Oerzen, Am Ohfeld 1	38:32	85	0:38
s03	Oerzen, Am Ohfeld 4	34:15	78	0:38
s04	Oerzen, Am Ohfeld 9	37:04	82	0:41
s05	Oerzen, Am Ohfeld 15	38:01	81	0:44
s06	Oerzen, Im Dorfe 14	35:16	89	0:32
s07	Oerzen, Im Dorfe 16	51:06	109	0:39
s08	Oerzen, Im Dorfe 19	35:44	92	0:32
s09	Oerzen, Im Dorfe 25	40:22	98	0:34
s10	Oerzen, Westerheide 1	40:59	95	0:35
s11	Oerzen, Westerheide 3	41:31	93	0:35
s12	Oerzen, Westerheide 4	37:23	87	0:33
s13	Oerzen, Westerheide 5	40:17	87	0:41
s14	Oerzen, Westerheide 12A	44:42	88	0:46
s15	Oerzen, Westerheide 12C	46:09	91	0:45
s16	Oerzen, Westerheide 18	50:58	94	0:49
s17	Oerzen, Westerheide 19	48:29	91	0:51
s18	Oerzen, Westerheide 20	53:49	96	0:52
s19	Oerzen, Westerheide 22	58:29	101	0:54
s20	Oerzen, Westerheide 28	69:53	112	1:00
s21	Oerzen, Zum Hasel 5	16:16	55	0:24
s22	Oerzen, Zum Hasel 10	23:07	72	0:28
s23	Oerzen, Mühlenweg 10	30:40	77	0:32
s24	Oerzen, Mühlenweg 18	34:27	79	0:38
s25	Südergellersen, Auf dem Brink 6	0:00	0	0:00
s26	Südergellersen, Auf dem Brink 7	0:00	0	0:00
s27	Südergellersen, Birkenweg 7	0:00	0	0:00
s28	Südergellersen, Forstweg 4	5:50	26	0:17
s29	Südergellersen, Forstweg 8	8:47	32	0:20
s30	Südergellersen, Forstweg 11	15:37	46	0:25
s31	Südergellersen, Forstweg 16	13:01	42	0:23
s32	Südergellersen, Forstweg 17	16:45	48	0:25
s33	Südergellersen, Gewerbegebiet	359:00	239	2:14
s34	Südergellersen, Heidberg 2	7:45	31	0:19
s35	Südergellersen, Heidberg 3	5:56	27	0:17
s36	Südergellersen, Heiligenthaler Weg 2	24:45	64	0:27
s37	Südergellersen, Heiligenthaler Weg 3	19:41	52	0:27
s38	Südergellersen, Heiligenthaler Weg 3c	19:25	52	0:26
s39	Südergellersen, Heiligenthaler Weg 11	21:43	60	0:25
s40	Südergellersen, Im Alten Dorfe 2	3:43	20	0:14
s41	Südergellersen, Im Alten Dorfe 3	0:00	0	0:00
s42	Südergellersen, Im Alten Dorfe 4	21:56	42	0:46
s43	Südergellersen, Im Alten Dorfe 5	4:40	22	0:16
s44	Südergellersen, Im Alten Dorfe 7	5:15	24	0:16
s45	Südergellersen, Im Alten Dorfe 8	17:07	44	0:29
s46	Südergellersen, Im Alten Dorfe 10A	18:07	46	0:29
s47	Südergellersen, Kirchgellerser Straße 2	0:00	0	0:00
s48	Südergellersen, Kirchgellerser Straße 3	0:00	0	0:00
s49	Südergellersen, Kirchgellerser Straße 6	0:00	0	0:00
s50	Südergellersen, Kirchgellerser Straße 9	0:00	0	0:00
s51	Südergellersen, Kirchgellerser Straße 10	0:00	0	0:00
s52	Südergellersen, Kirchgellerser Straße 13	0:00	0	0:00
s53	Südergellersen, Kirchgellerser Straße 15	16:39	46	0:26
s54	Südergellersen, Kirchgellerser Straße 16	22:55	56	0:29
s55	Südergellersen, Oerzer Str. 13A	18:12	56	0:28
s56	Südergellersen, Oerzer Str. 15	14:00	44	0:27
s57	Südergellersen, Oerzer Str. 18	29:43	70	0:29
s58	Südergellersen, Oerzer Str. 19	22:46	71	0:30
s59	Südergellersen, Poggenpohl 7	31:40	88	0:32
s60	Südergellersen, Poggenpohl 8	31:47	66	0:33
s61	Südergellersen, Schwarzer Weg 2	0:00	0	0:00
s62	Südergellersen, Schwarzer Weg 9	0:00	0	0:00

(Fortsetzung nächste Seite)...

## SHADOW - Hauptergebnis

### Berechnung: Vorbelastung Repowering 18 Bestand

...(Fortsetzung von vorheriger Seite)

Nr.	Name	astron. max. mögl. Beschattungsdauer		
		Stunden/Jahr [h/a]	Schattentage/Jahr [d/a]	Max.Schattendauer/Tag [h/d]
s63	Südergellersen, Westergellenser Weg 1	0:00	0	0:00
s64	Südergellersen, Westergellenser Weg 4	0:00	0	0:00
s65	Südergellersen, Wetzer Weg 3	14:45	44	0:25
s66	Südergellersen, Wetzer Weg 6	58:08	76	1:14
s67	Südergellersen, In de Masch 8	8:07	31	0:20
s68	Wetzen, Zum Lerchenberg 5	20:25	89	0:19
s69	Wetzen, Zum Lerchenberg 10	13:47	66	0:18
s70	Wetzen, Zum Lerchenberg 37	35:54	103	0:40

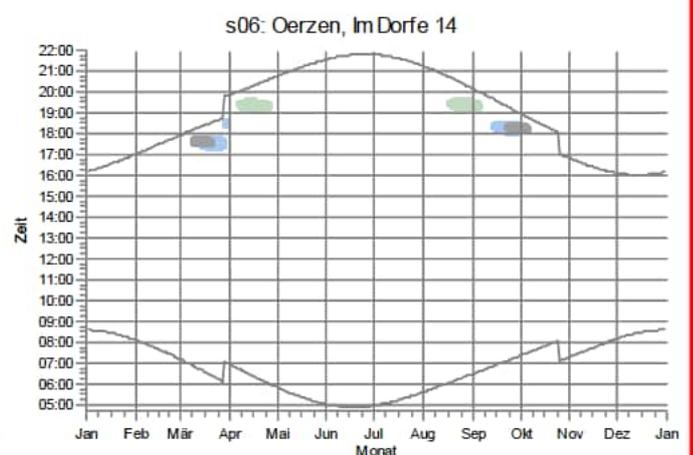
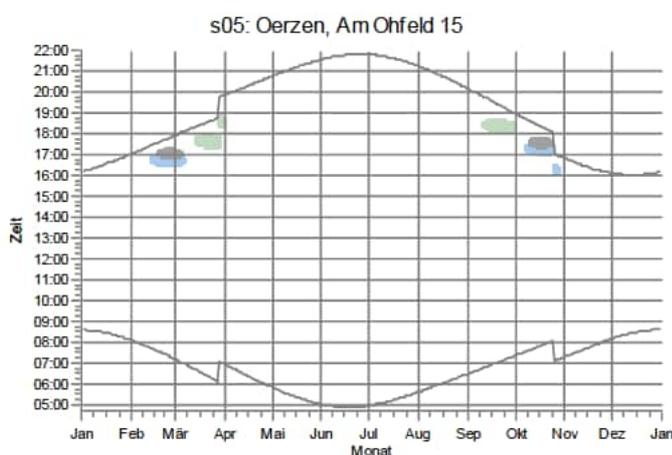
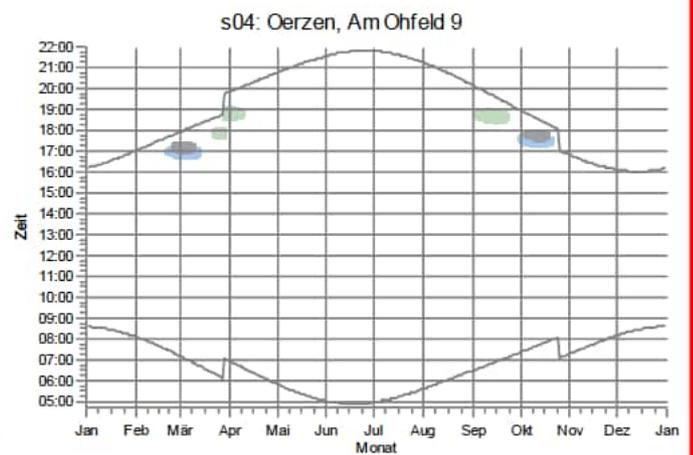
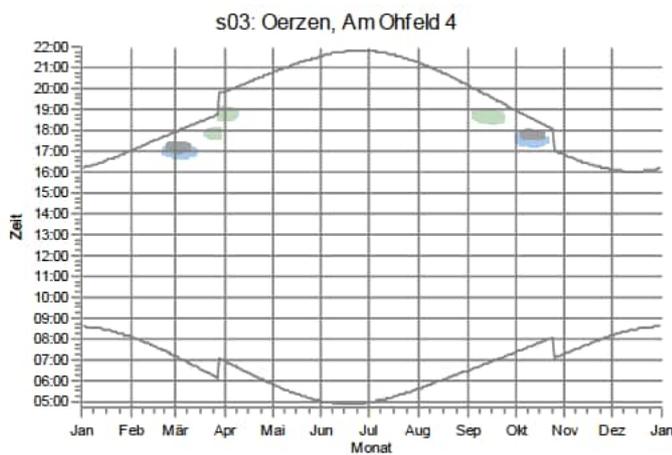
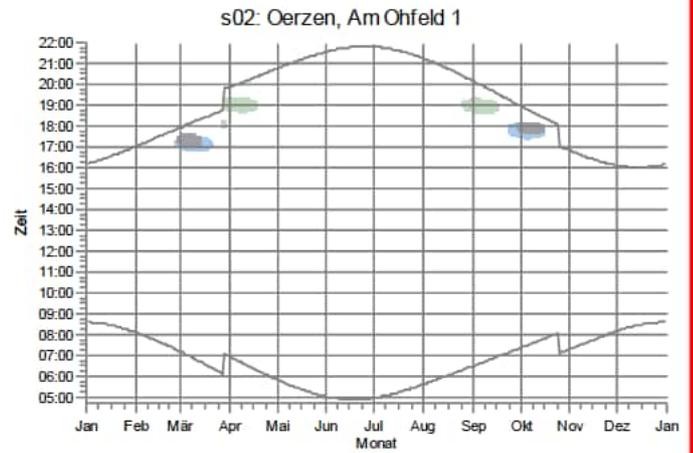
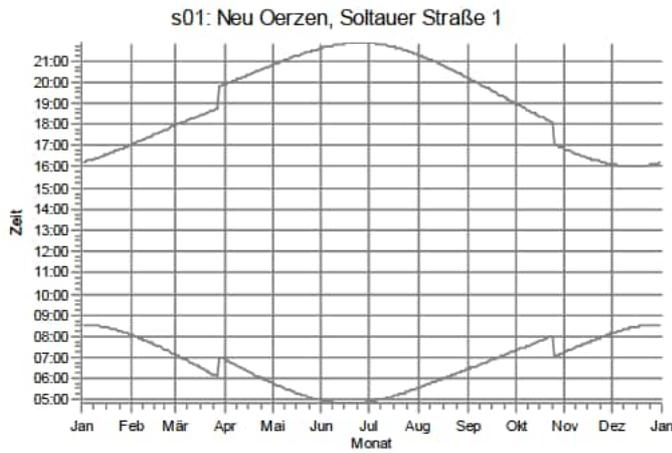
#### Gesamtdauer Beschattung an Rezeptoren pro WEA

Nr.	Name	Maximal [h/a]
B 01	NORDEX N149/4.0-4.5 4500 149.0 !O! NH: 125,0 m (Ges:199,5 m) (101)	142:41
B 02	NORDEX N131/3300 DE 3300 131.0 !-! NH: 134,0 m (Ges:199,5 m) (120)	11:43
B 03	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (94)	11:18
B 04	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (95)	12:12
B 05	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (96)	10:15
B 06	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (97)	23:02
B 07	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (98)	20:35
B 08	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (99)	0:00
B 09	GE WIND ENERGY GE 2.75-120 2750 120.0 !O! NH: 139,0 m (Ges:199,0 m) (100)	0:00
B 10	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (103)	0:00
B 11	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (104)	0:00
B 12	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (105)	0:00
B 13	ENERCON E-66/18.70 1800 70.0 !O! NH: 65,0 m (Ges:100,0 m) (106)	0:00
Oerzen 1	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (79)	331:00
Oerzen 2	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (80)	194:07
Oerzen 3	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (81)	115:16
Oerzen 4	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (82)	50:45
Oerzen 5	NORDEX N175/6.X 6800 175.0 !-! NH: 179,0 m (Ges:266,5 m) (83)	0:00

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

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



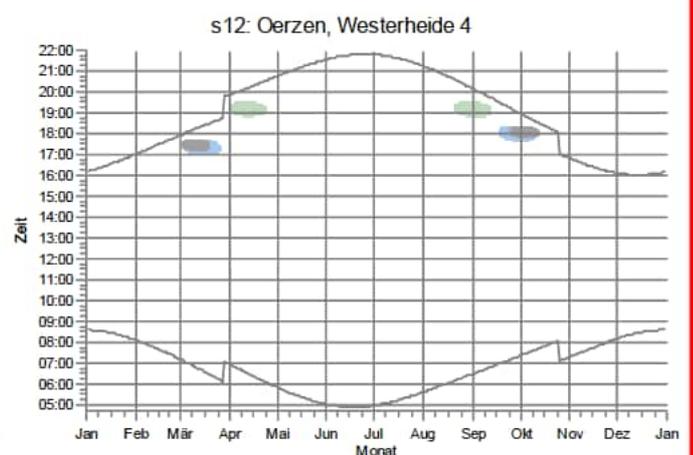
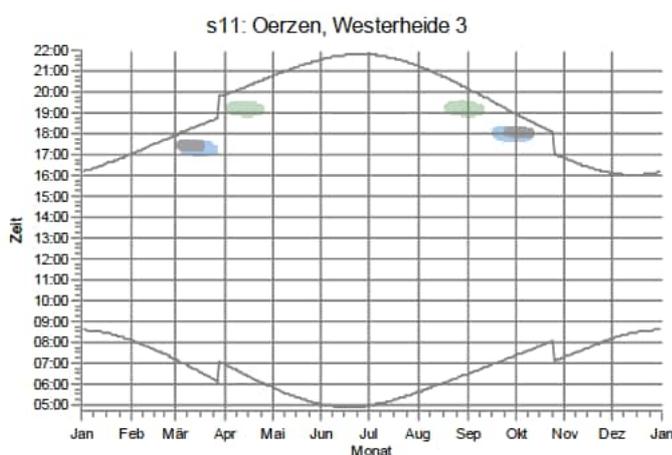
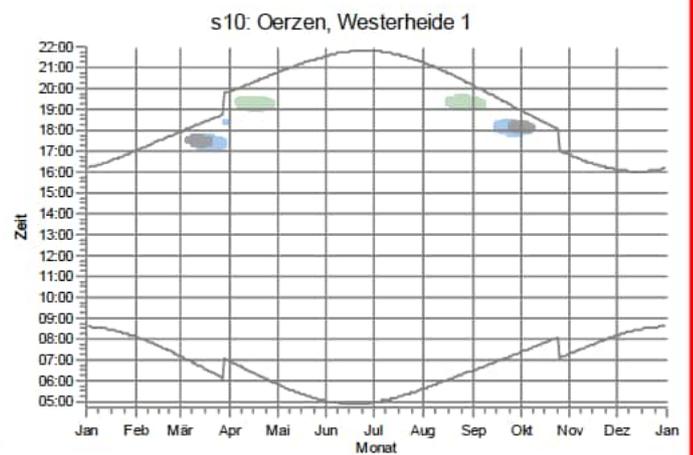
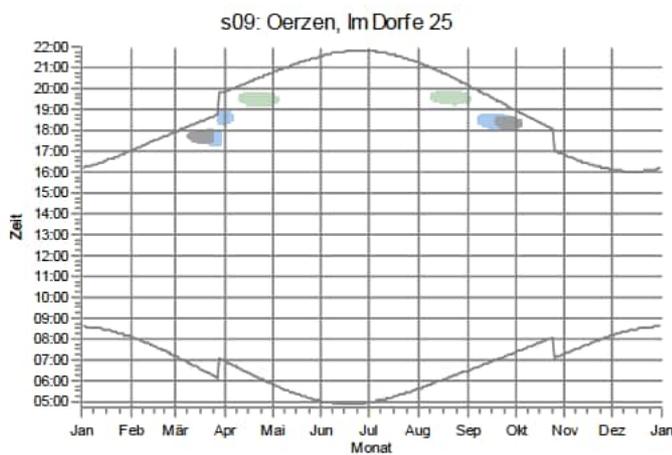
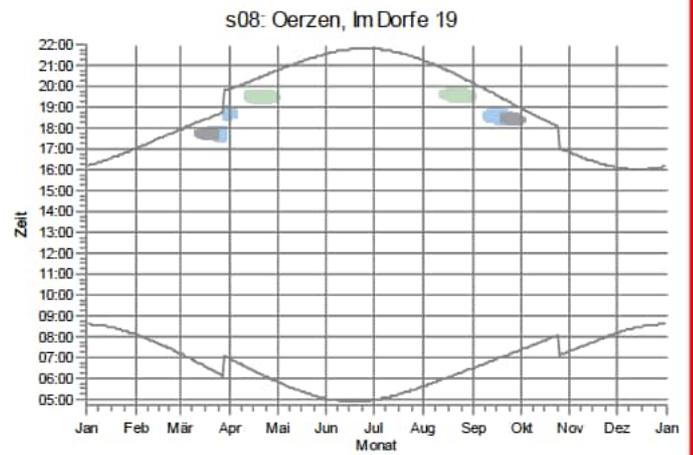
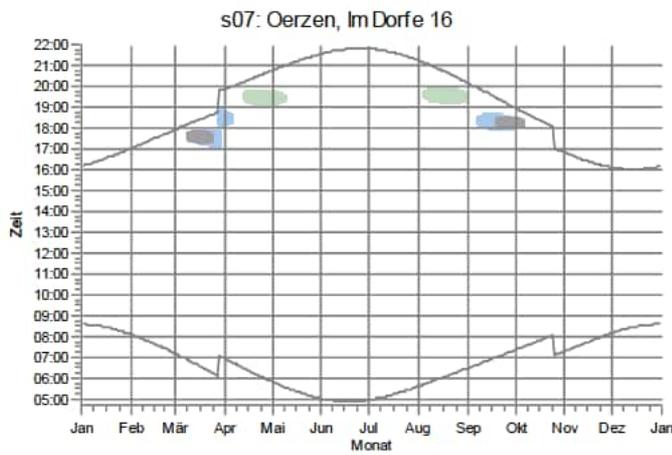
WEA

Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)  
 Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)

Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



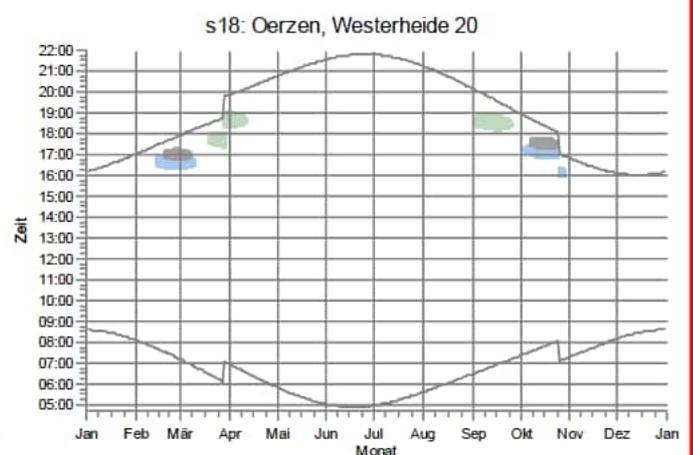
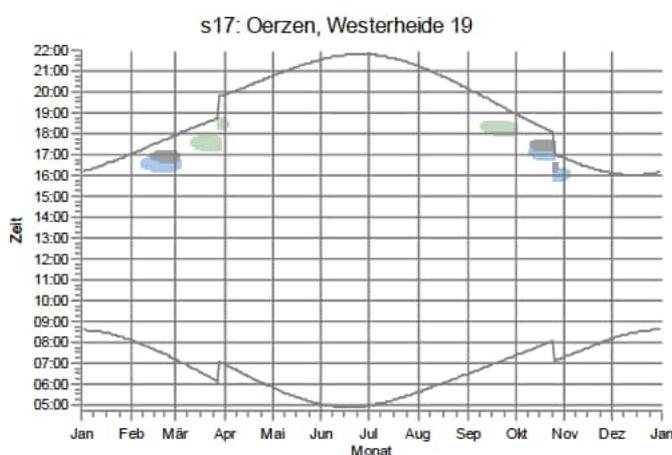
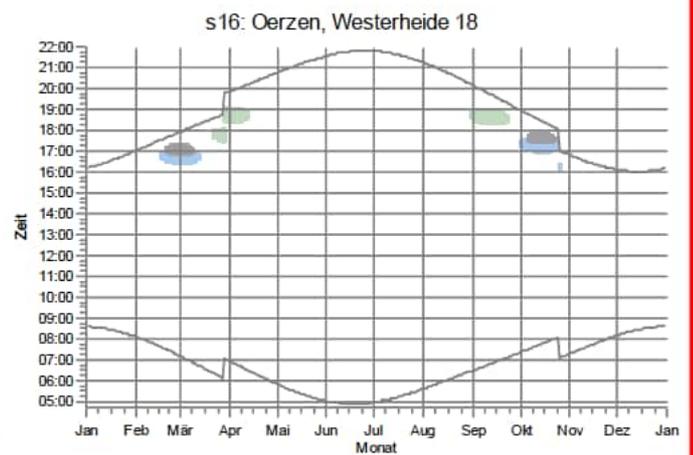
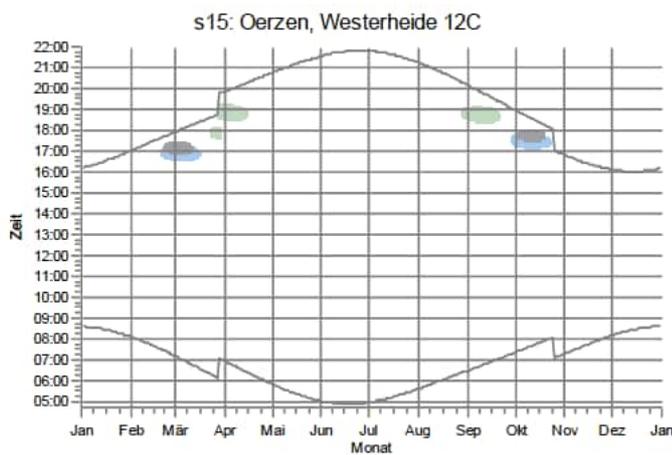
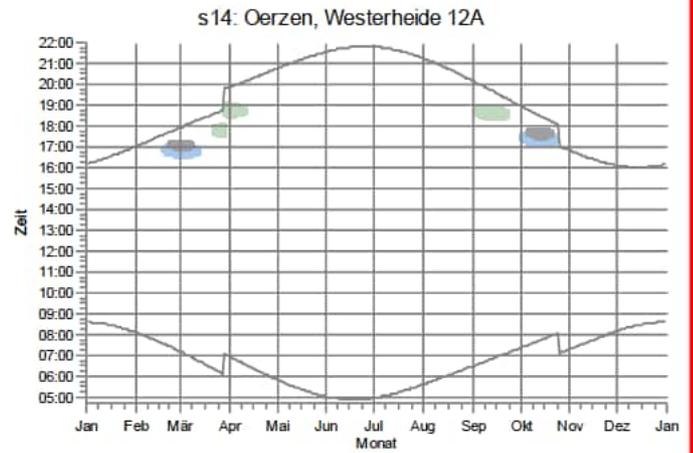
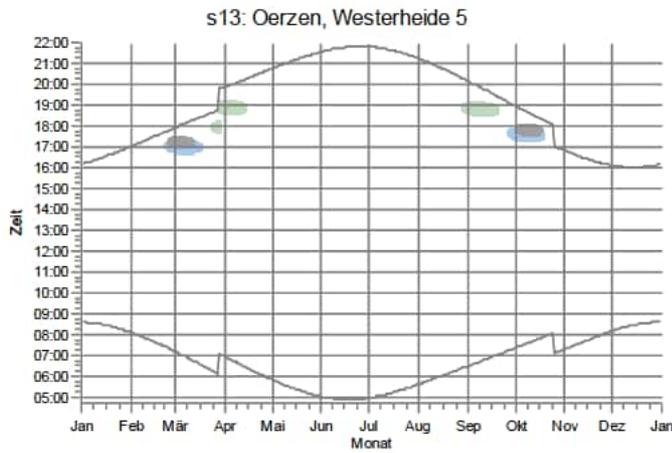
WEA

- Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)
- Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)

- Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



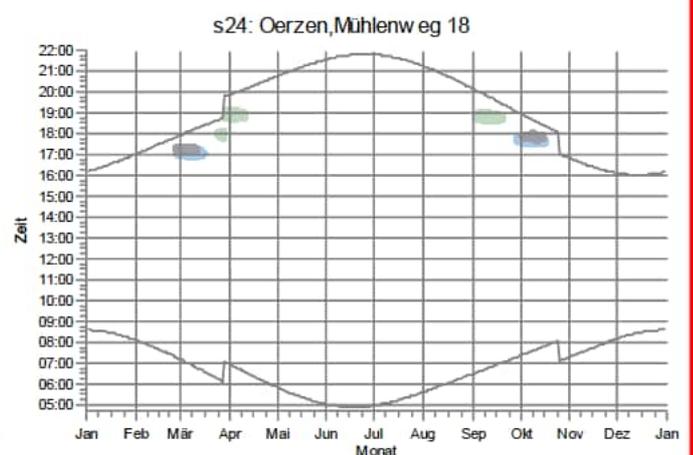
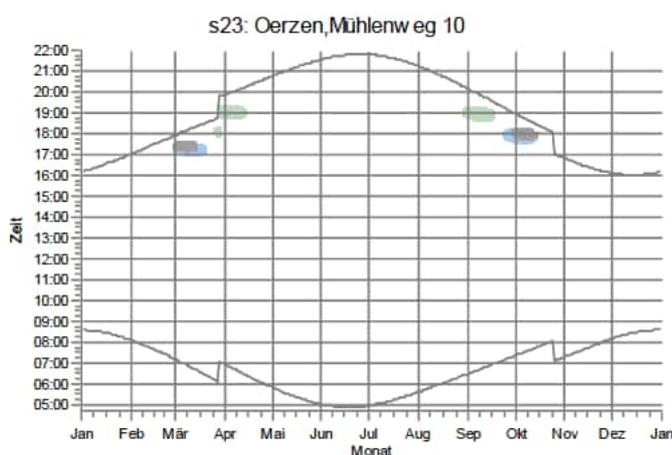
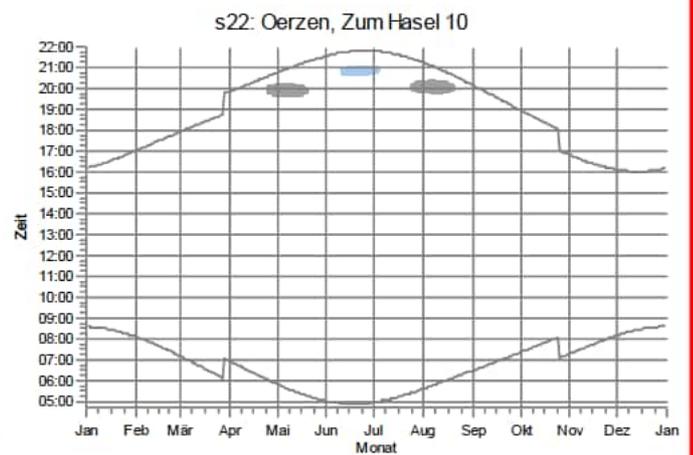
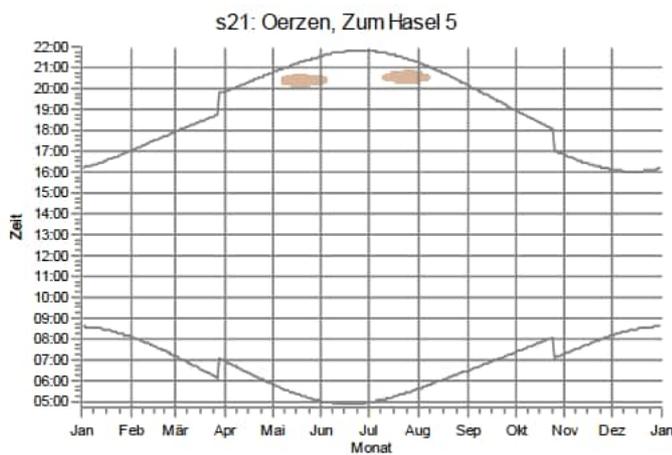
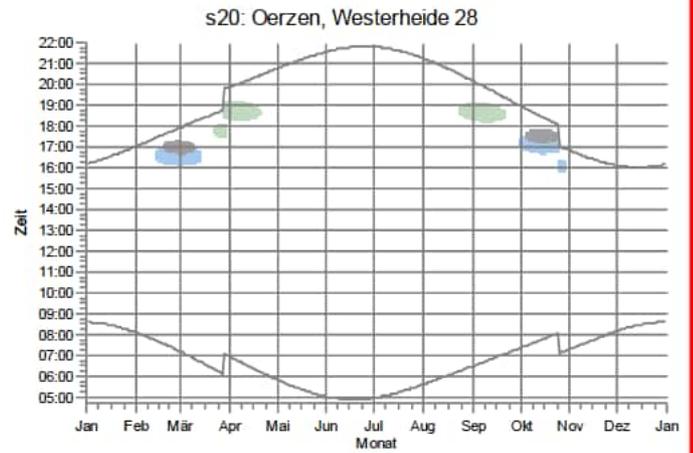
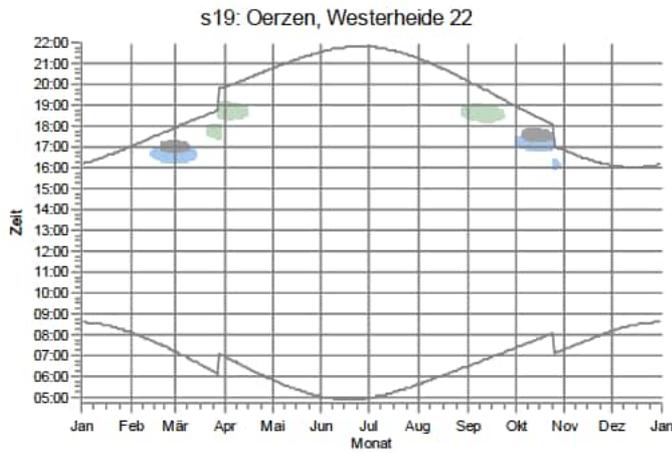
WEA

- Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)
- Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)

- Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



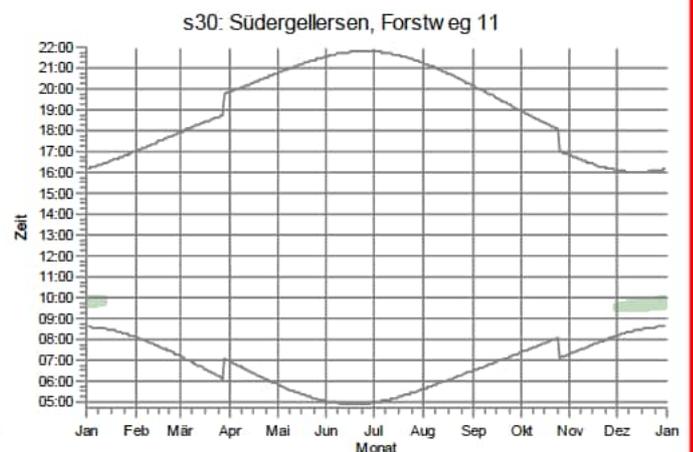
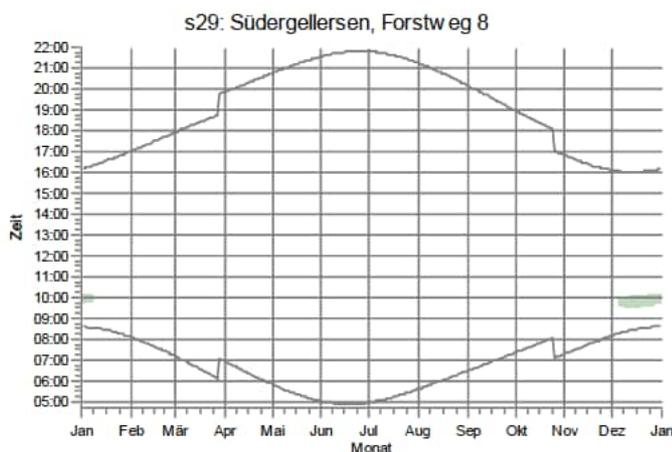
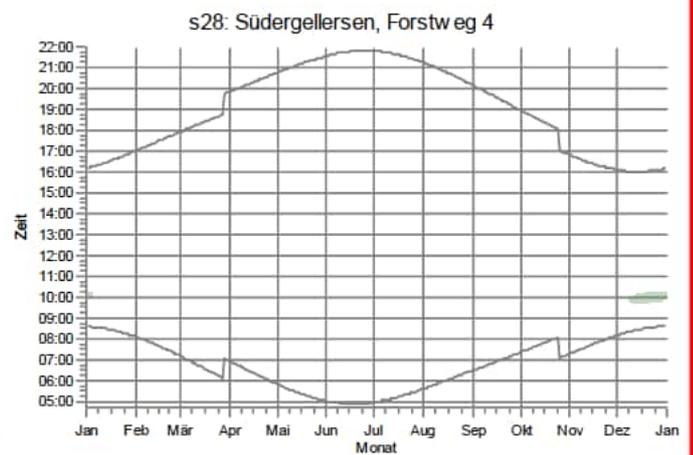
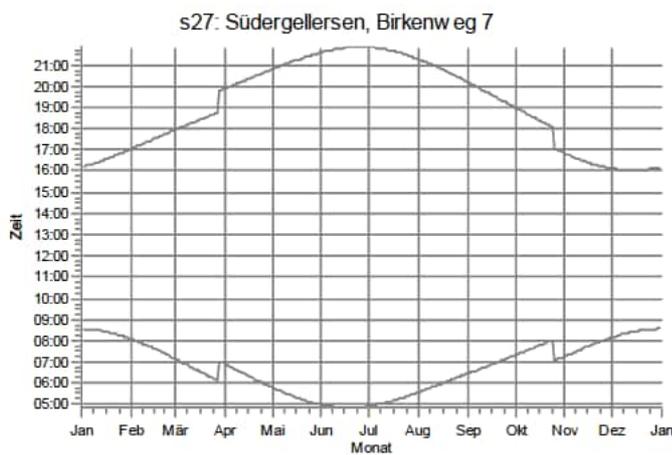
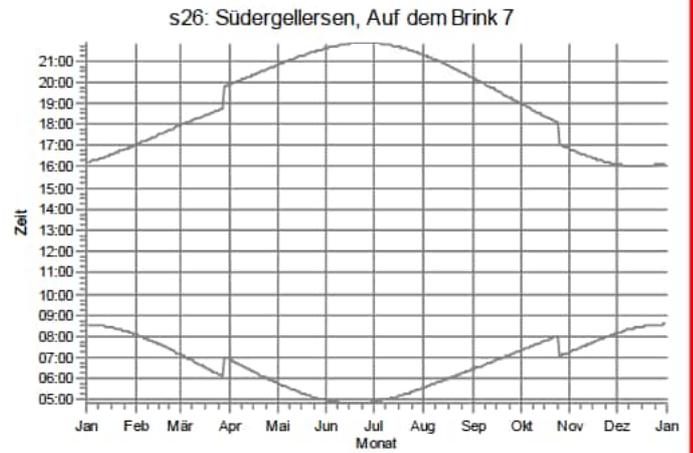
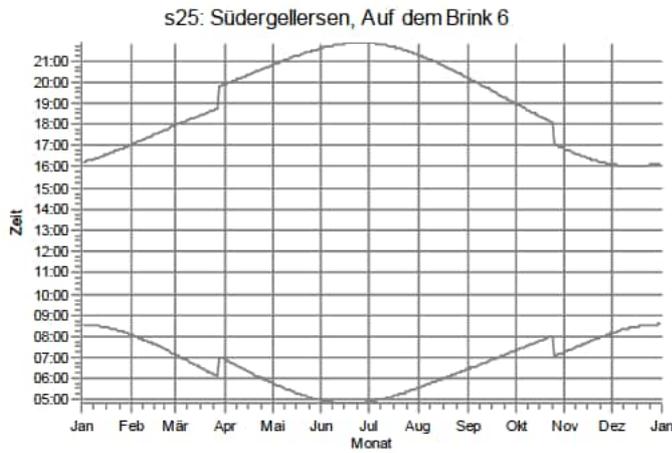
WEA

Oerzen 1: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (79)  
 Oerzen 2: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (80)

Oerzen 3: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (81)  
 Oerzen 4: NORDEX N175/6.X 6800 175.0 I-I NH: 179,0 m (Ges:266,5 m) (82)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand

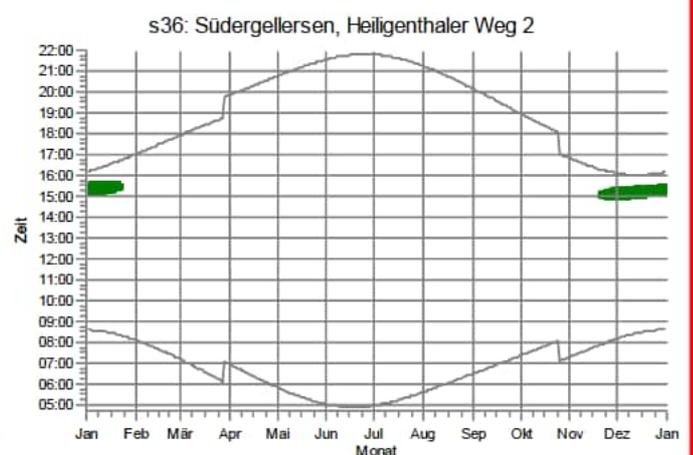
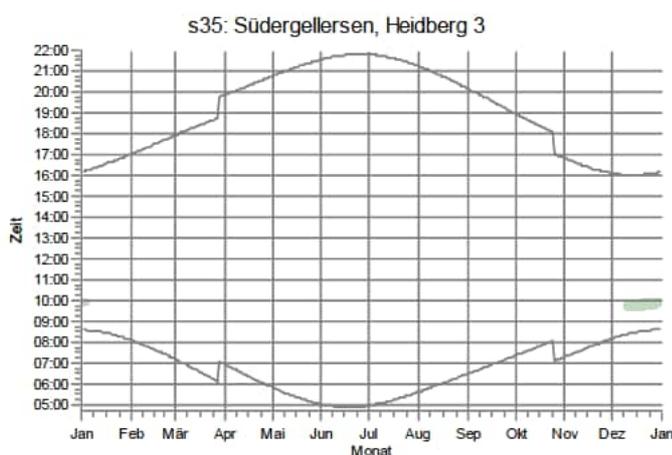
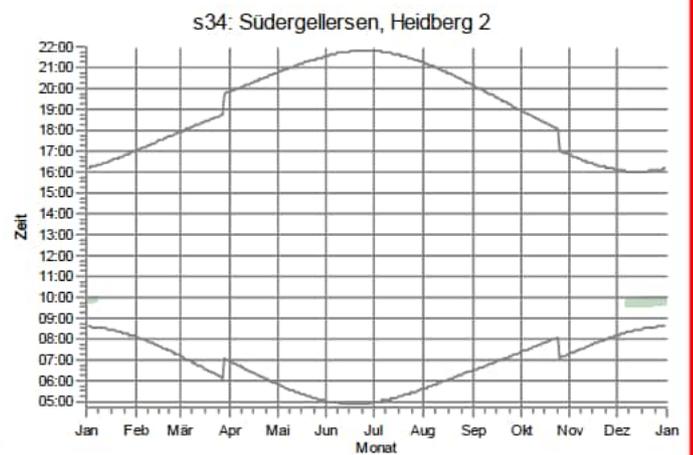
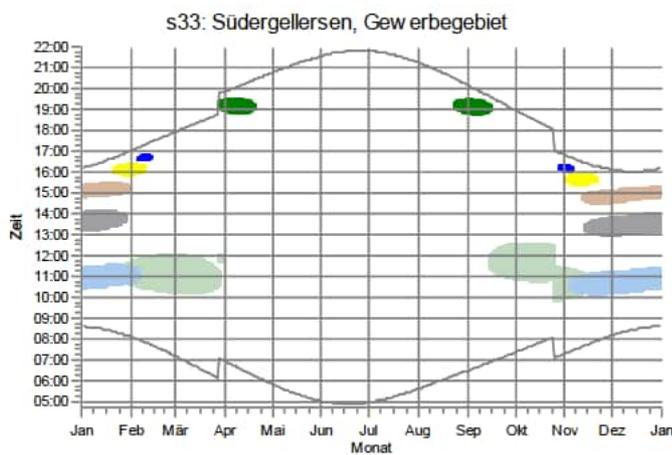
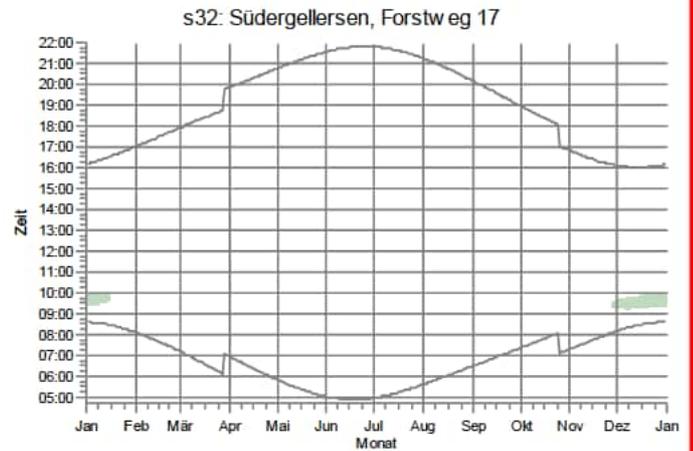
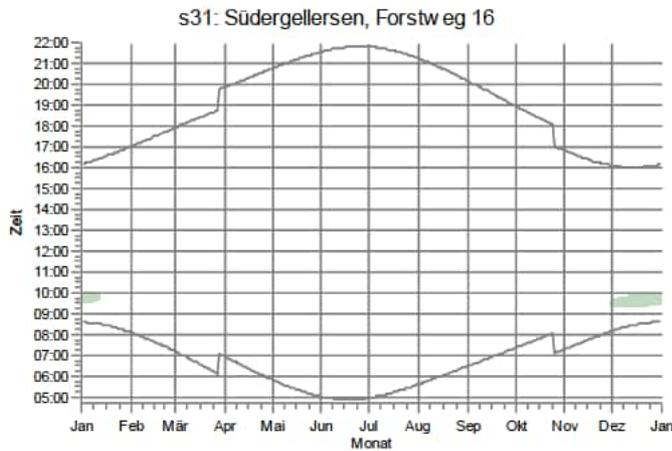


WEA

Oerzen 1: NORDEX N175/6,X 6800 175,0 I-I NH: 179,0 m (Ges:266,5 m) (79)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



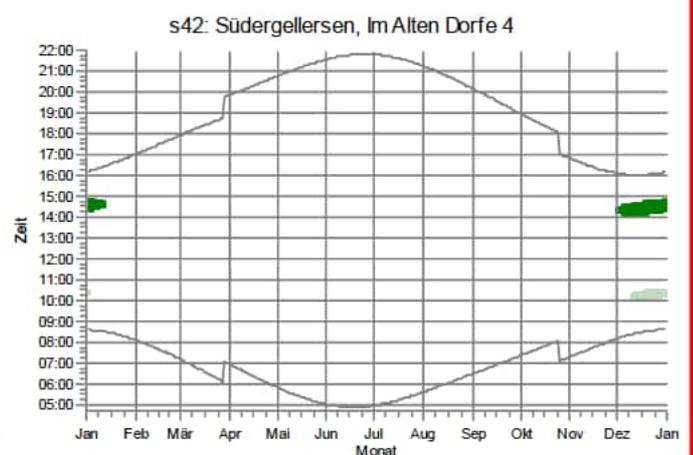
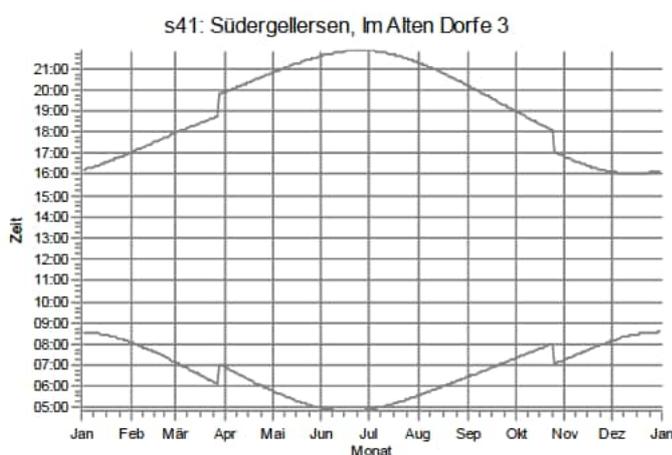
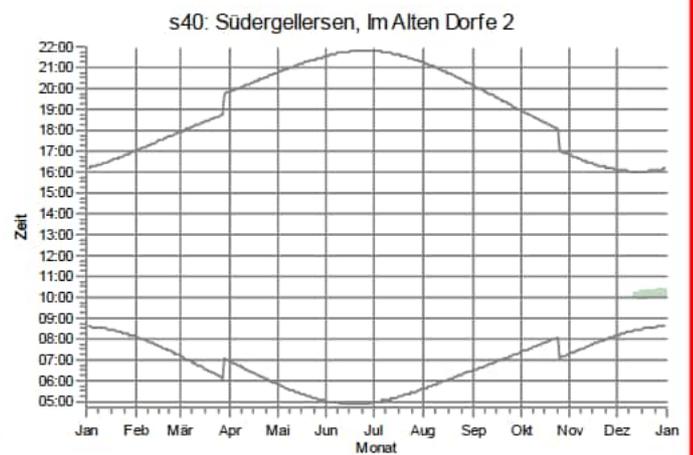
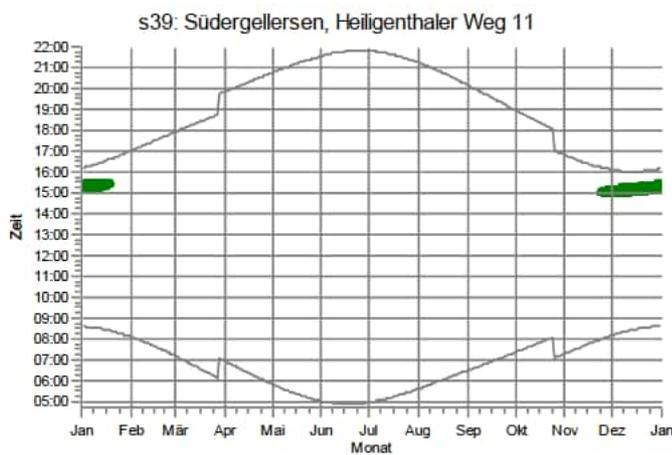
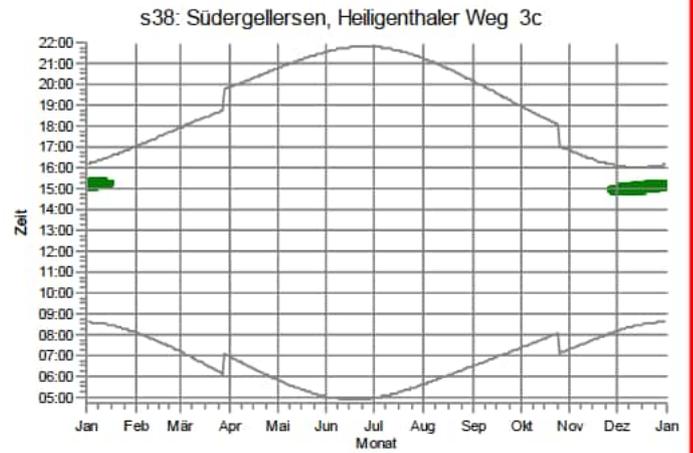
WEA

- B 01: NORDEX N149/4,0-4,5 4500 149,0 IOI NH: 125,0 m (Ges:199,5 m) (101)
- B 02: NORDEX N131/3300 DE 3300 131,0 I-I NH: 134,0 m (Ges:199,5 m) (120)
- B 03: GE WIND ENERGY GE 2.75-120 2750 120,0 IOI NH: 139,0 m (Ges:199,0 m) (94)
- Oerzen 1: NORDEX N175/6,X 6800 175,0 I-I NH: 179,0 m (Ges:266,5 m) (79)

- Oerzen 2: NORDEX N175/6,X 6800 175,0 I-I NH: 179,0 m (Ges:266,5 m) (80)
- Oerzen 3: NORDEX N175/6,X 6800 175,0 I-I NH: 179,0 m (Ges:266,5 m) (81)
- Oerzen 4: NORDEX N175/6,X 6800 175,0 I-I NH: 179,0 m (Ges:266,5 m) (82)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



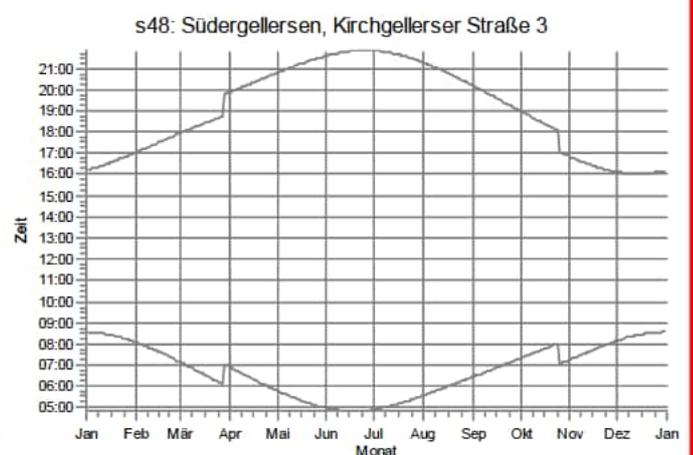
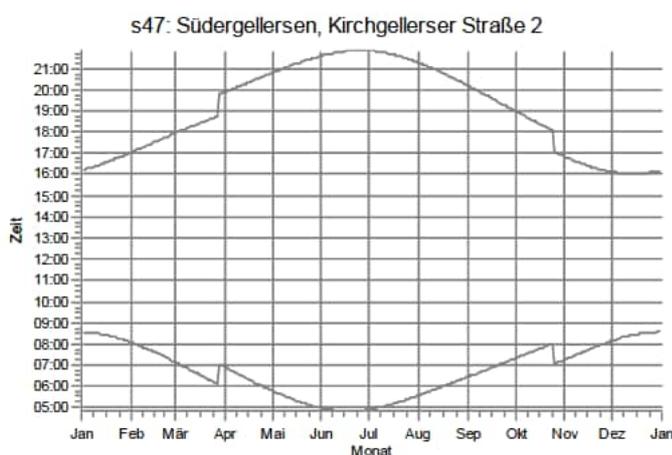
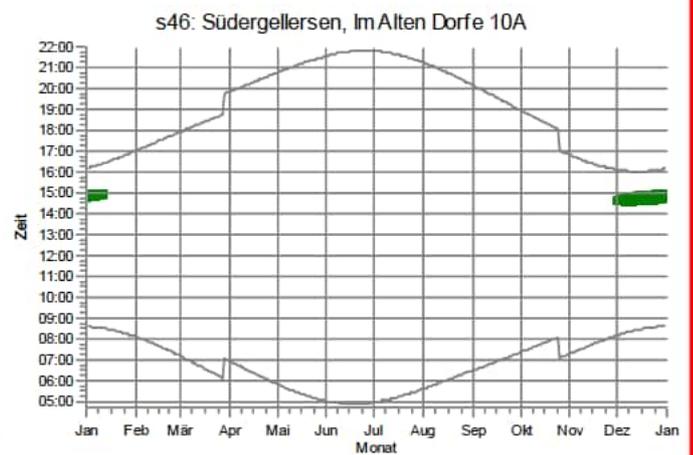
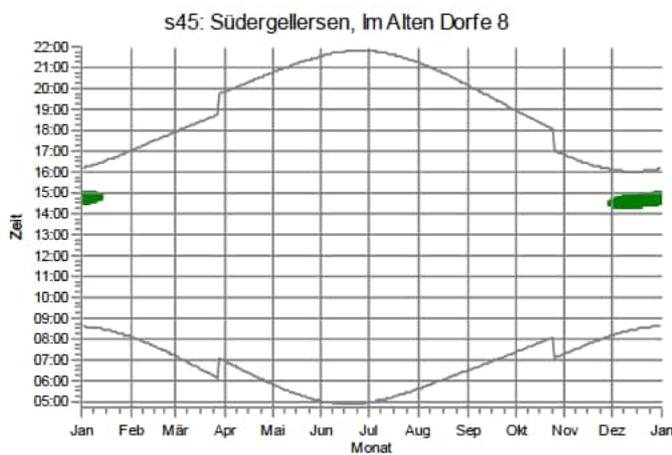
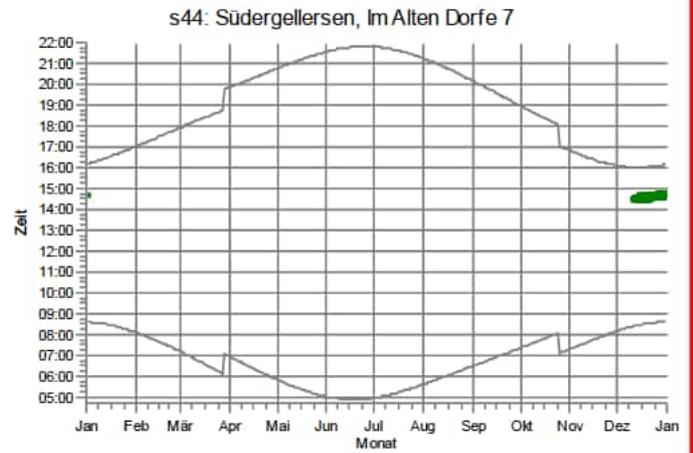
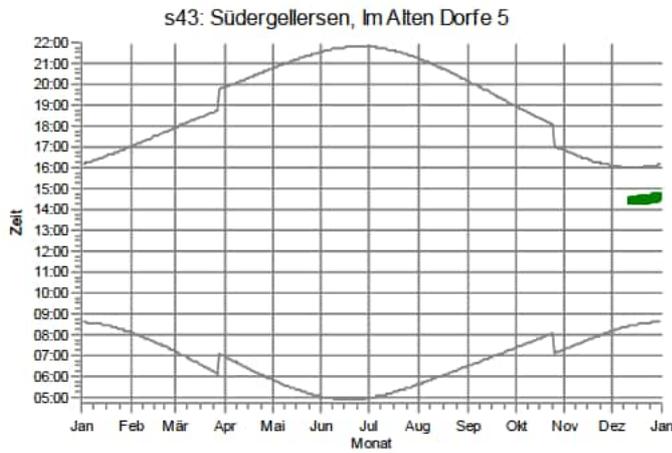
WEA

B 01: NORDEX N149/4,0-4,5 4500 149,0 I-1 NH: 125,0 m (Ges:199,5 m) (101)

Oerzen 1: NORDEX N175/6,X 6800 175,0 I-1 NH: 179,0 m (Ges:266,5 m) (79)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



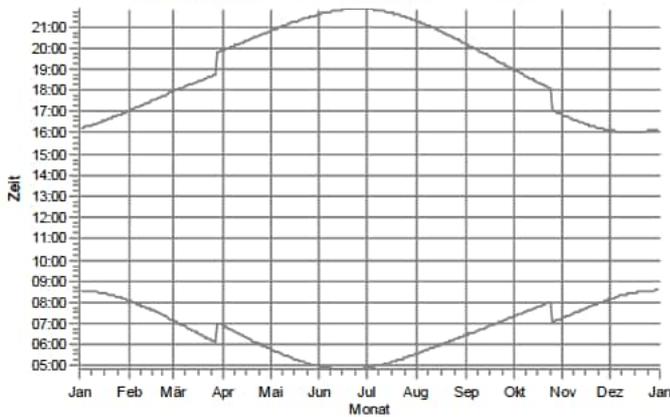
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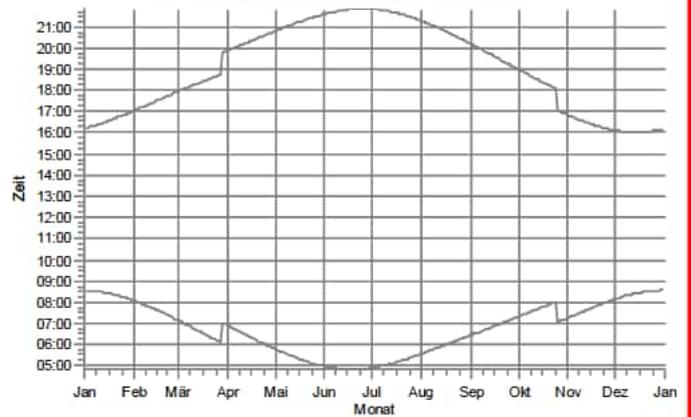
## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand

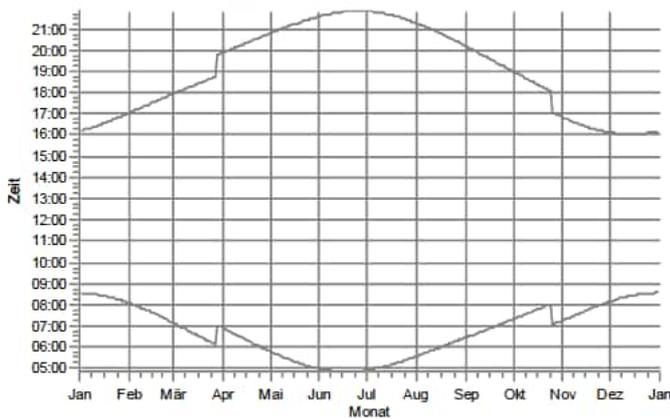
s49: Südergellersen, Kirchgellerser Straße 6



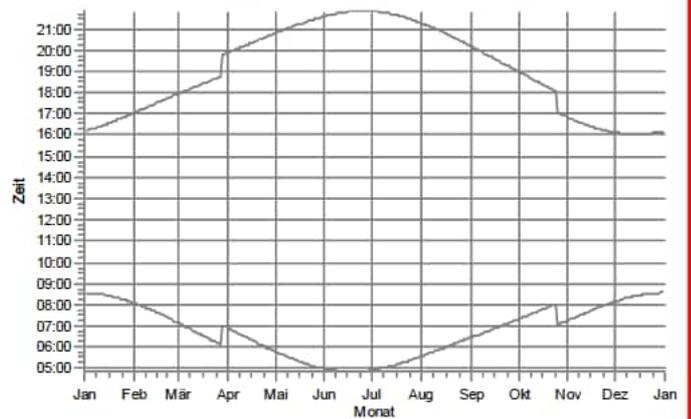
s50: Südergellersen, Kirchgellerser Straße 9



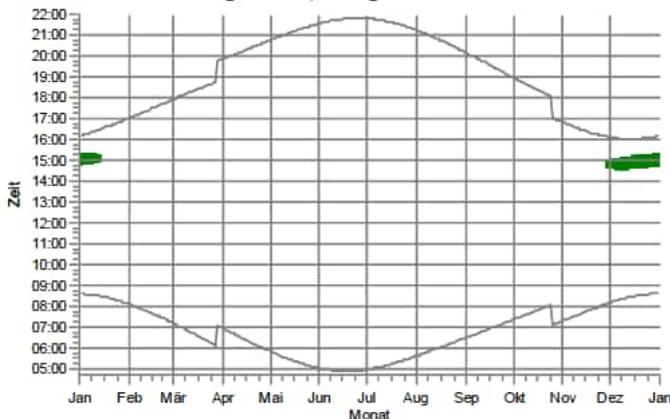
s51: Südergellersen, Kirchgellerser Straße 10



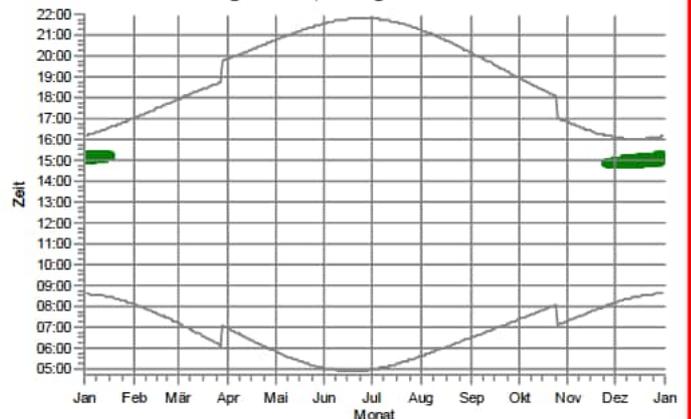
s52: Südergellersen, Kirchgellerser Straße 13



s53: Südergellersen, Kirchgellerser Straße 15



s54: Südergellersen, Kirchgellerser Straße 16

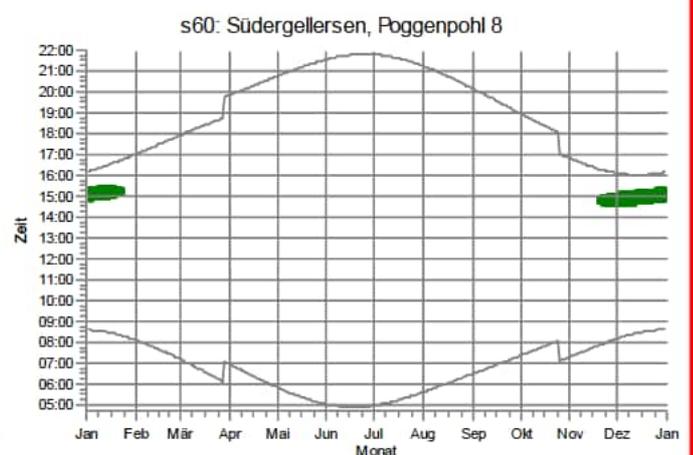
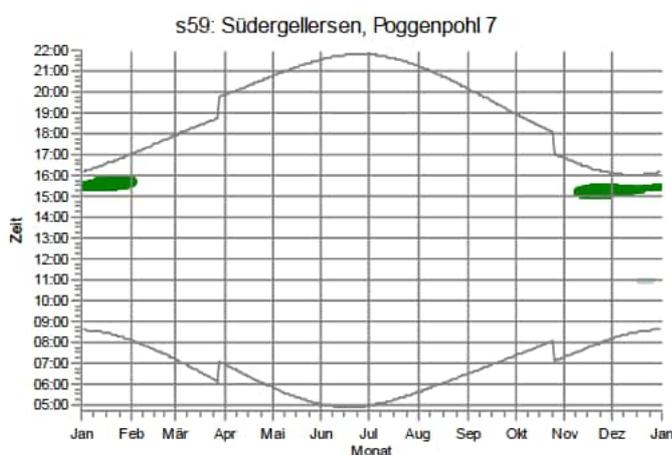
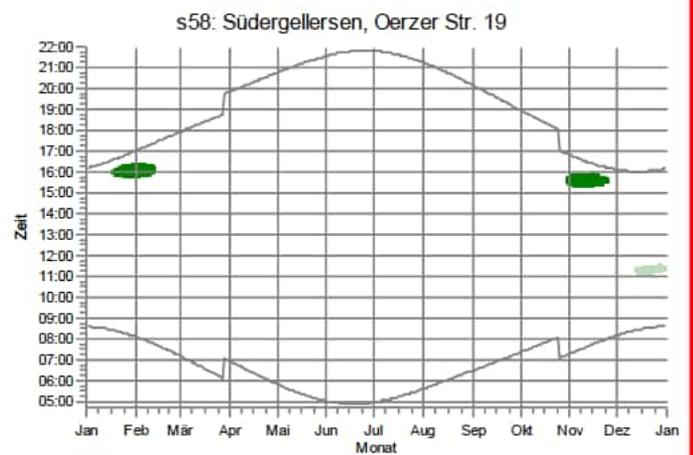
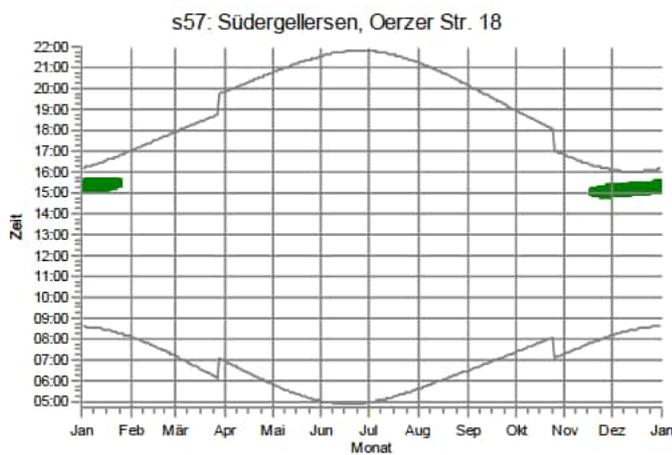
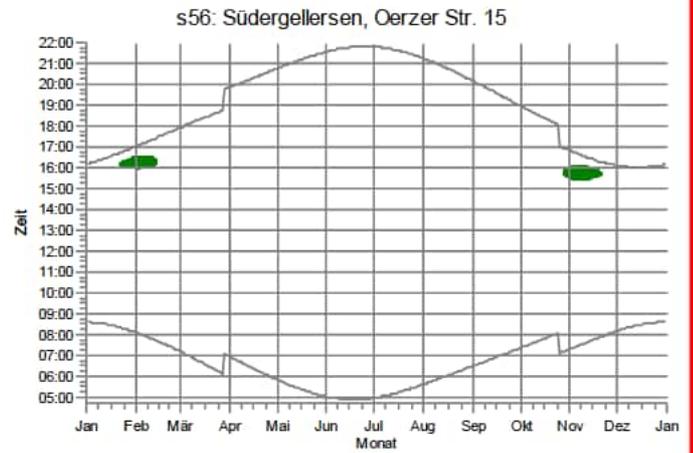
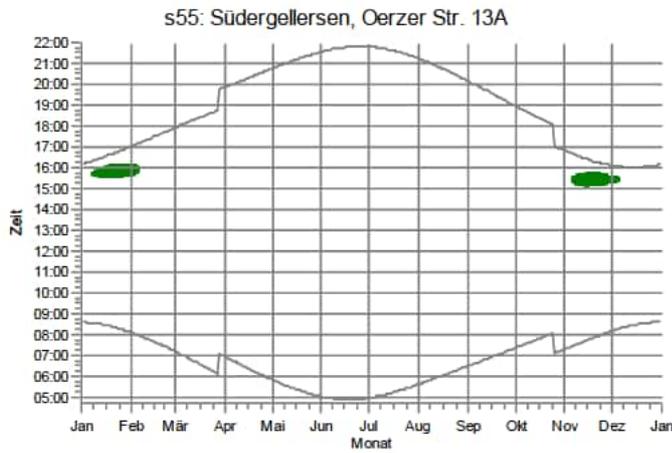


WEA

 B 01: NORDEX N149/4,0-4.5 4500 149,0 IO! NH: 125,0 m (Ges:199,5 m) (101)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



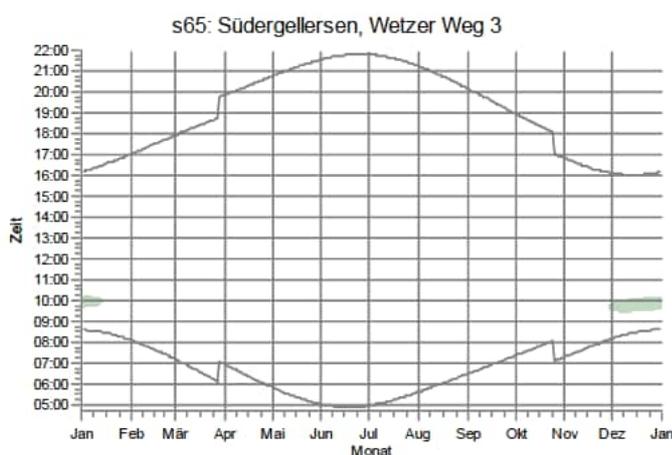
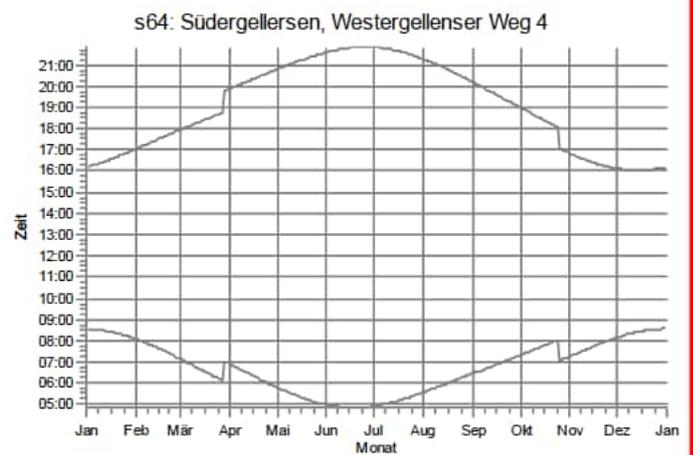
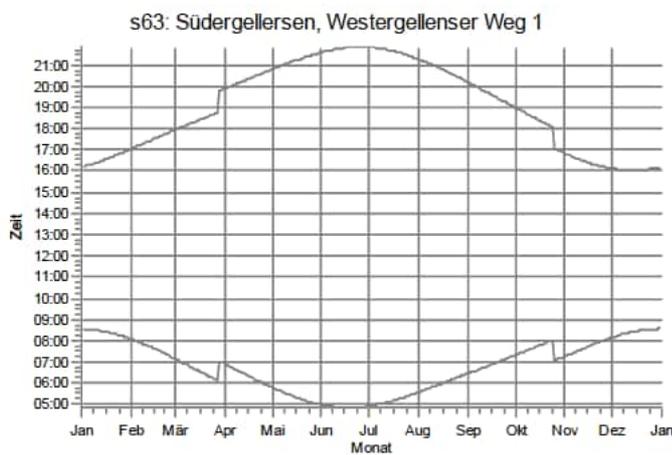
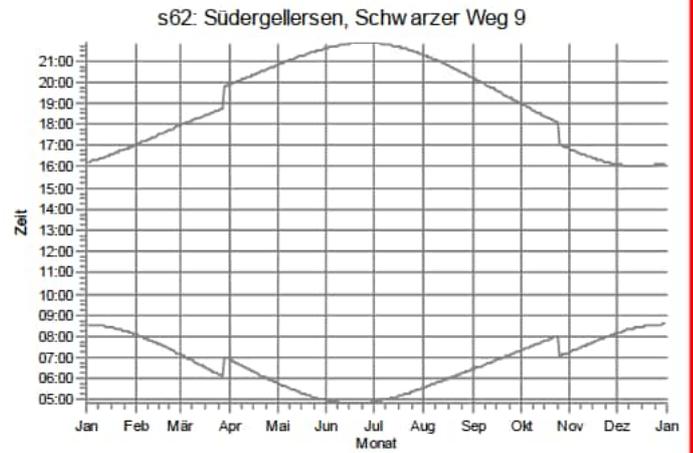
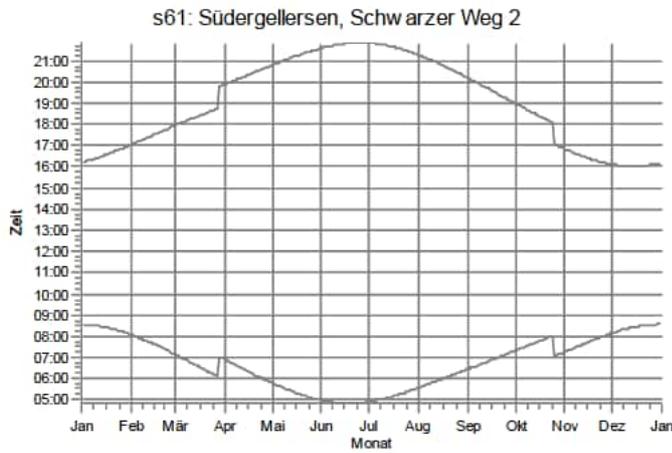
WEA

  B 01: NORDEX N149/4,0-4.5 4500 149,0 I-1 NH: 125,0 m (Ges:199,5 m) (101)

  Oerzen 1: NORDEX N175/6,X 6800 175,0 I-1 NH: 179,0 m (Ges:266,5 m) (79)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



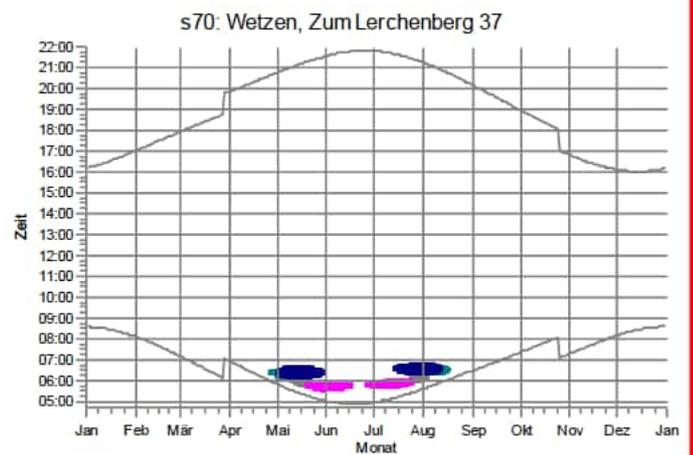
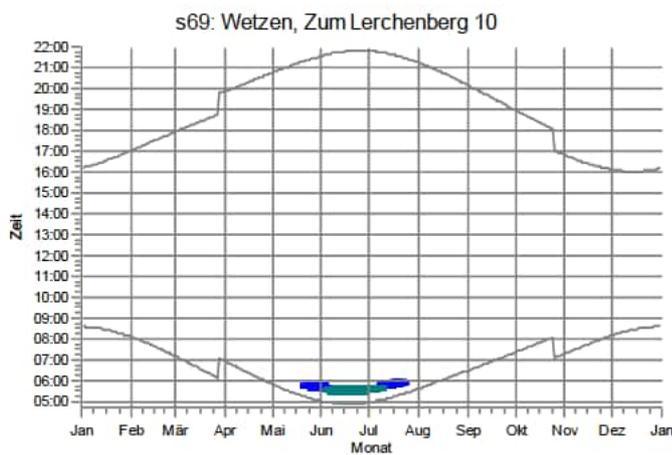
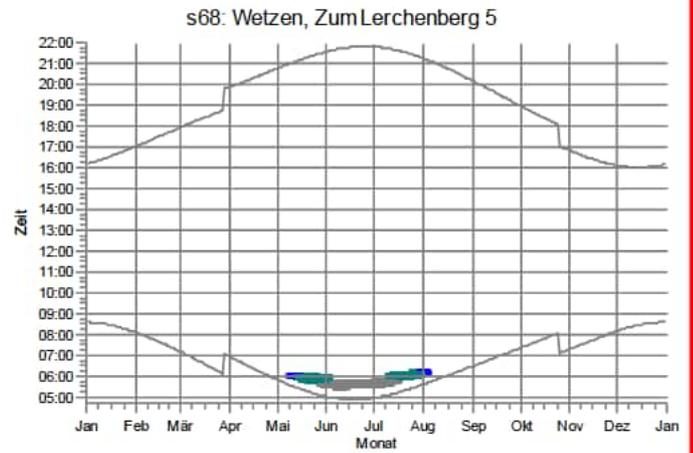
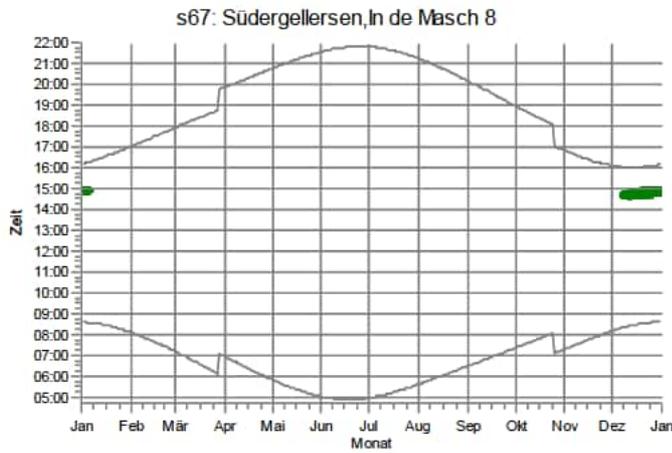
WEA

 B 01: NORDEX N149/4,0-4,5 4500 149,0 I-1 NH: 125,0 m (Ges:199,5 m) (101)  
 Oerzen 1: NORDEX N175/6,X 6800 175,0 I-1 NH: 179,0 m (Ges:266,5 m) (79)

 Oerzen 2: NORDEX N175/6,X 6800 175,0 I-1 NH: 179,0 m (Ges:266,5 m) (80)

## SHADOW - Grafischer Kalender

**Berechnung:** Vorbelastung Repowering 18 Bestand



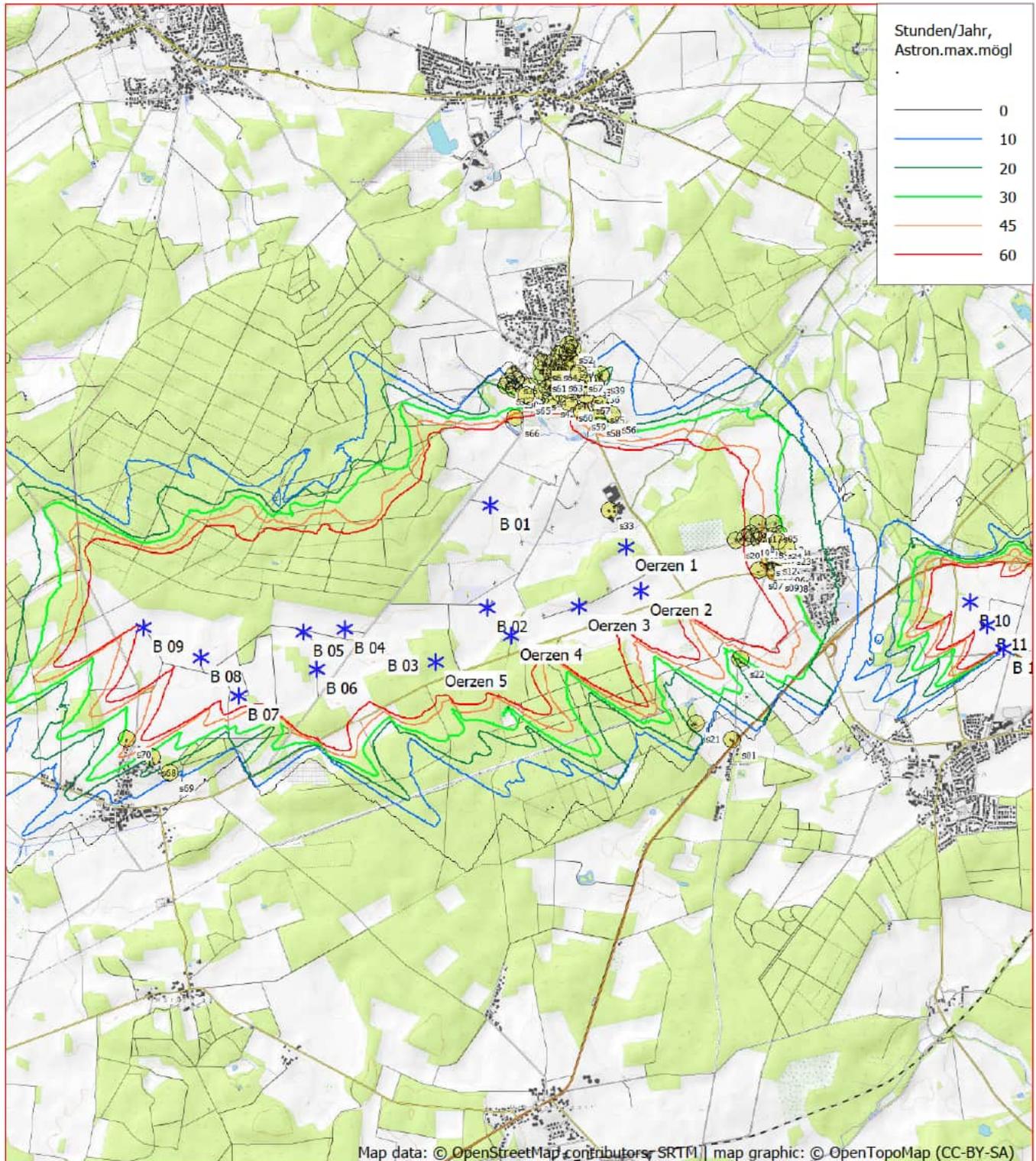
WEA

- B 01: NORDEX N149/4,0-4.5 4500 149,0 IOI NH: 125,0 m (Ges:199,5 m) (101)
- B 03: GE WIND ENERGY GE 2.75-120 2750 120,0 IOI NH: 139,0 m (Ges:199,0 m) (94)
- B 04: GE WIND ENERGY GE 2.75-120 2750 120,0 IOI NH: 139,0 m (Ges:199,0 m) (95)

- B 05: GE WIND ENERGY GE 2.75-120 2750 120,0 IOI NH: 139,0 m (Ges:199,0 m) (96)
- B 06: GE WIND ENERGY GE 2.75-120 2750 120,0 IOI NH: 139,0 m (Ges:199,0 m) (97)
- B 07: GE WIND ENERGY GE 2.75-120 2750 120,0 IOI NH: 139,0 m (Ges:199,0 m) (98)

## SHADOW - Karte

**Berechnung:** Vorbelastung Repowering 18 Bestand



0 500 1000 1500 2000 m

Karte: OpenTopoMap.org , Maßstab 1:50.000, Mitte: UTM (north)-ETRS89 Zone: 32 Ost: 586.120,0 Nord: 5.894.340,0

\* Existierende WEA    Schattenrezeptor

Höhe der Schattenkarte: Höhenlinien: CONTOURLINE\_ONLINEDATA\_0.wpo (1)

Zeitschritt: 2 Minuten, Schrittweite: 2 Tag(e), Kartenaufösung: 20 m, Sichtbarkeit Auflösung: 5 m, Augenhöhe: 1,5 m

