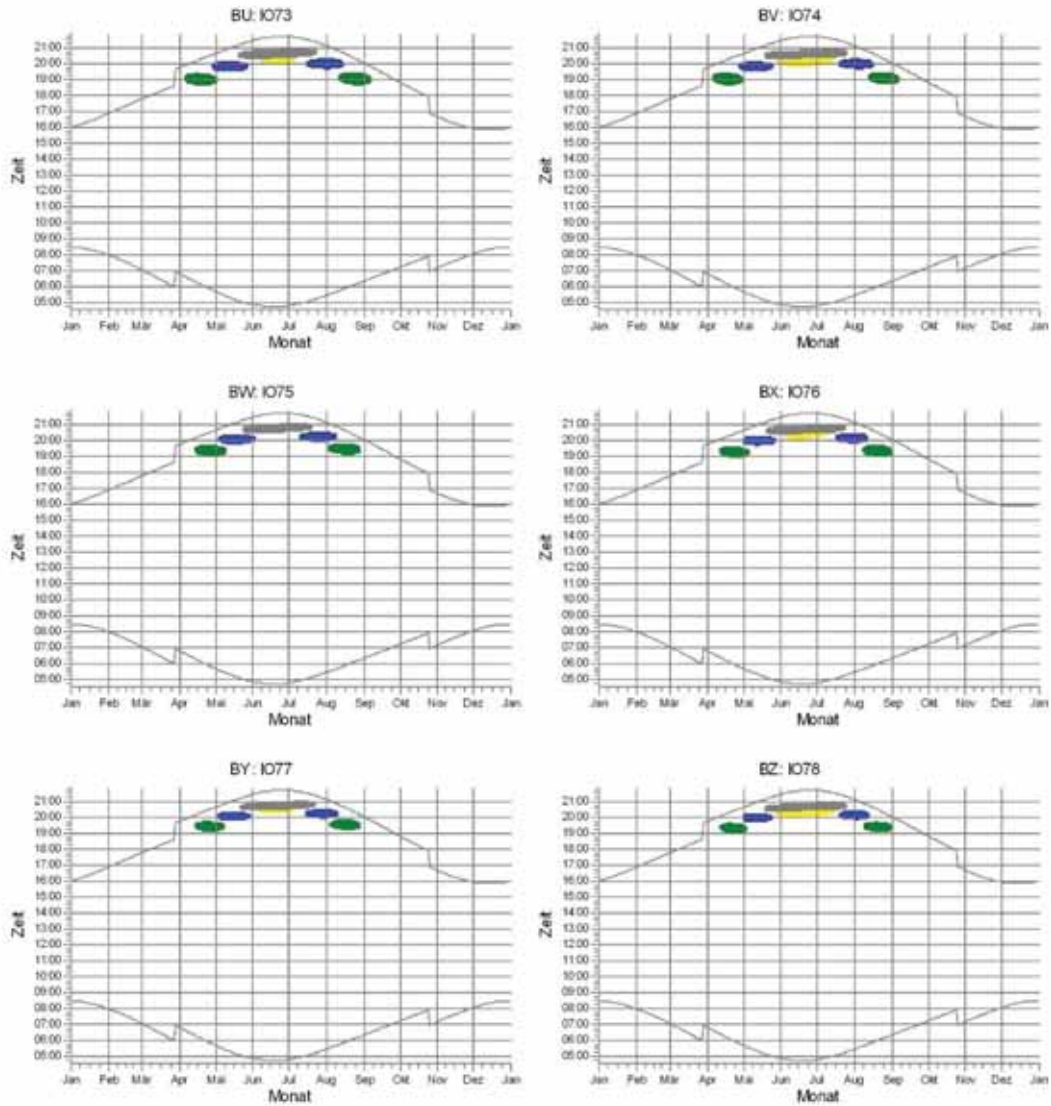


Projekt: **180926\_Werder-Lübz\_II**      Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

1: W1

2: W2

3: W3

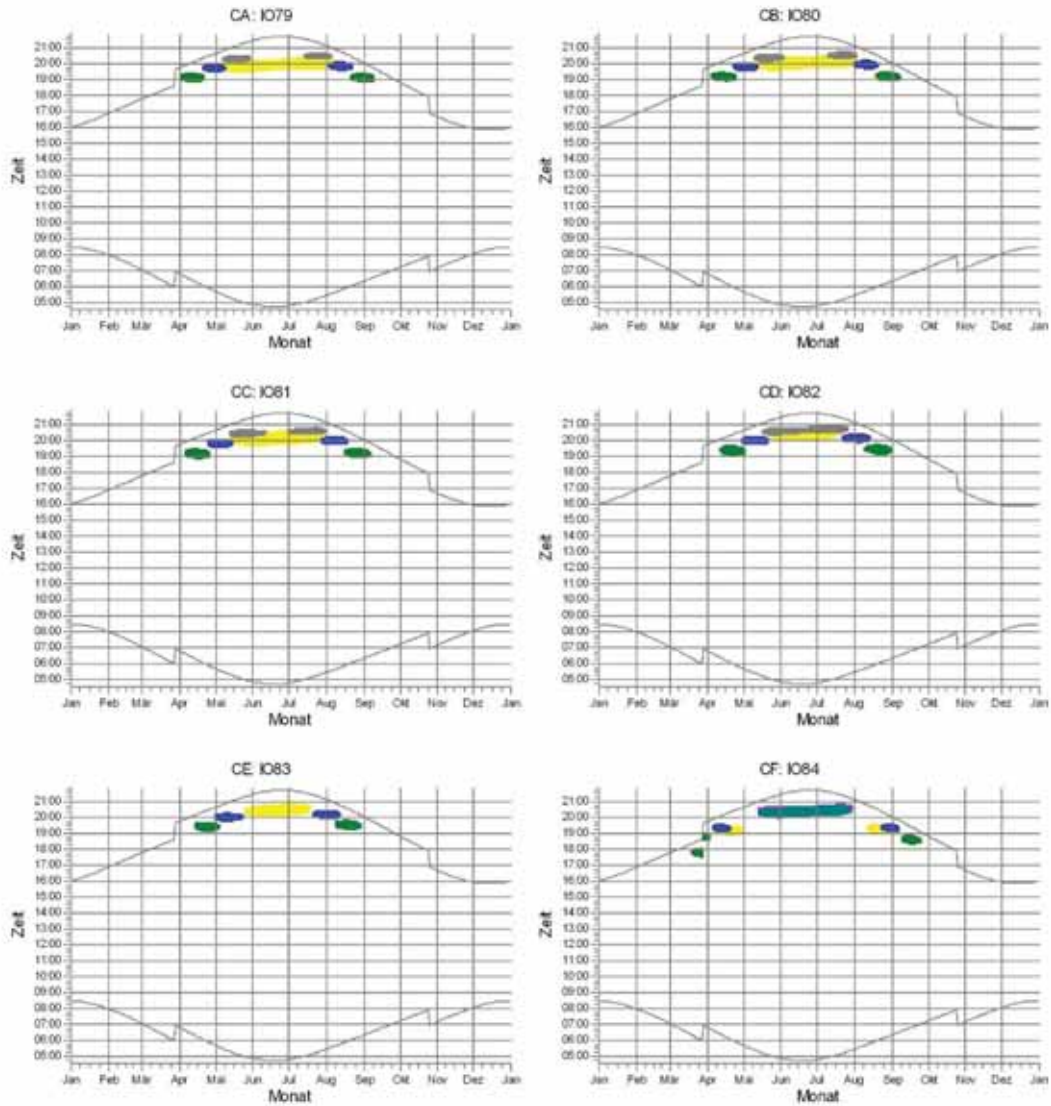
4: W4

Projekt: **180926\_Werder-Lübz\_II**      Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

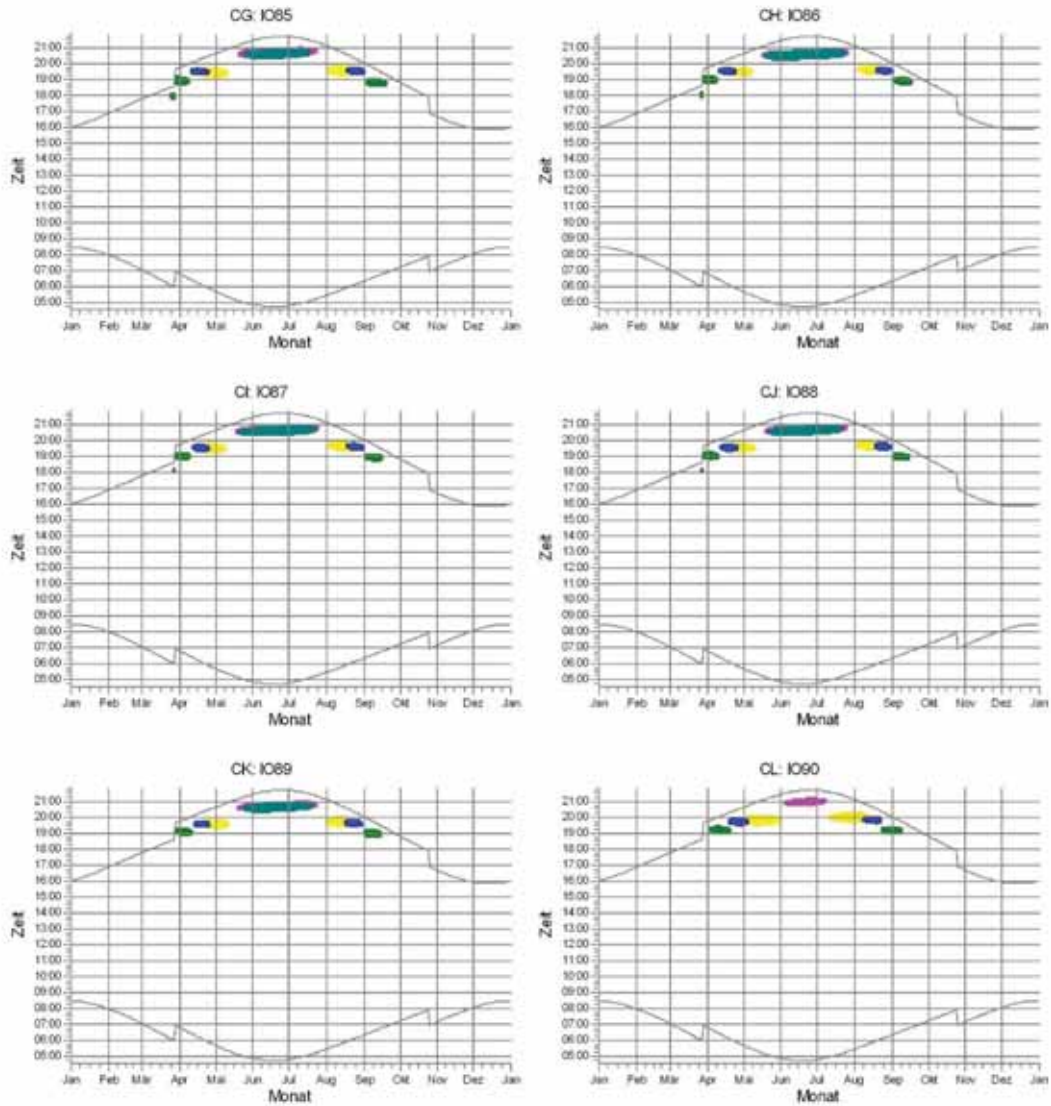


Projekt: **180926\_Werder-Lübz\_II**      Beschreibung: Windpark Werder

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 Am Westersielzug 11  
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 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

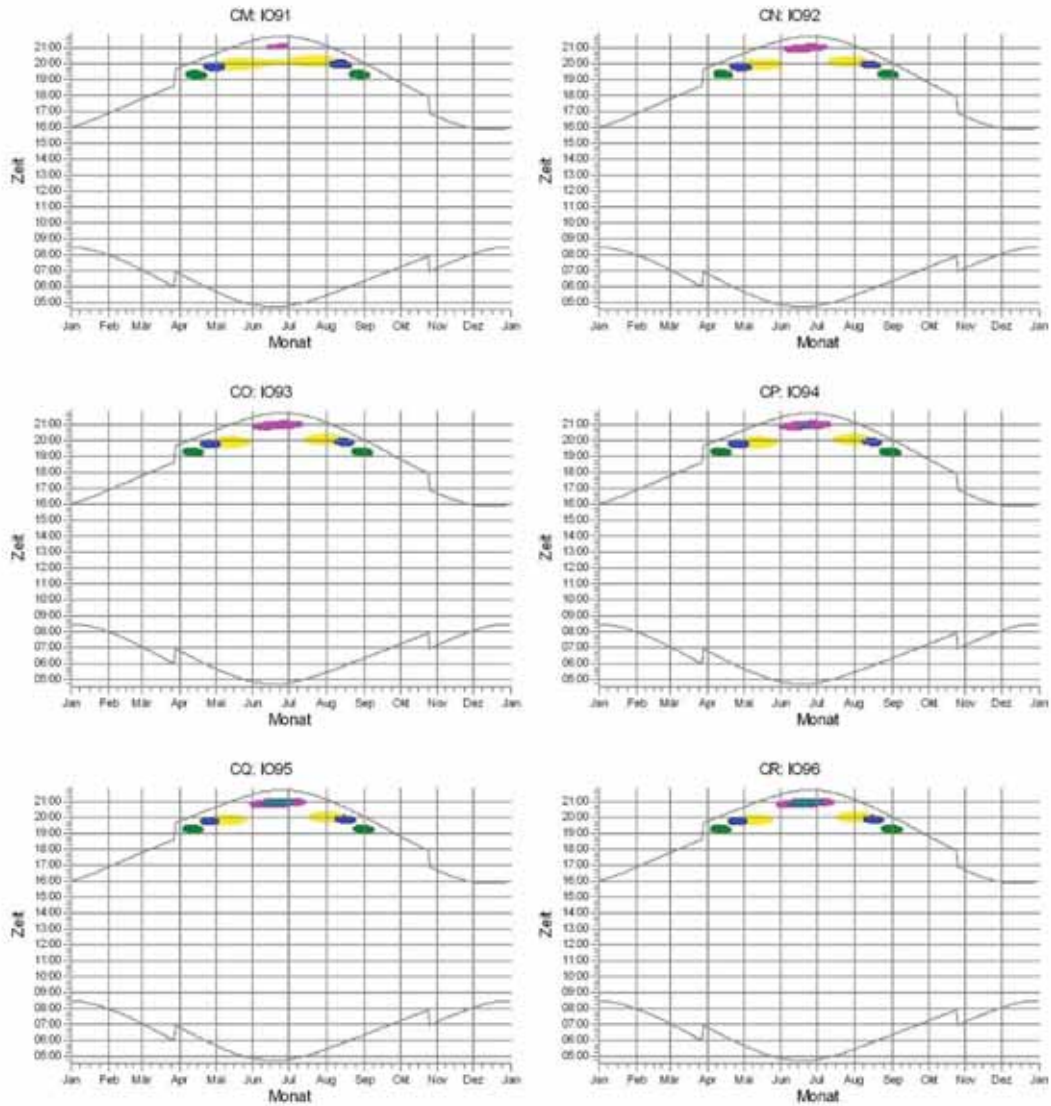


Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
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 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

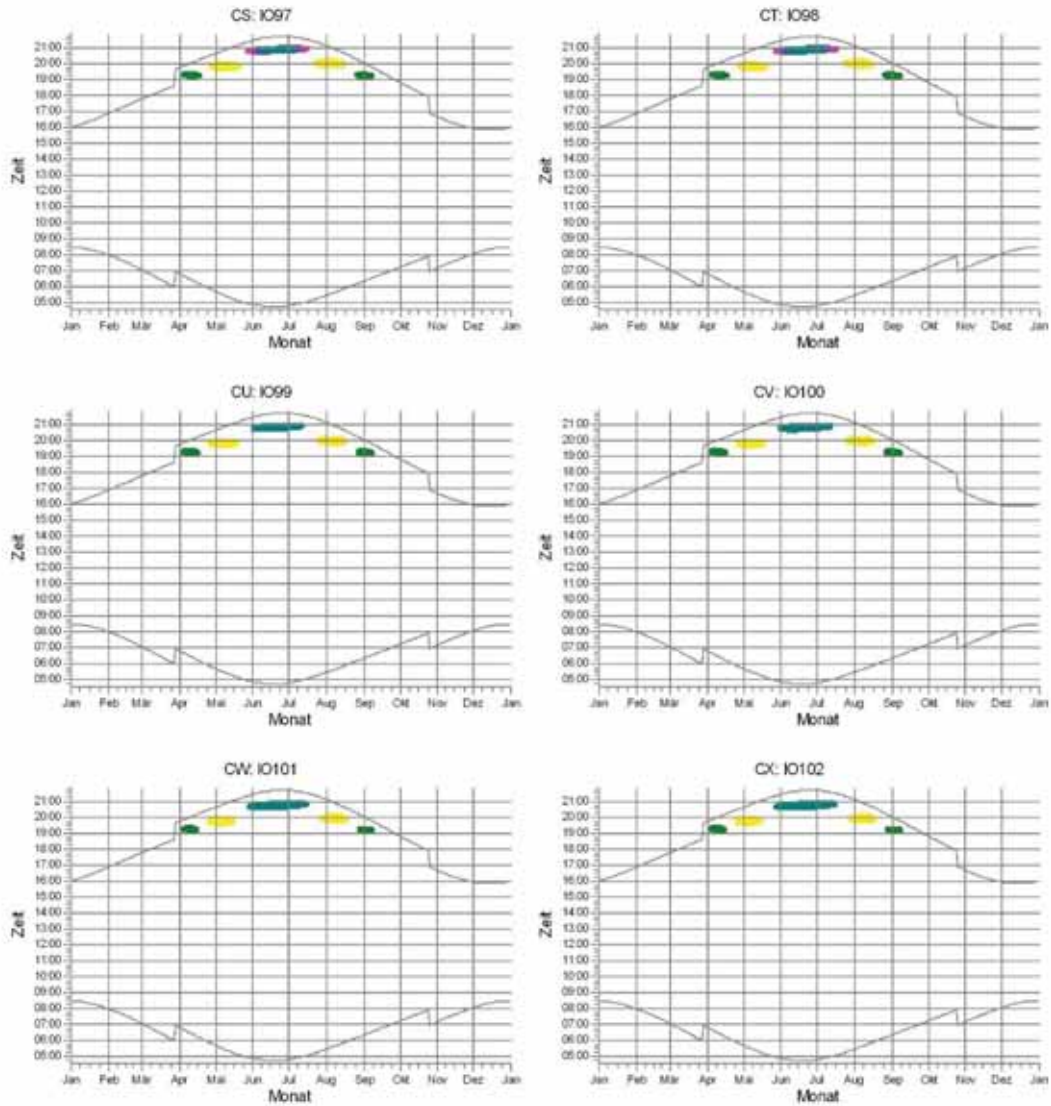


Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer Anwalter:  
**I17-Wind GmbH & Co. KG**  
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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

1: W1

2: W2

5: W5

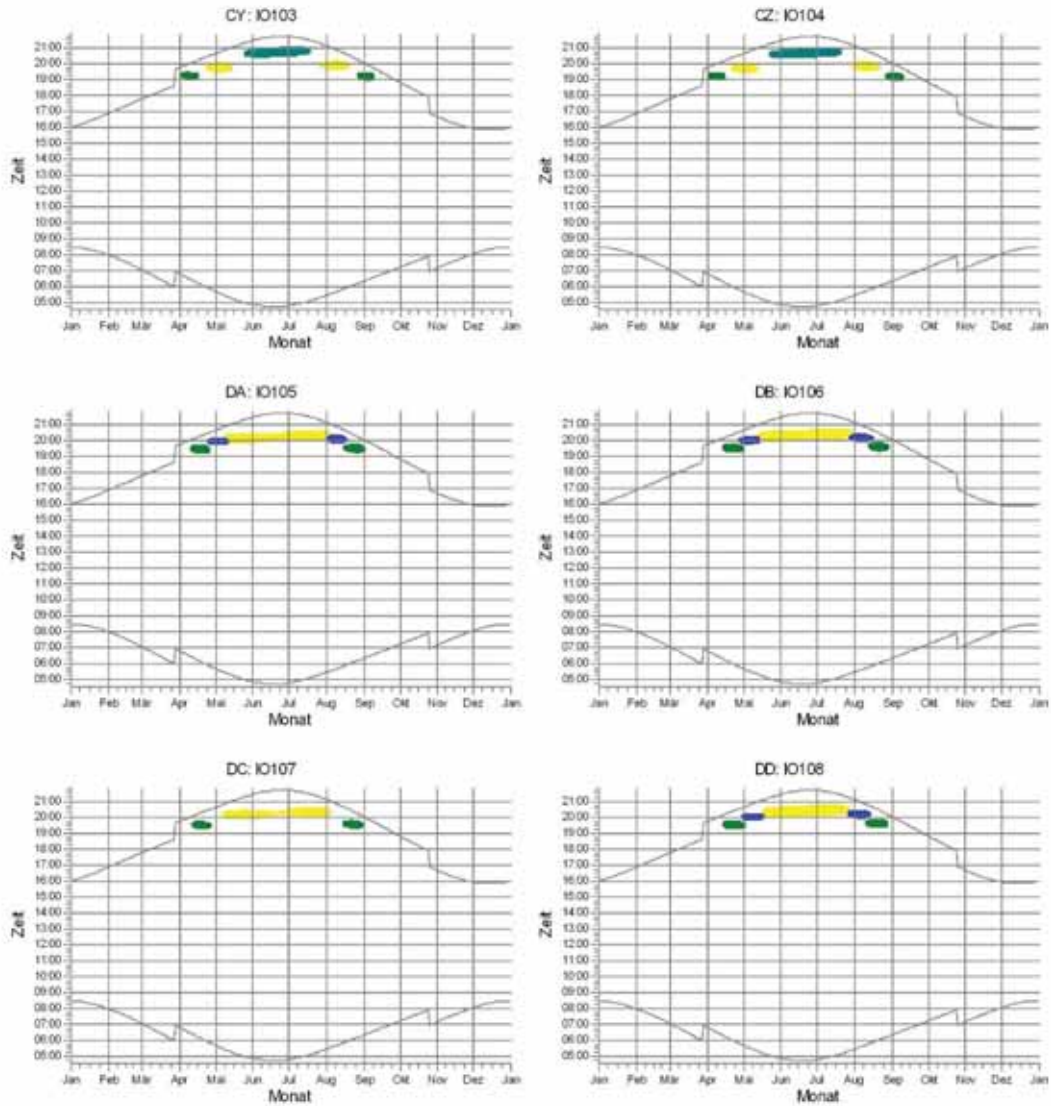
6: W11

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer Anwalter:  
**I17-Wind GmbH & Co. KG**  
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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

1: W1

2: W2

3: W3

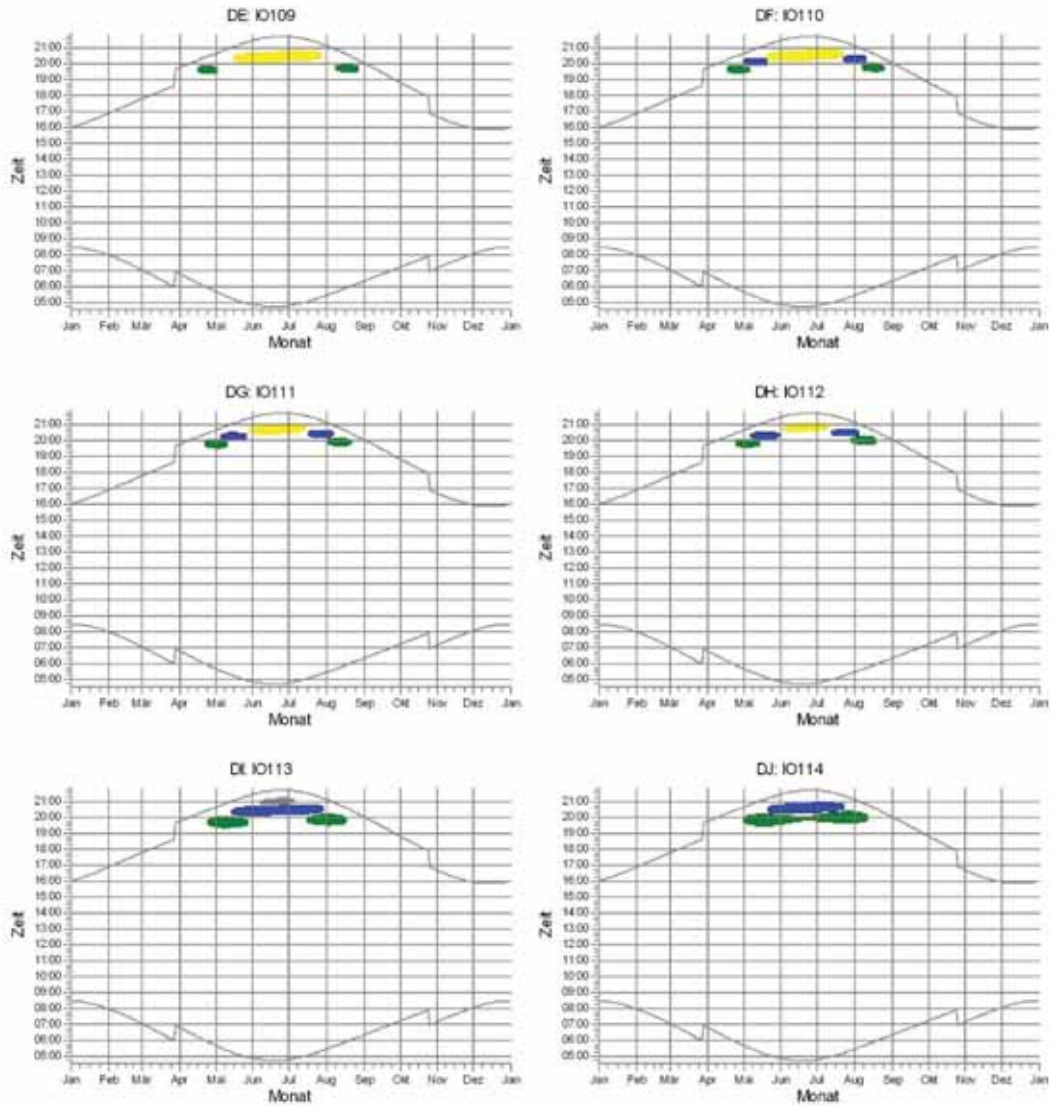
6: W11

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
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 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

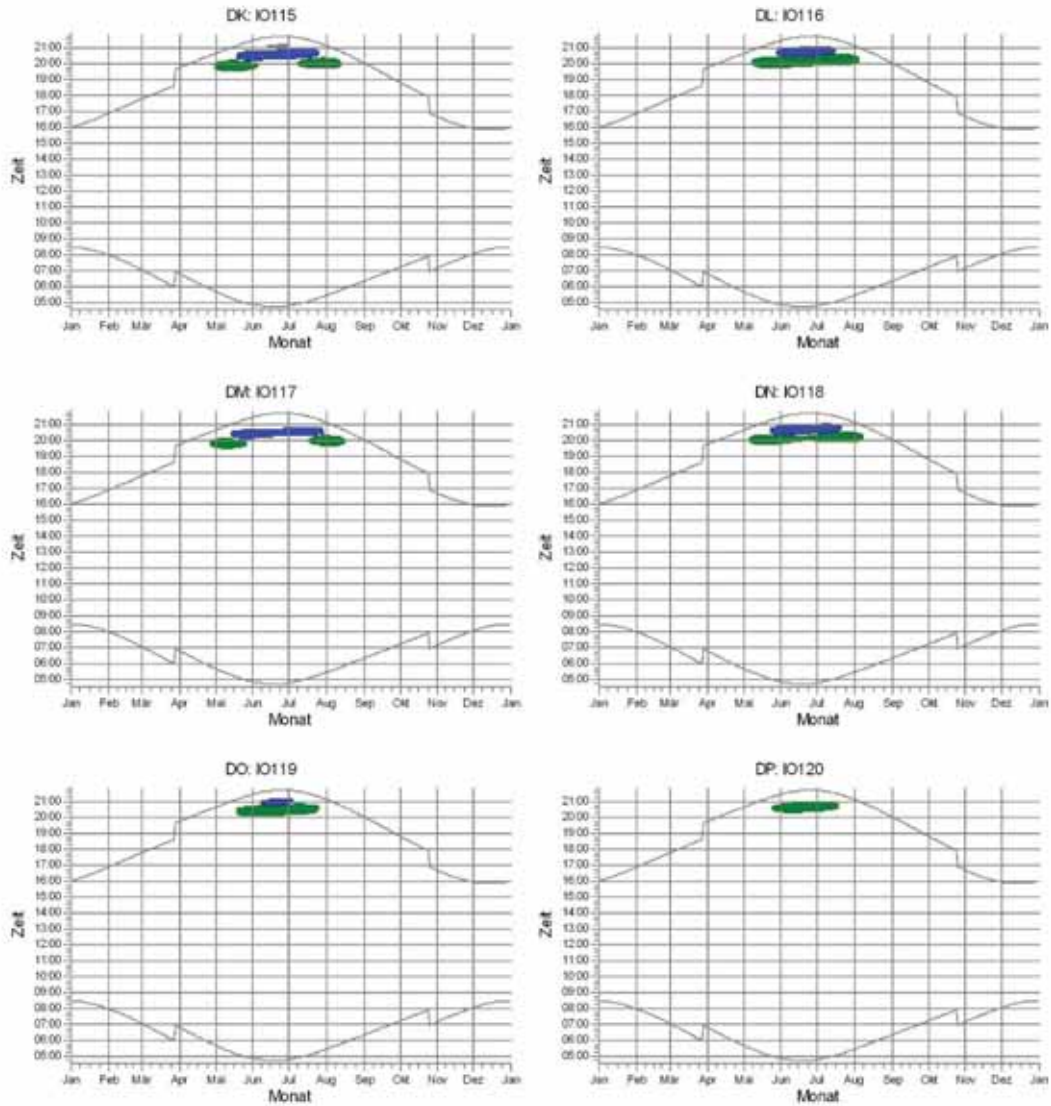


Projekt: **180926\_Werder-Lübz\_II**      Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
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### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA



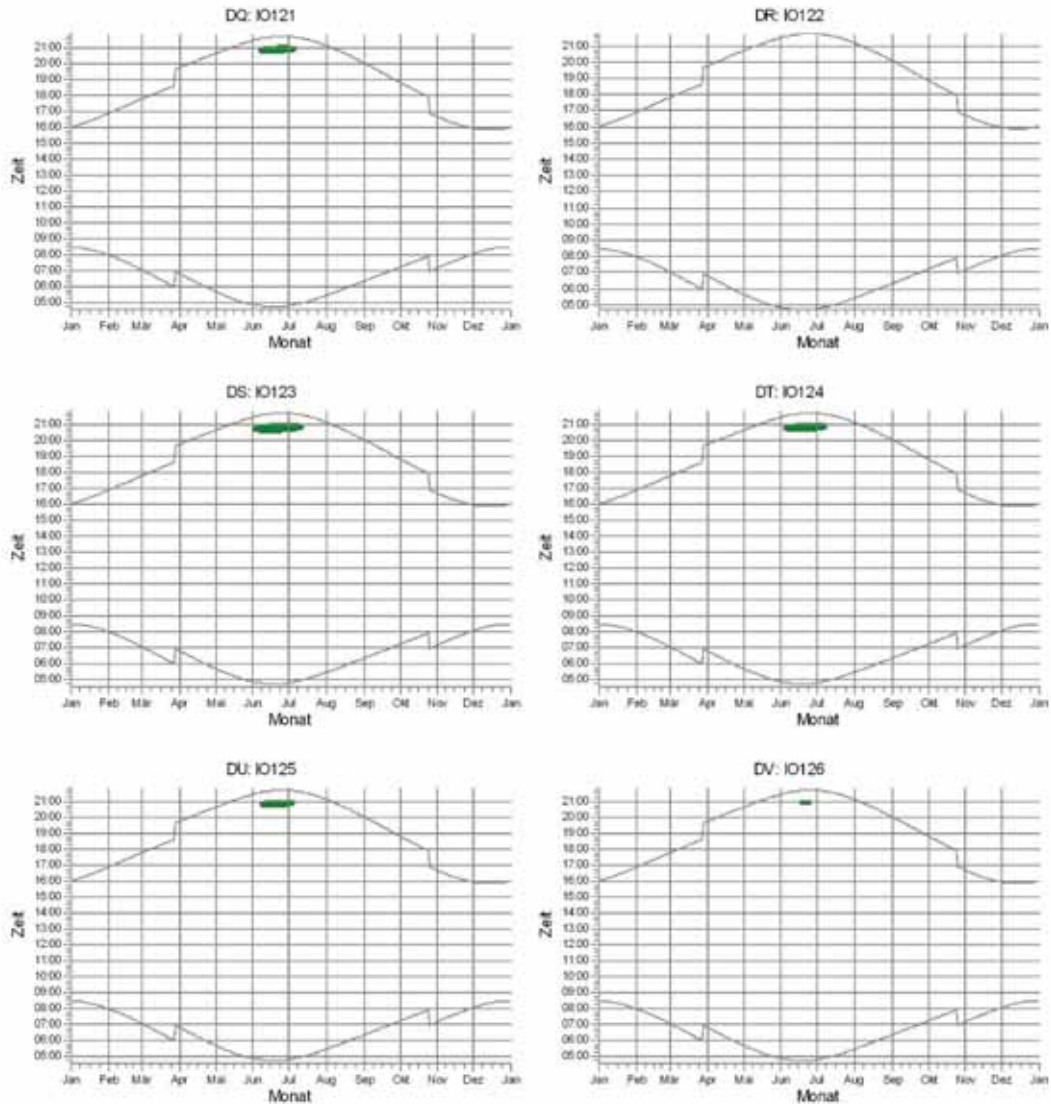


Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenzierter Anwender:  
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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

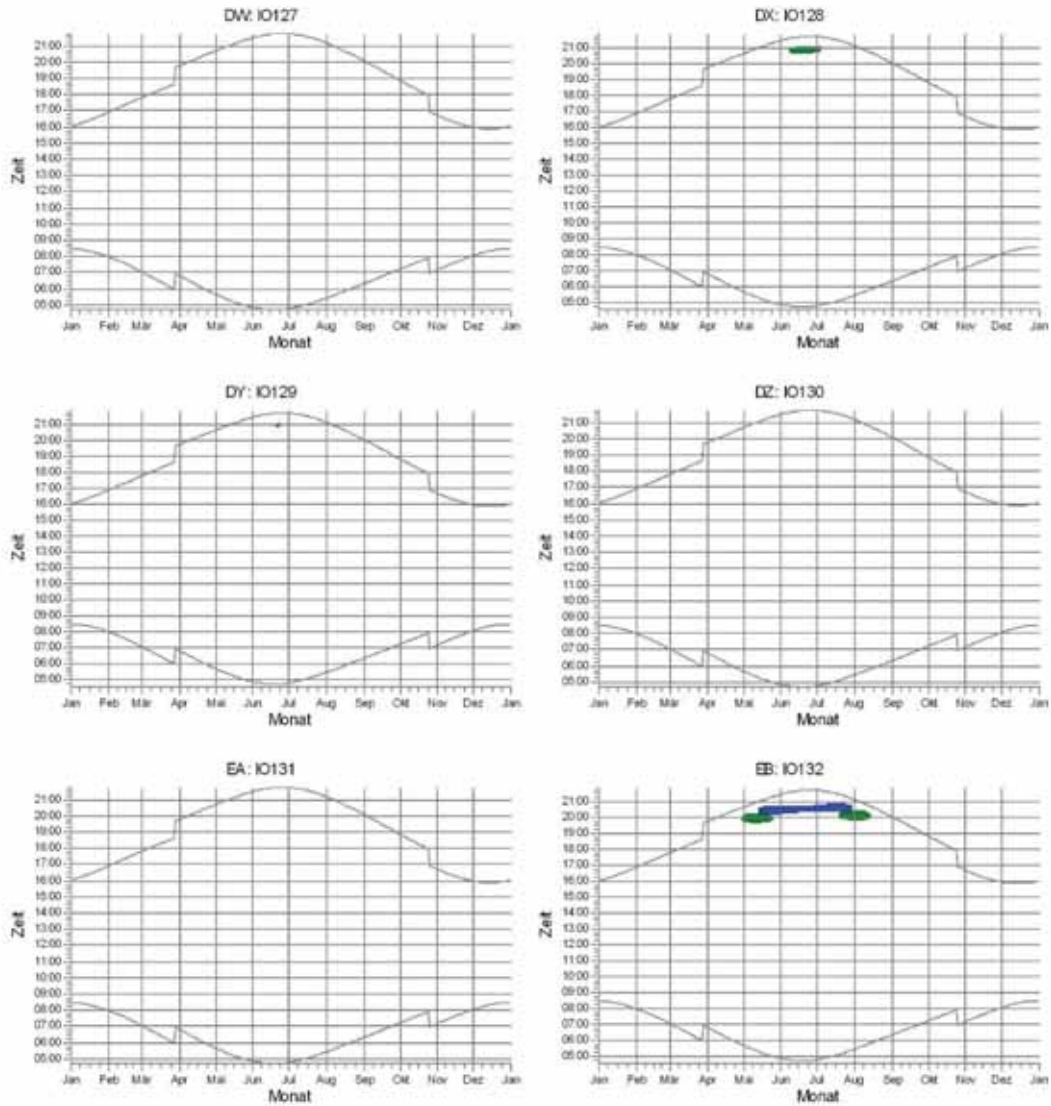
1: W1

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
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 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

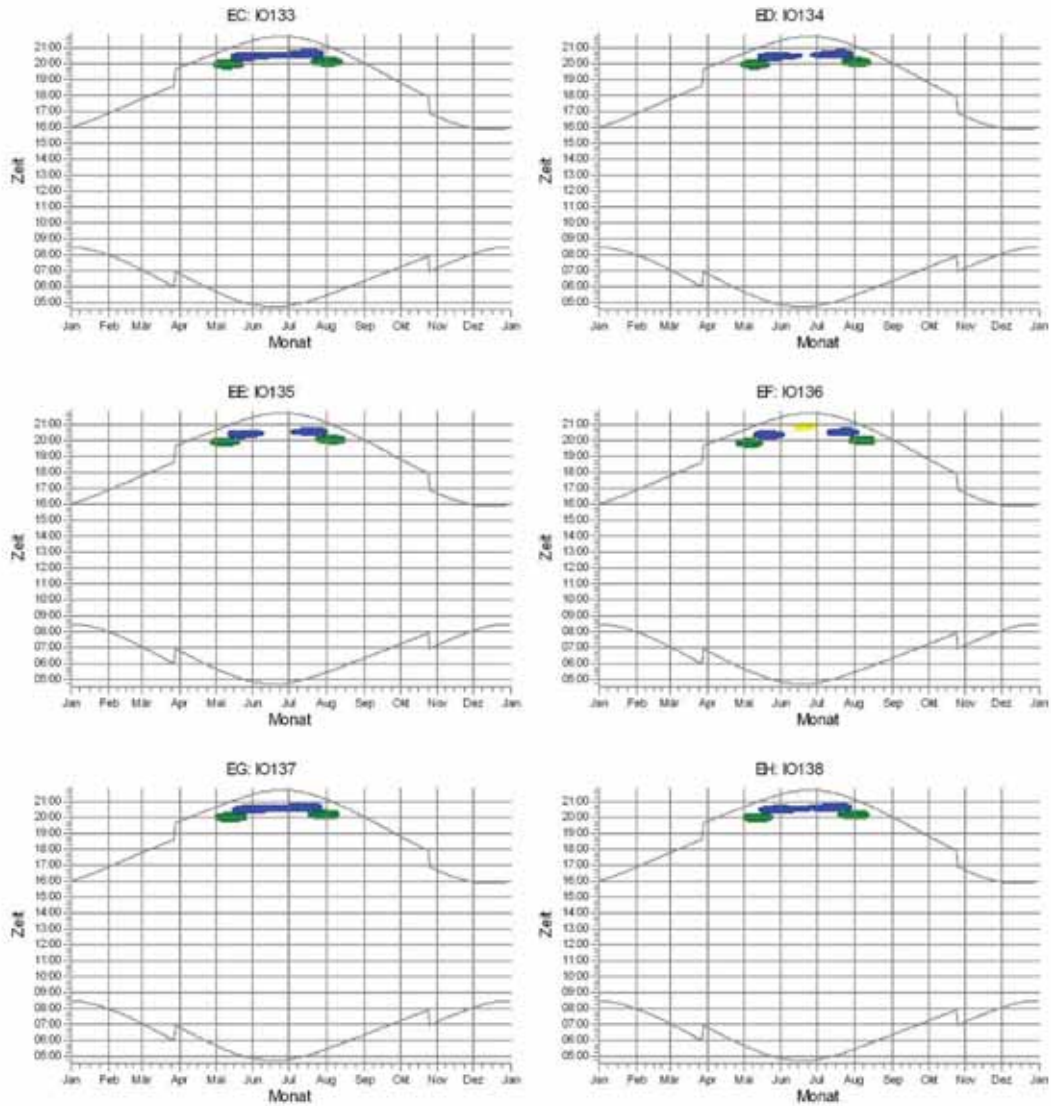
1: W1       3: W3

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
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### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

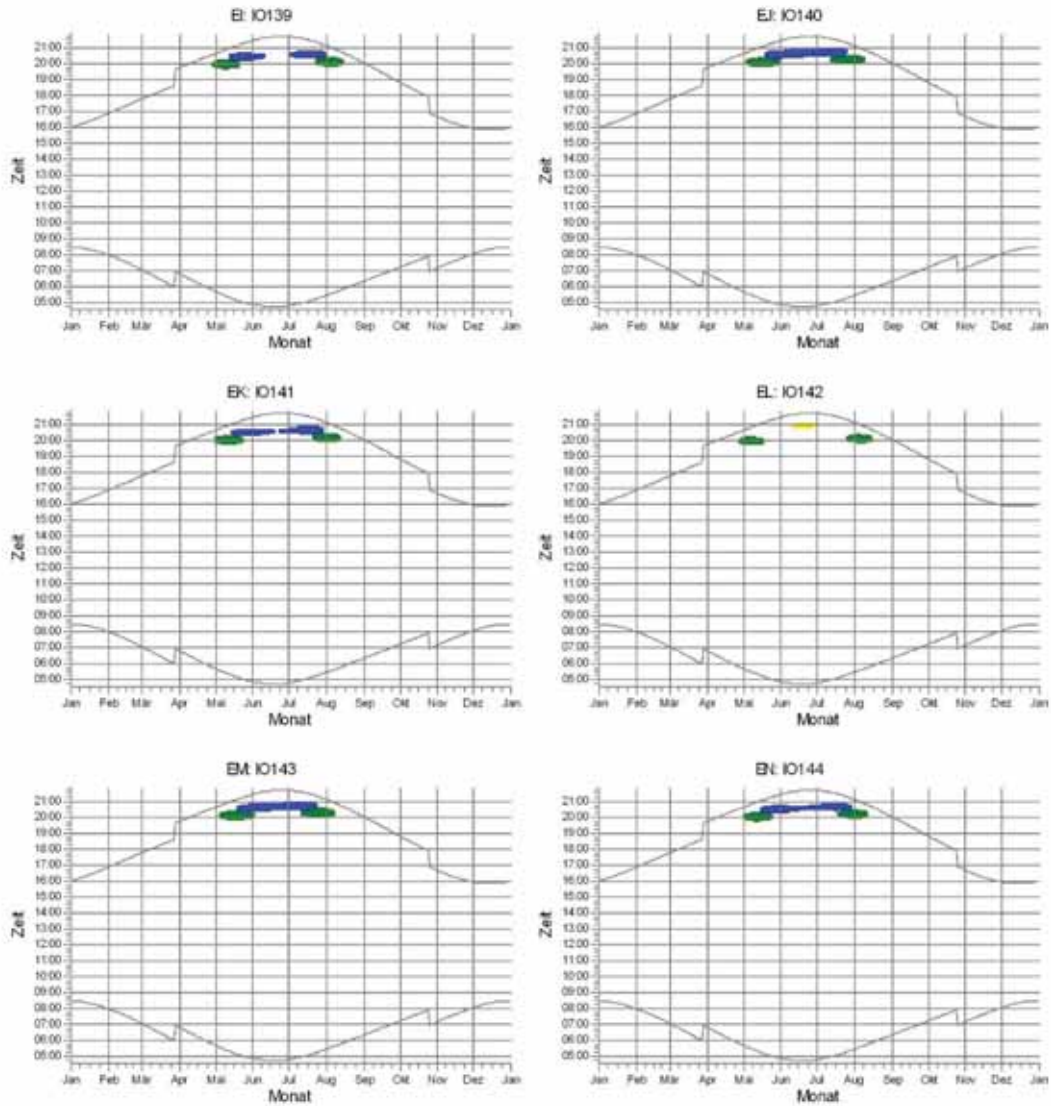
1: W1      2: W2      3: W3

Projekt: **180926\_Werder-Lübz\_II**      Beschreibung: Windpark Werder

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### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

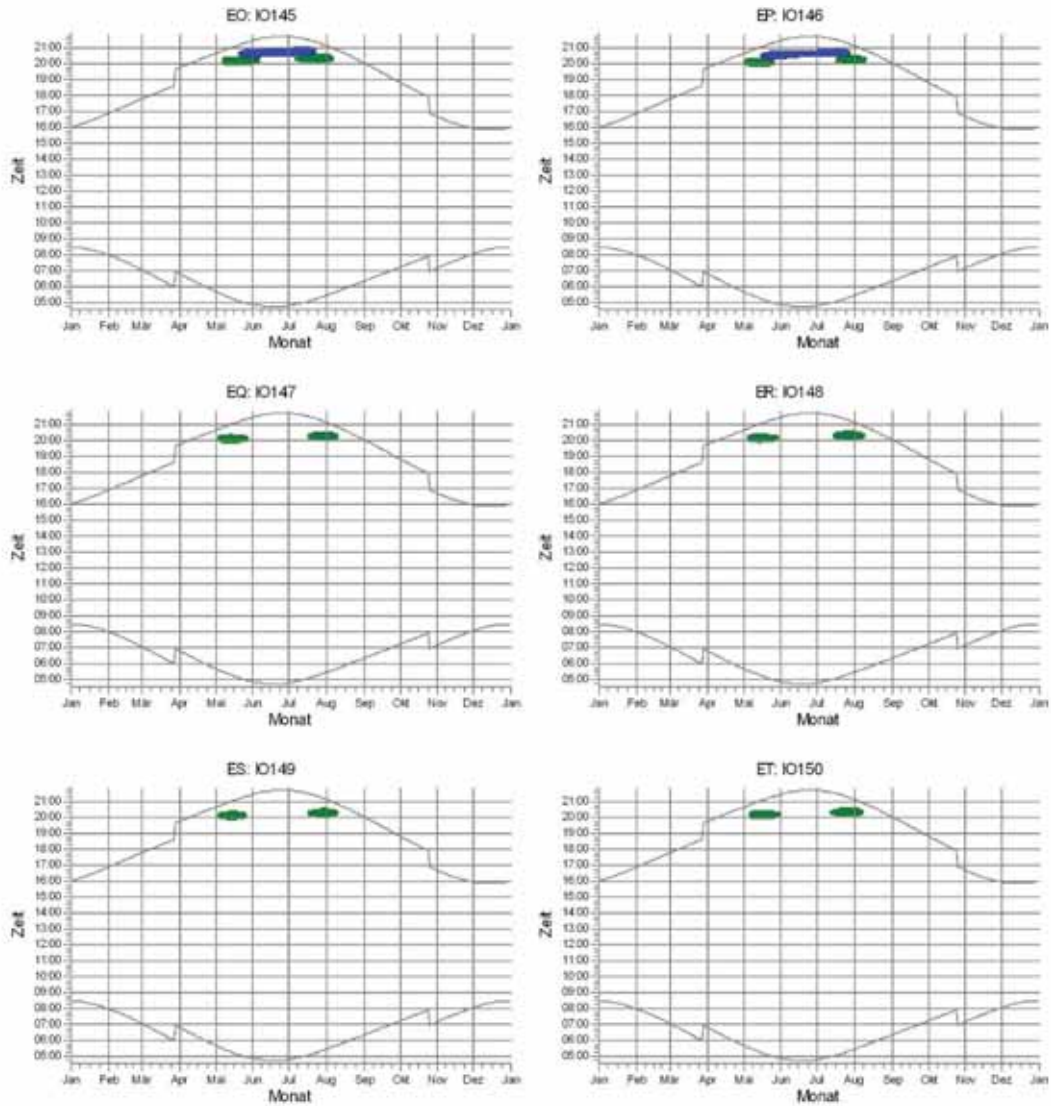
1: W1      2: W2      3: W3

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer/Anwender:  
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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

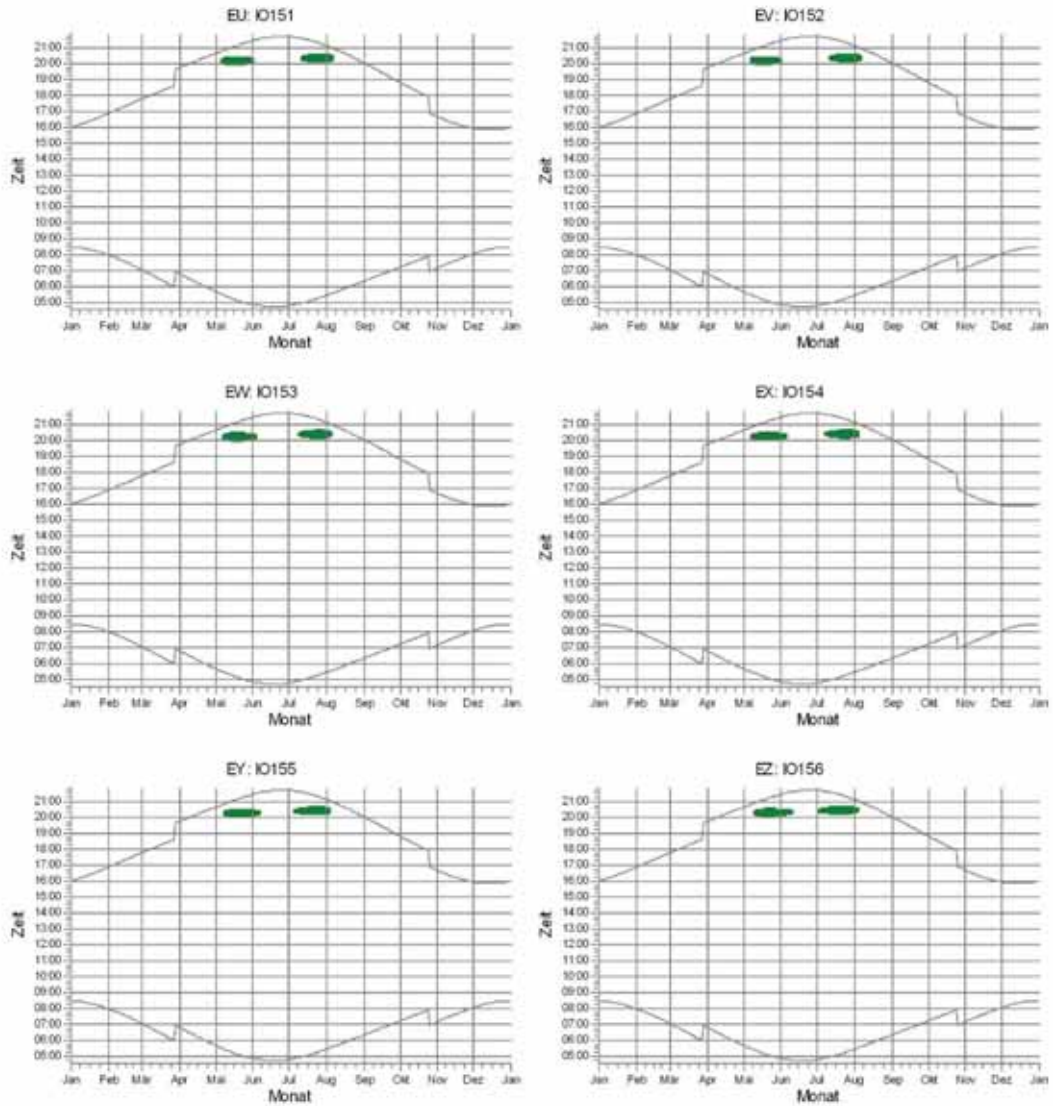
1: W1 3: W3

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

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 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

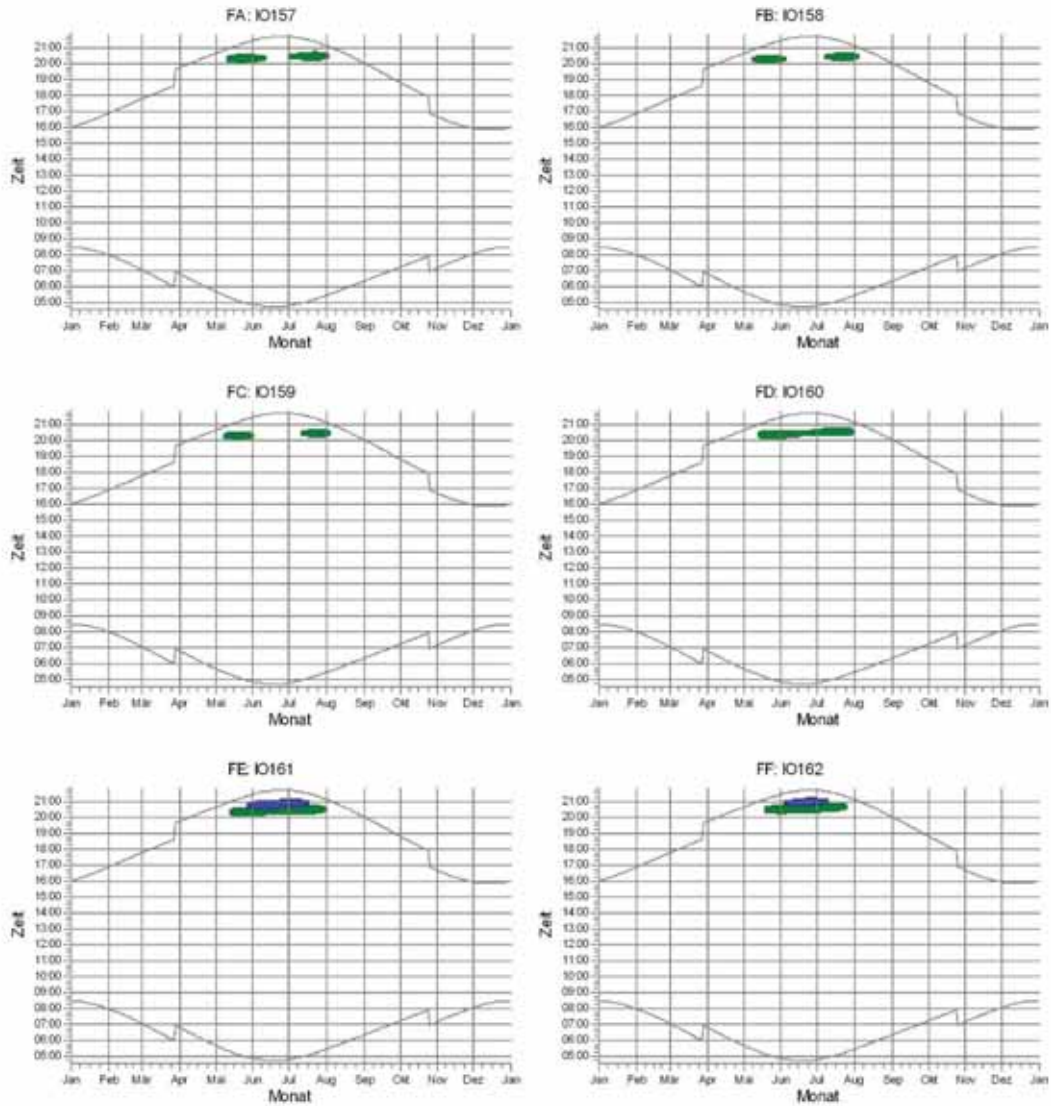
1: W1

Projekt: **180926\_Werder-Lübz\_II**      Beschreibung: Windpark Werder

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 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

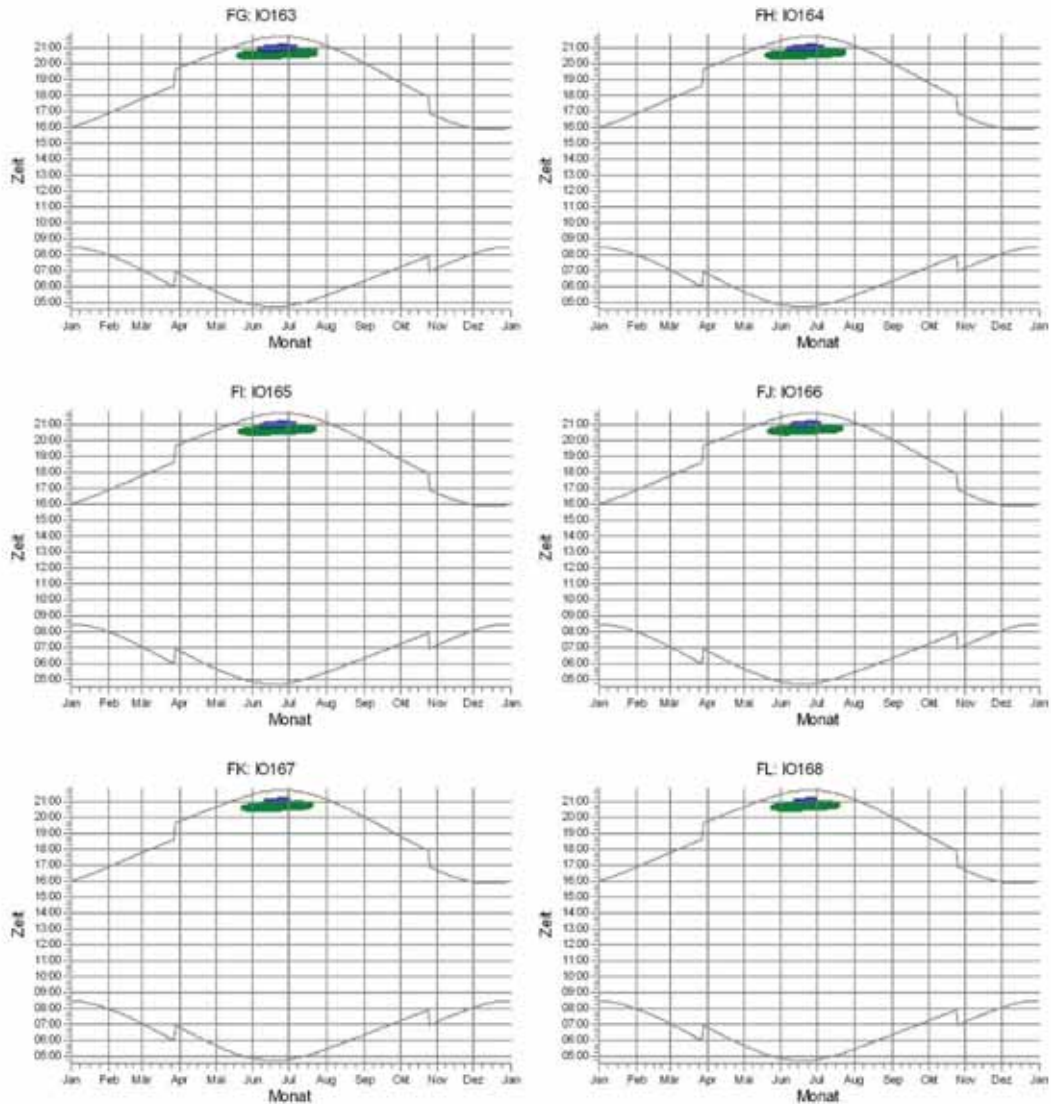
1: W1      3: W3

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

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### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

1: W1      3: W3

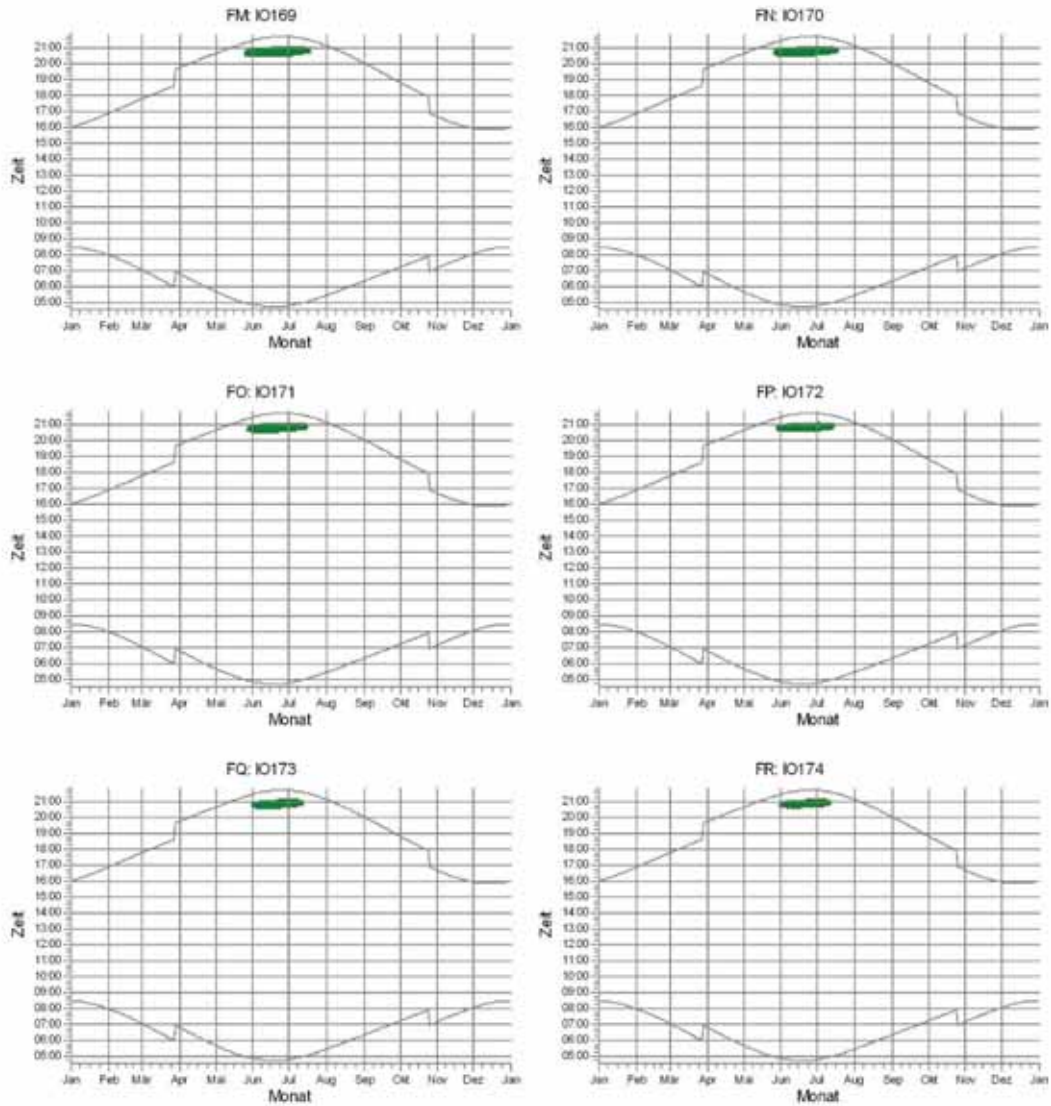


Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

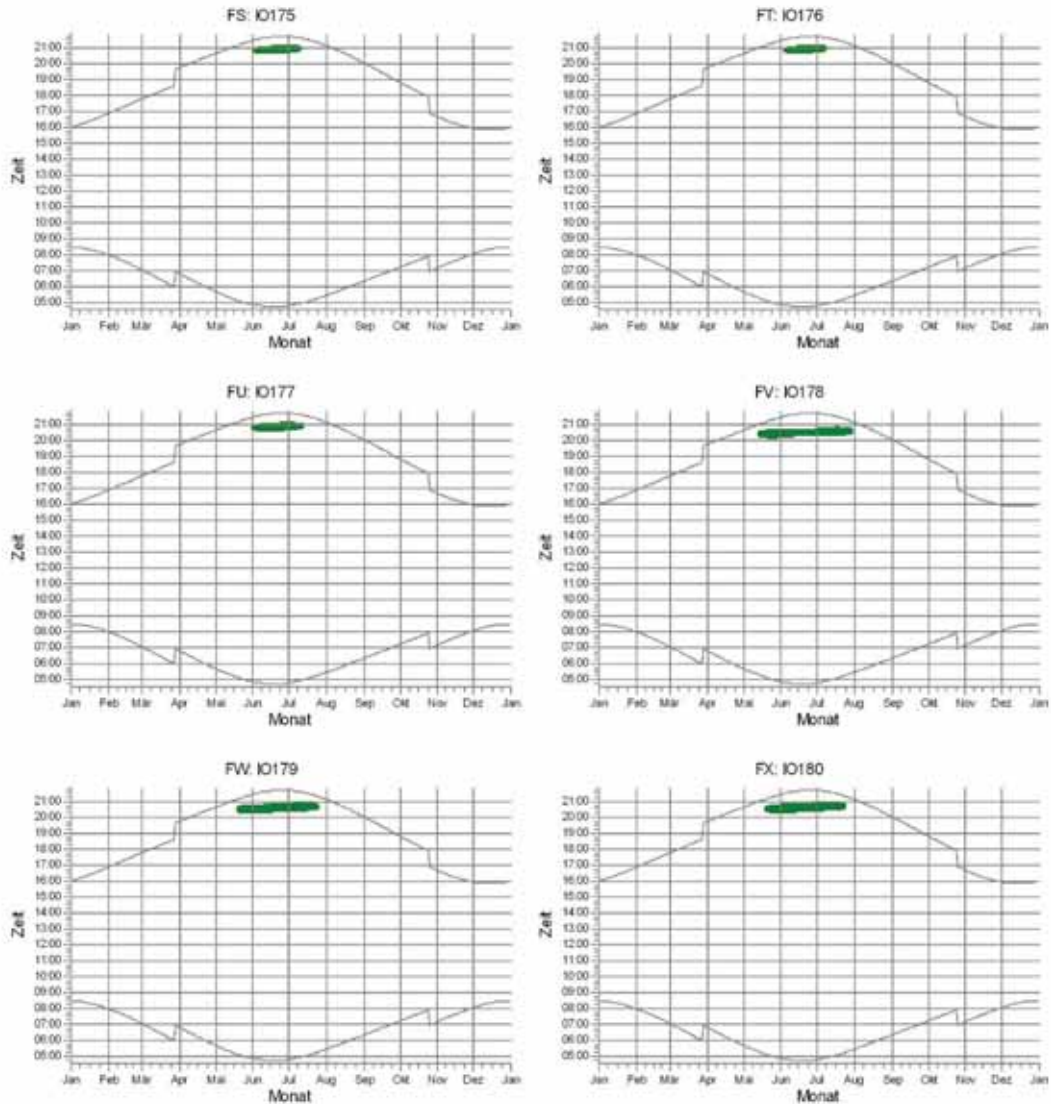
1: W1

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenzierter Anwender:  
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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

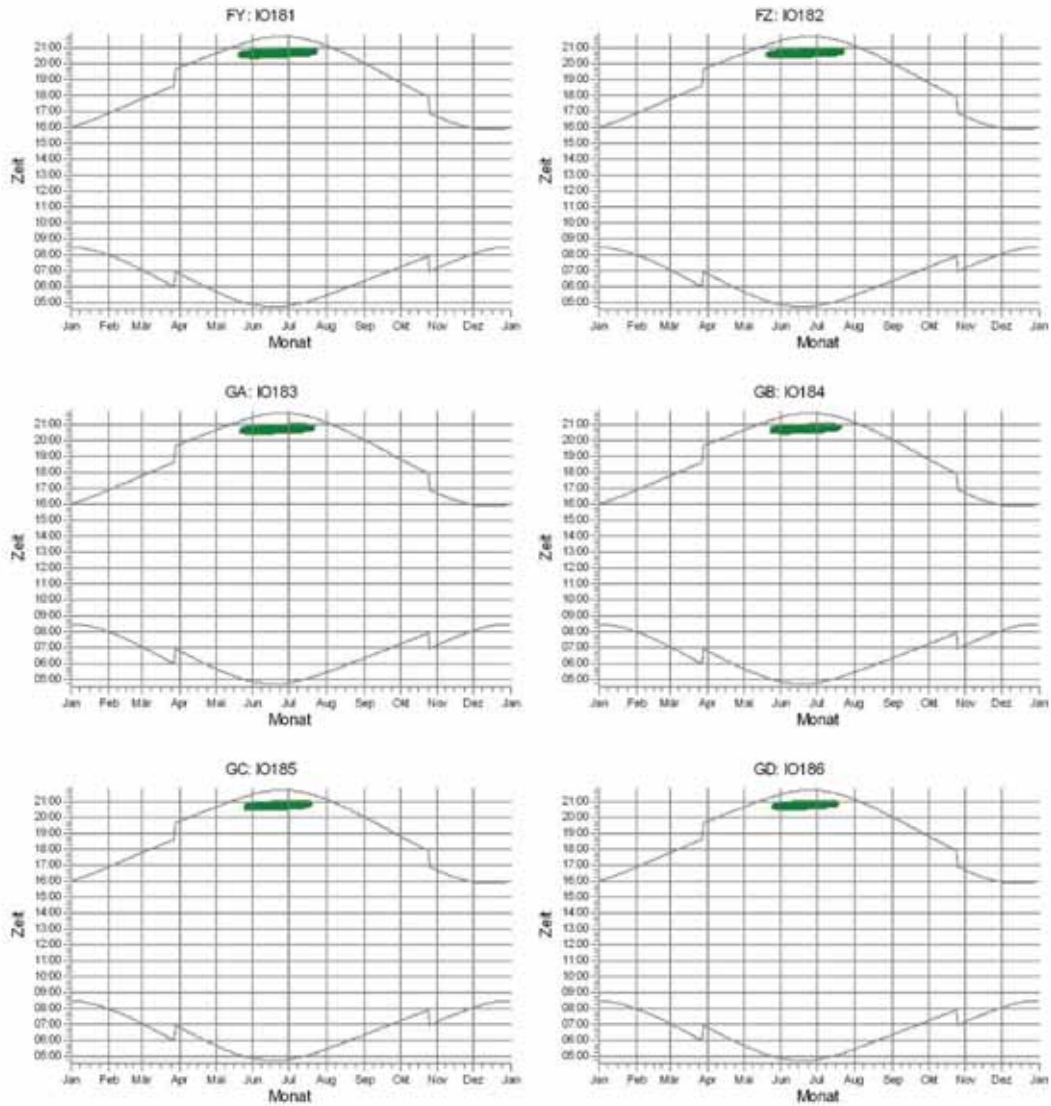
1: W1

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenzierter Anwender:  
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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

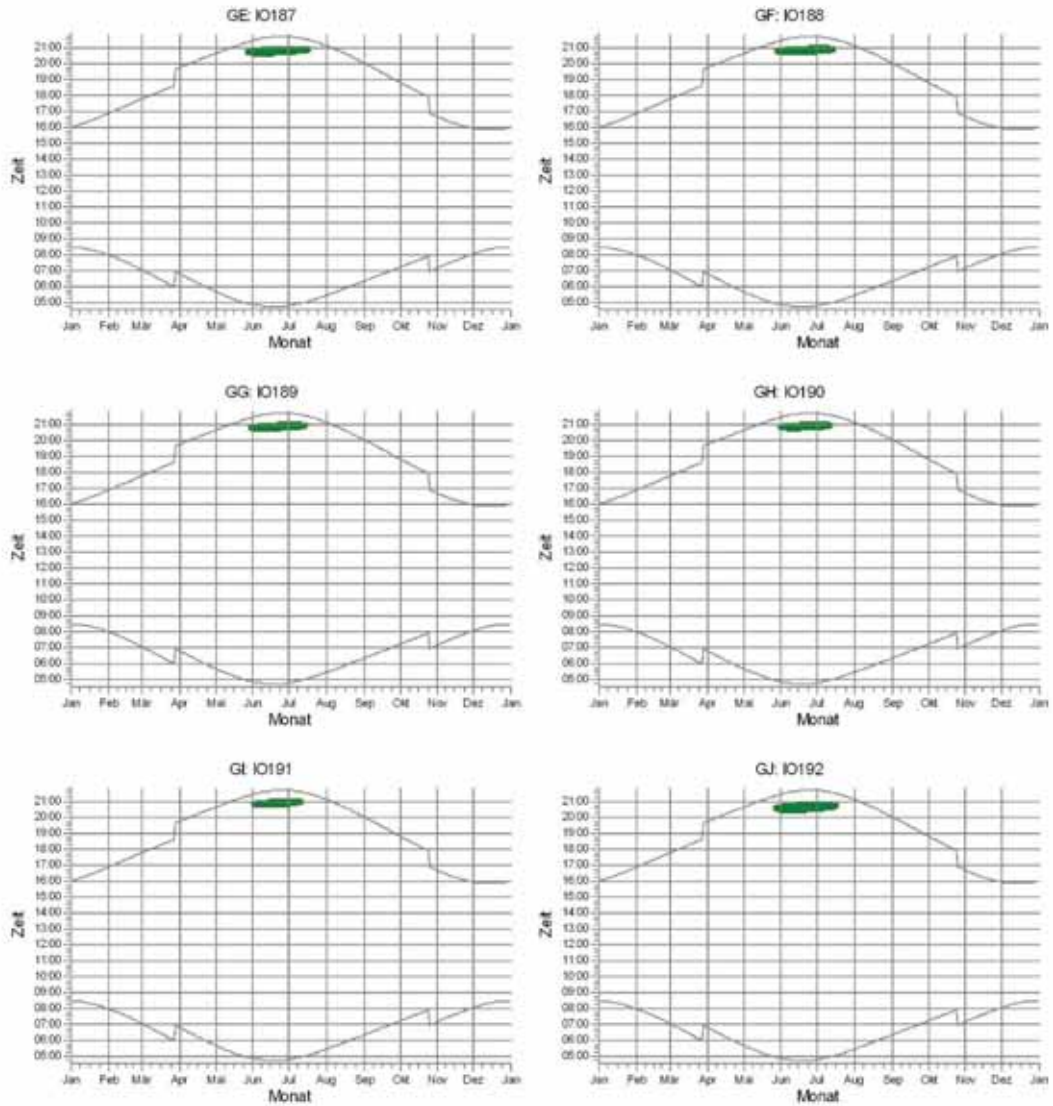
1: W1

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenzierter Anwender:  
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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

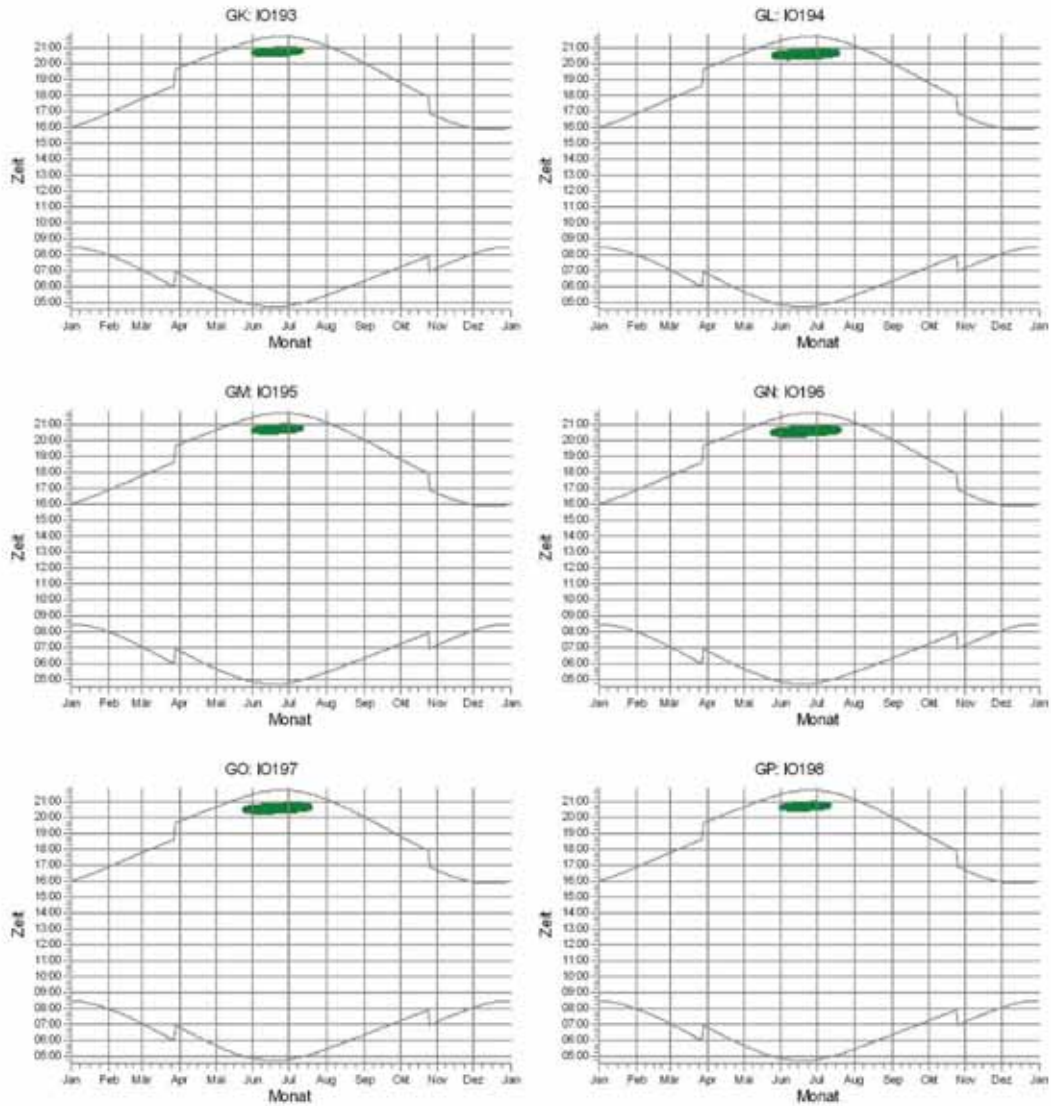
1: W1

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
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 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet: 28.01.2019 15:06/3.2.737

**SHADOW - Grafischer Kalender**

Berechnung: GB\_Werder/Lübz



WEA

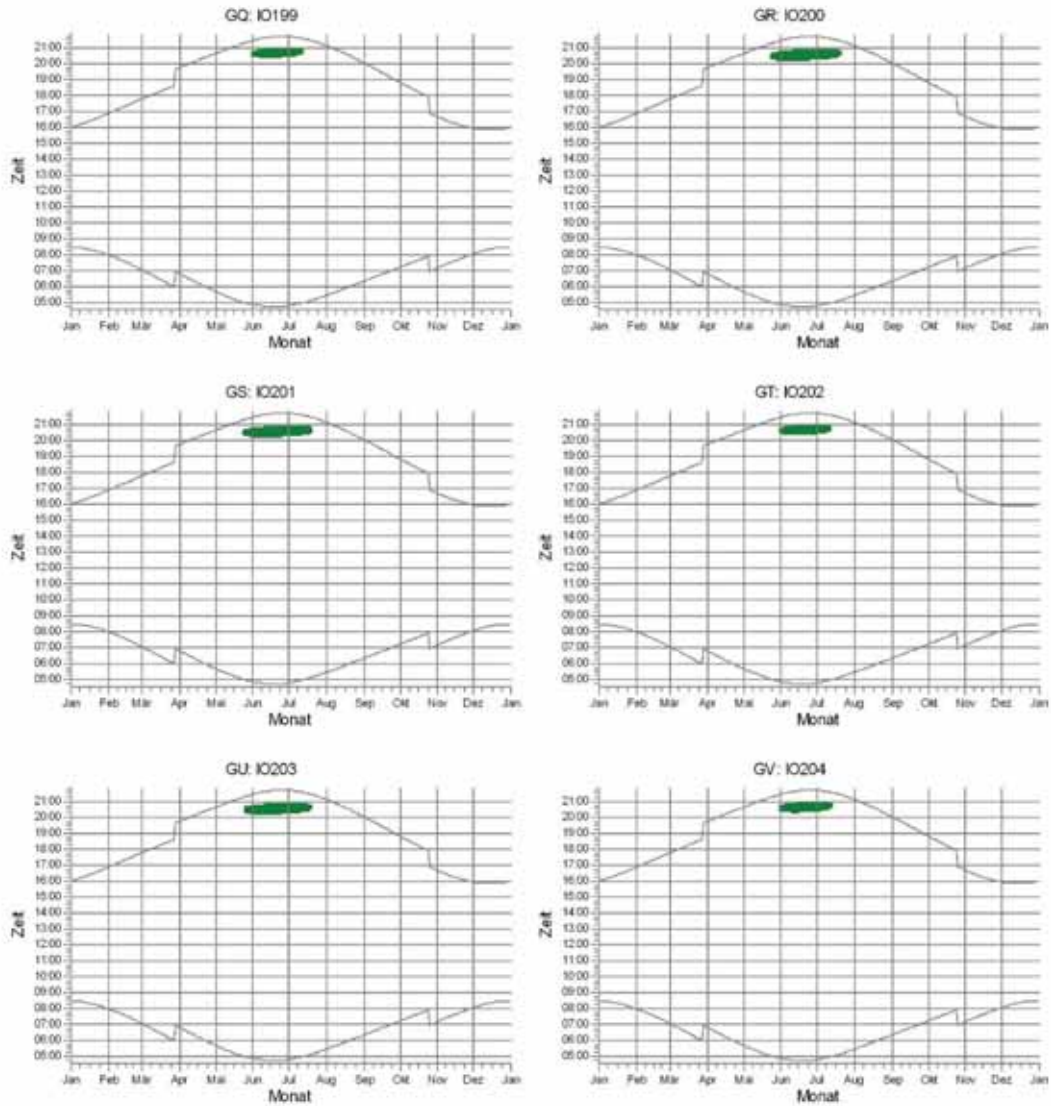
1: W1

Projekt: **180926\_Werder-Lübz\_II**      Beschreibung: Windpark Werder

Lizenznehmer/Anwender:  
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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

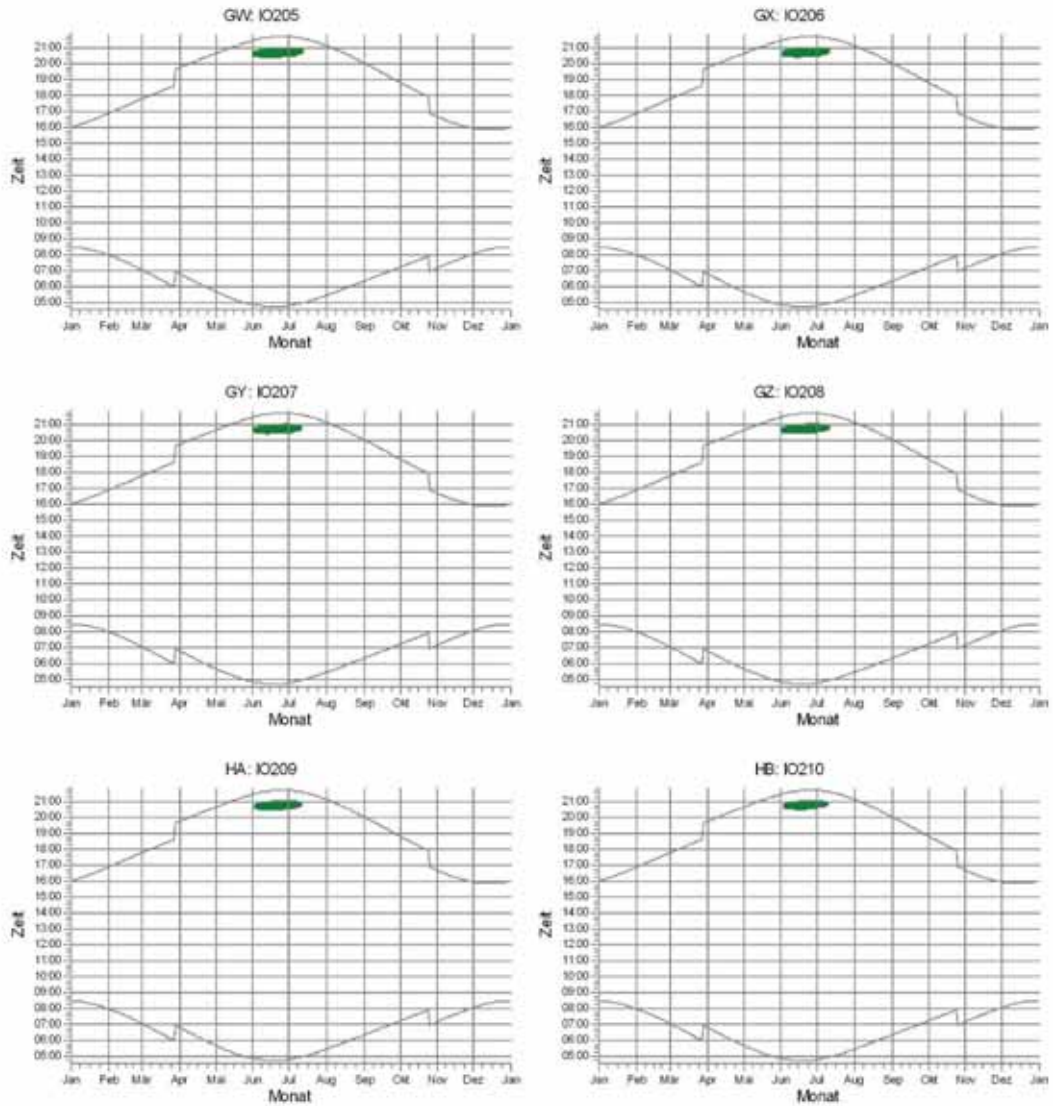
1: W1

Projekt: **180926\_Werder-Lübz\_II**      Beschreibung: Windpark Werder

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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

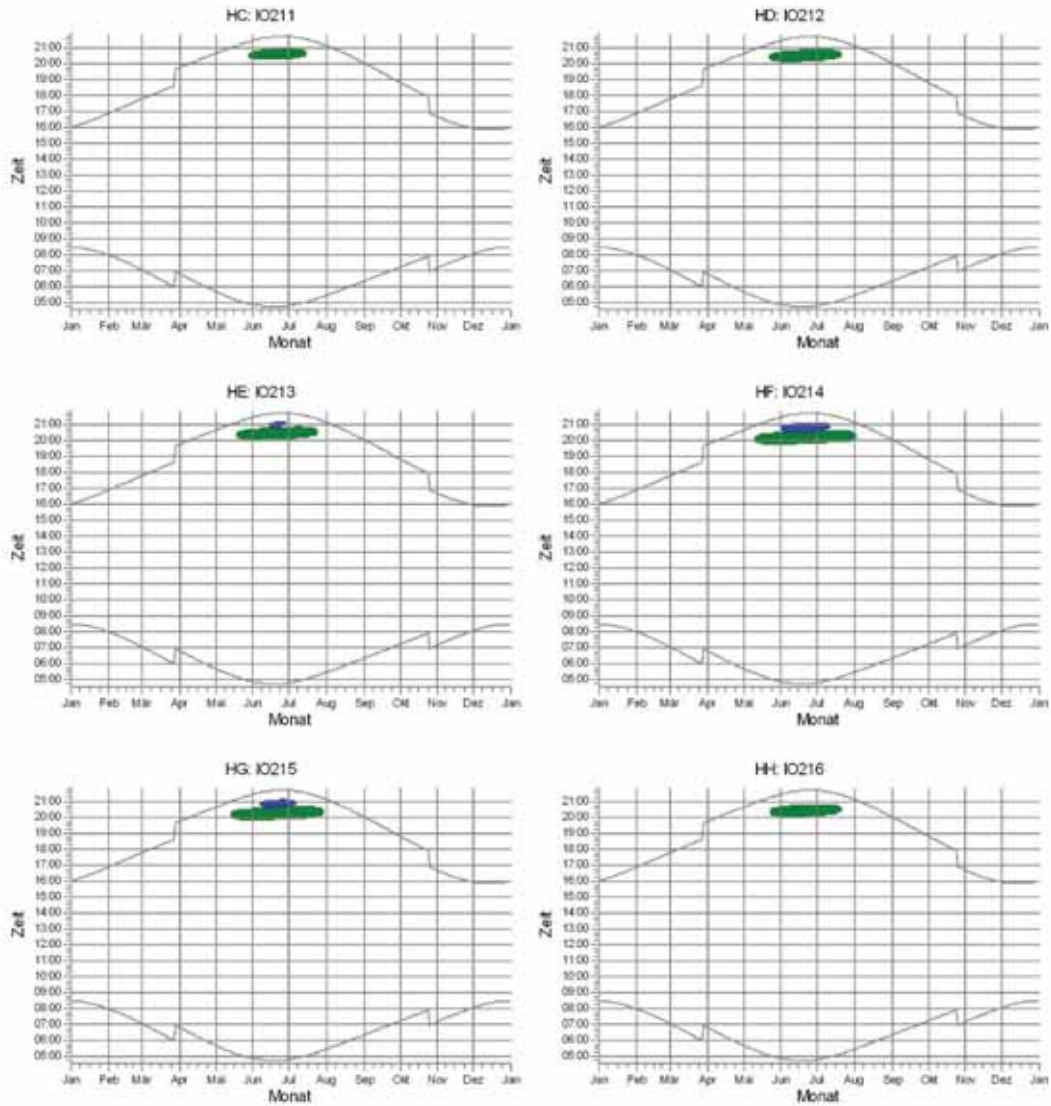
1: W1

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
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### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

1: W1      3: W3

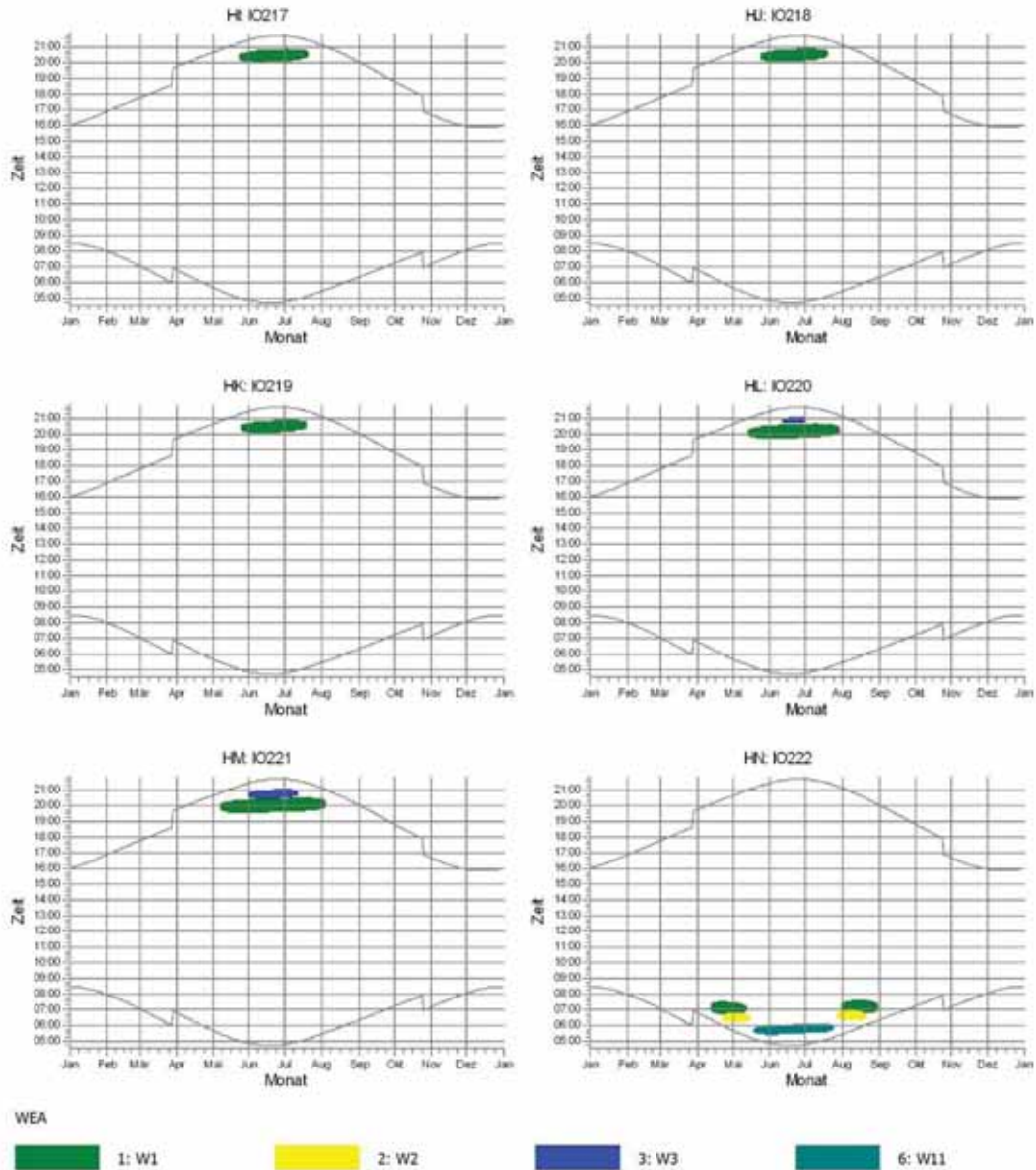


Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
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### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz

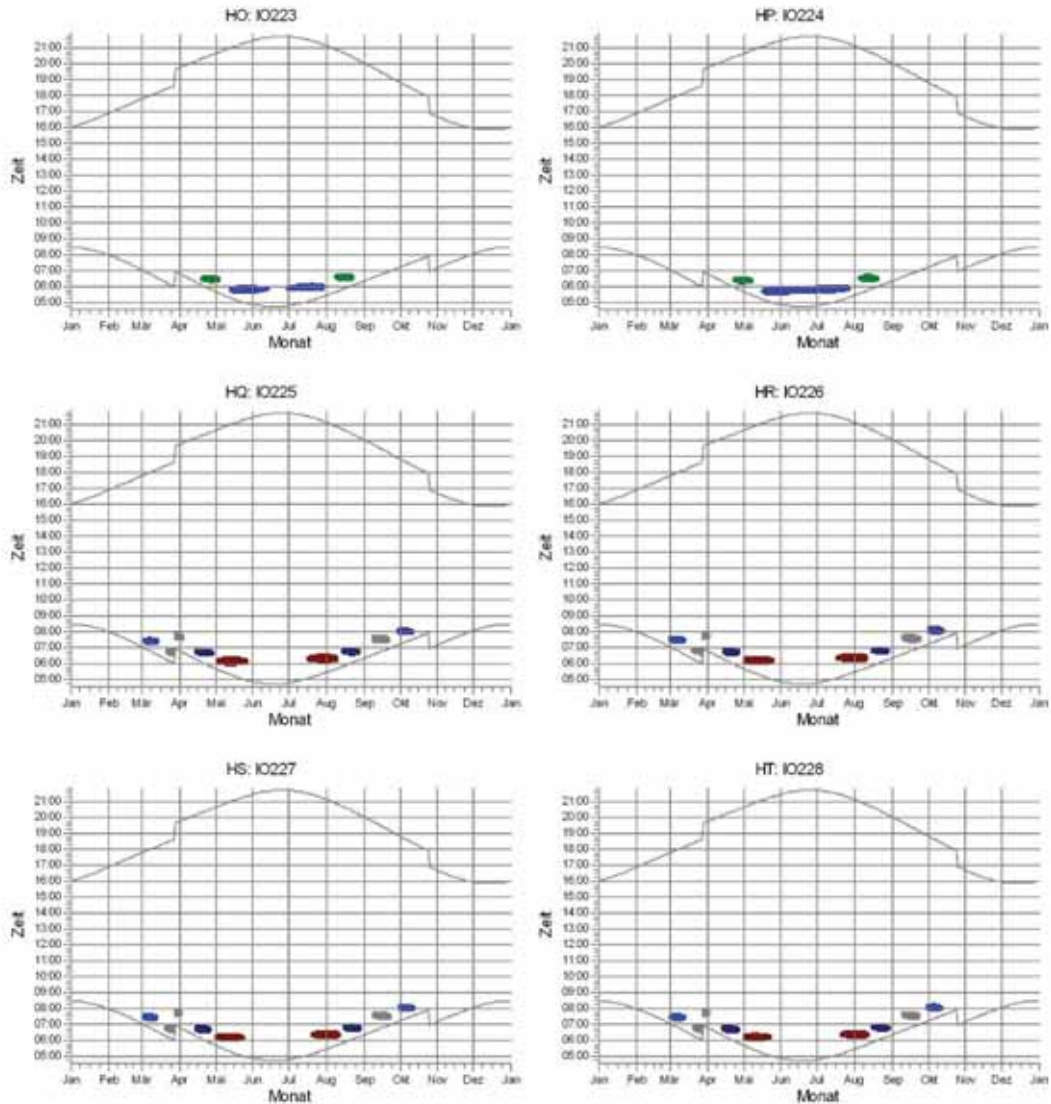


Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
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### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

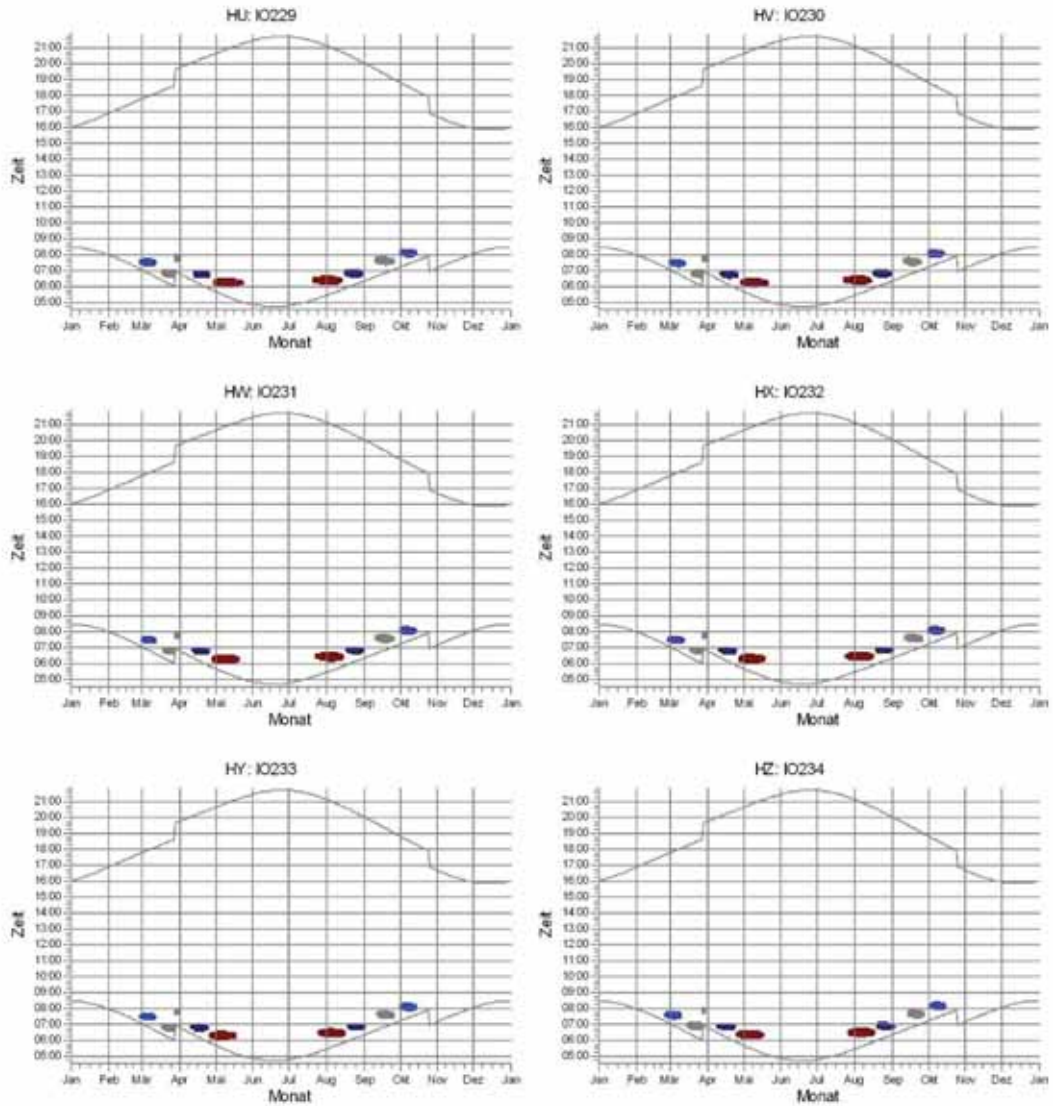


Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenzierter Anwender:  
**I17-Wind GmbH & Co. KG**  
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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

3: W3

4: W4

7: W6

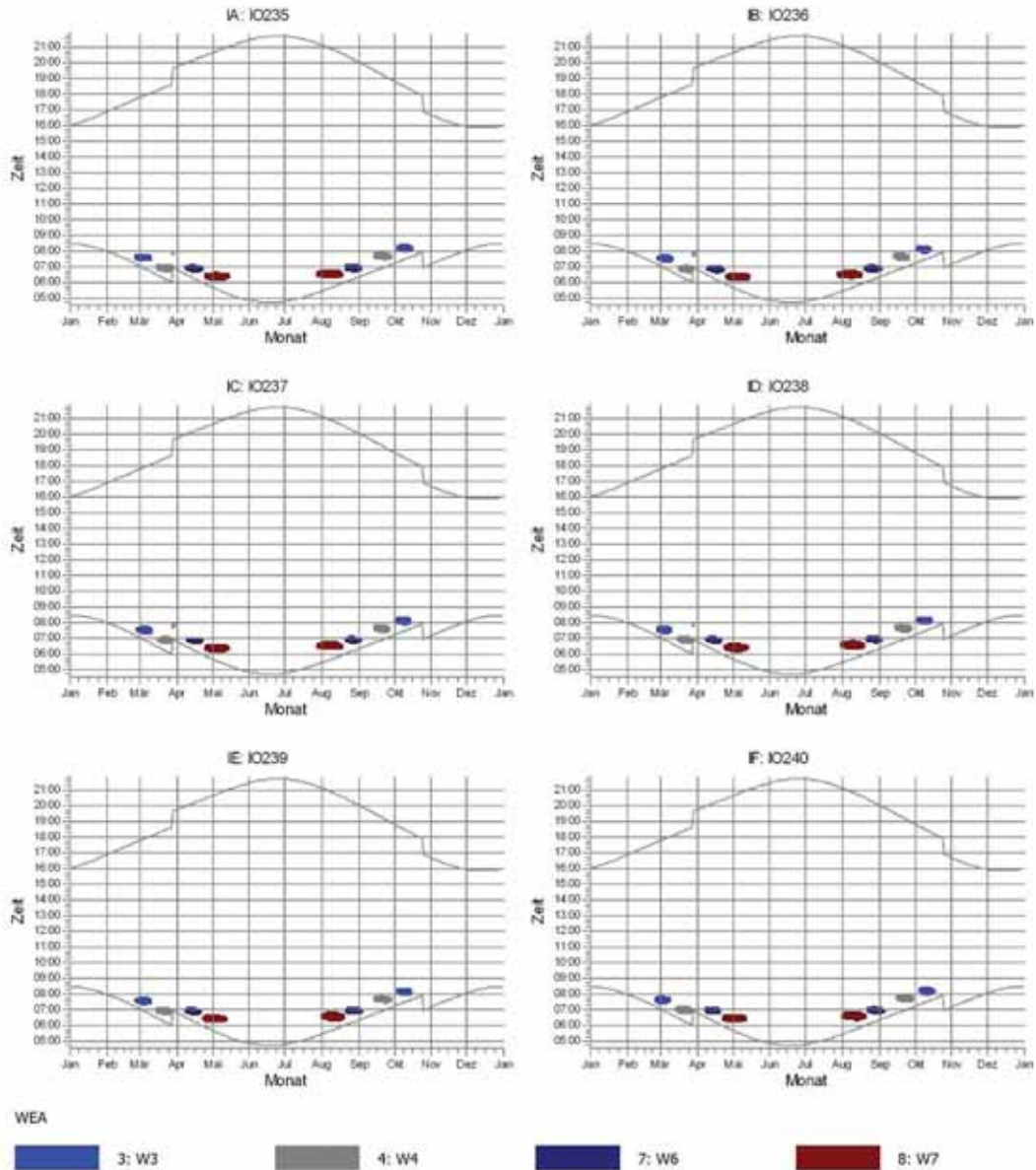
8: W7

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lieferanten-Adresse:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz

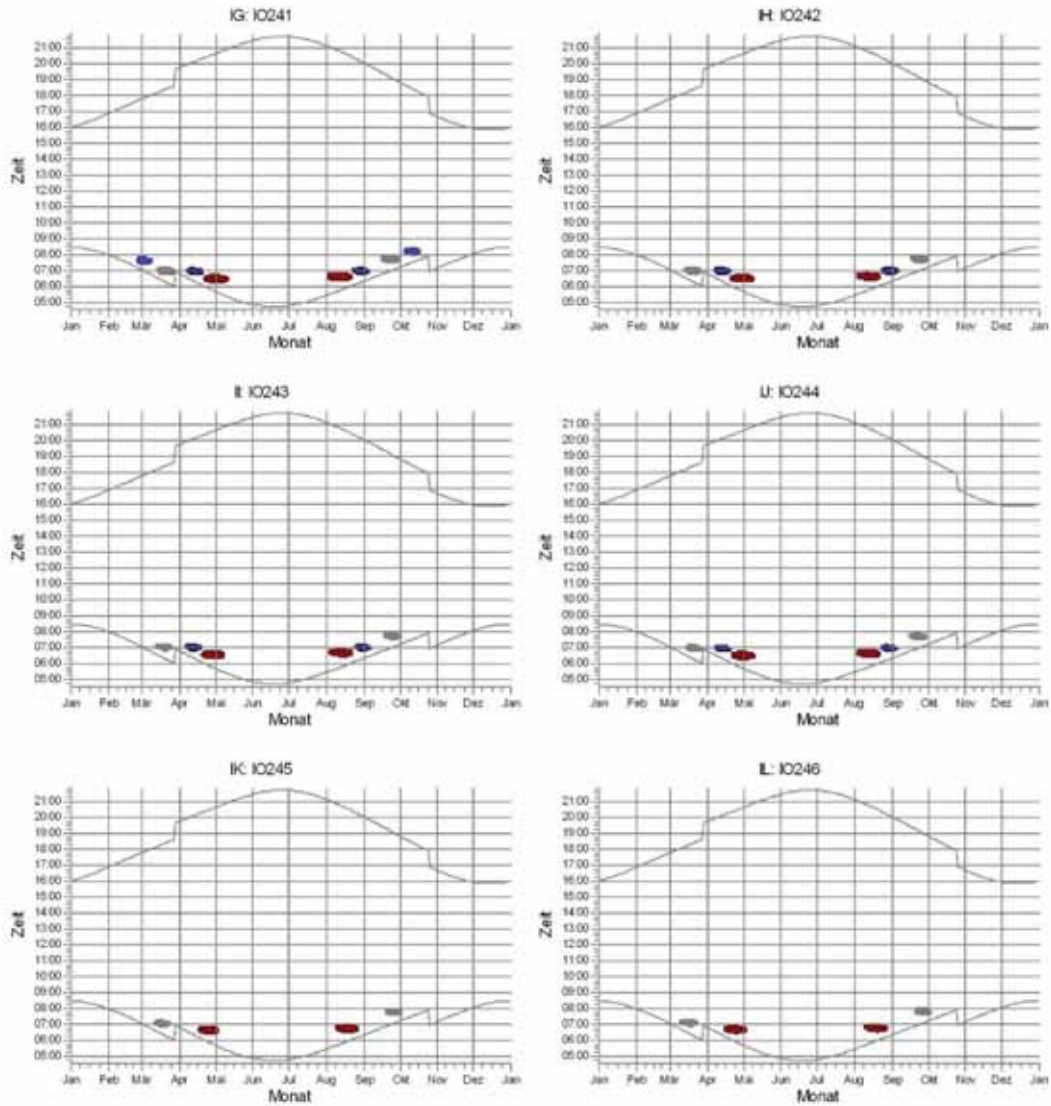


Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
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 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

3; W3

4; W4

7; W6

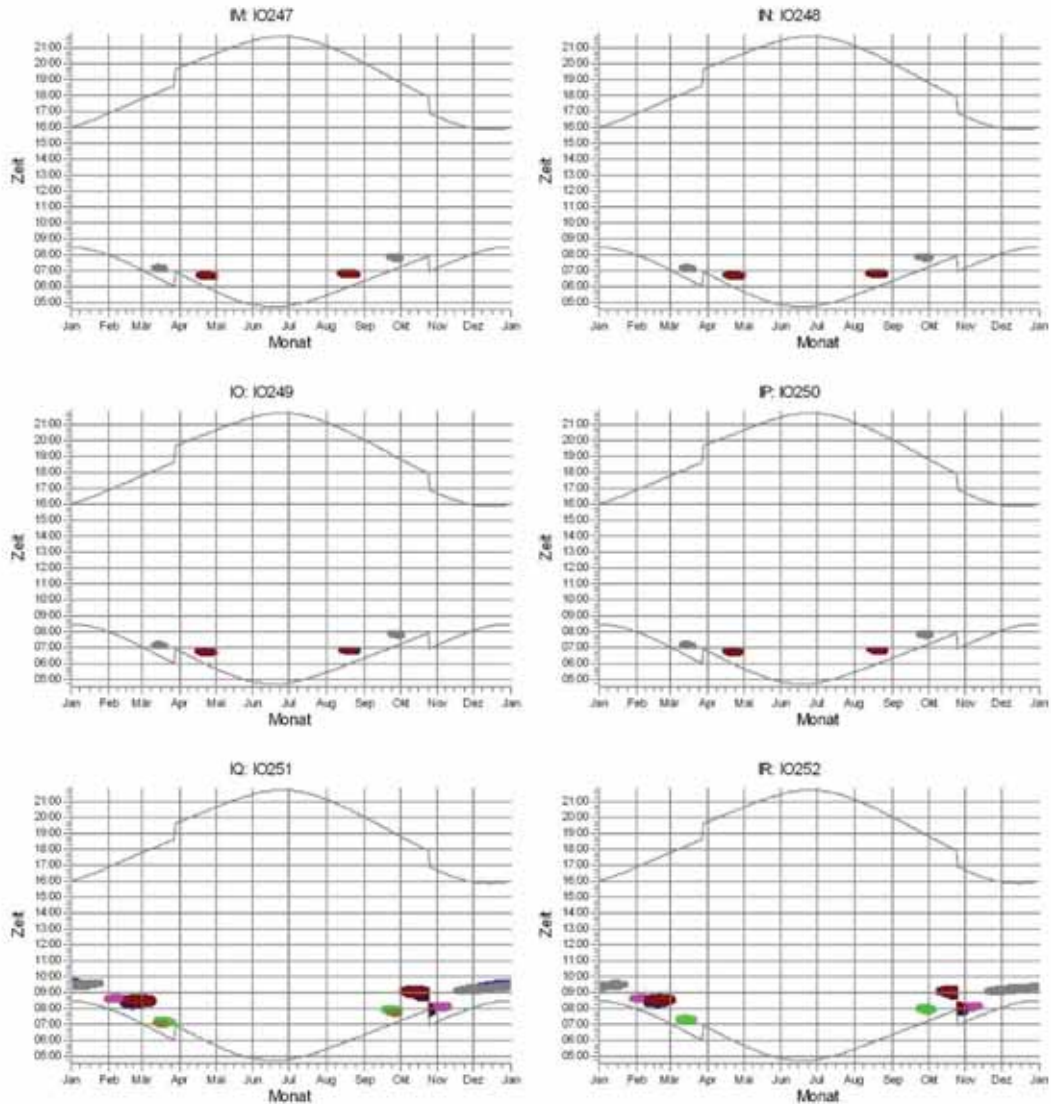
8; W7

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenzierter Anwender:  
**I17-Wind GmbH & Co. KG**  
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### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

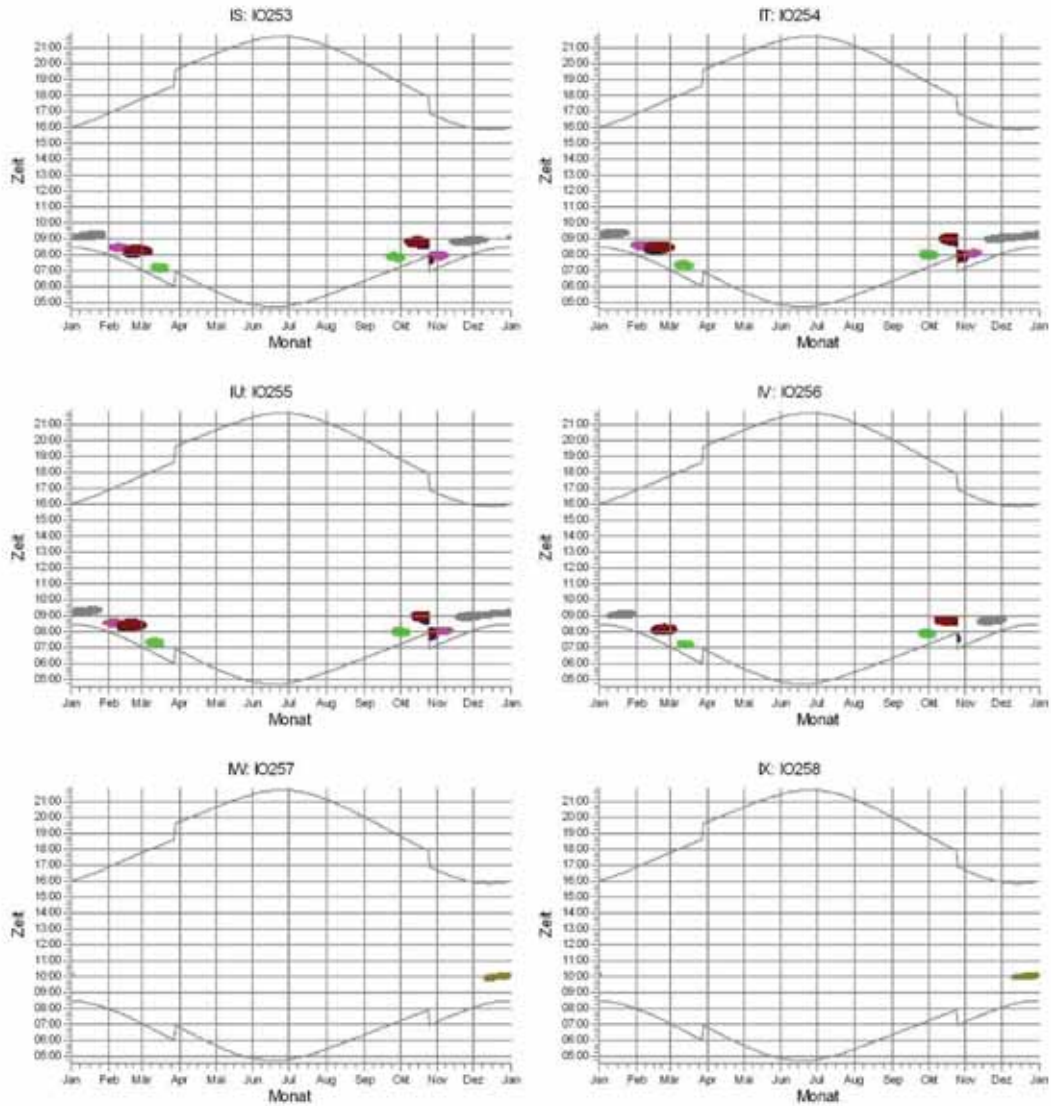


Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
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 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

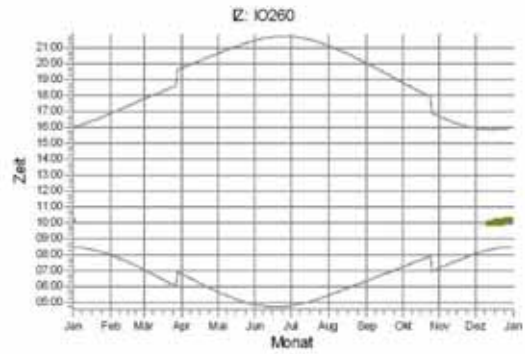
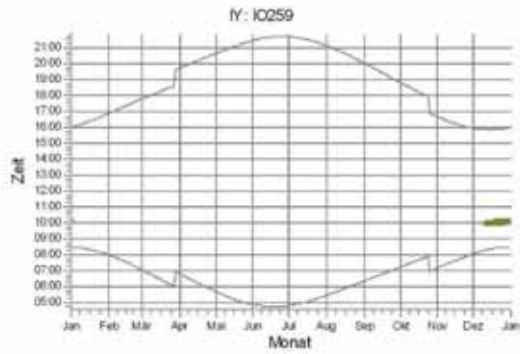


Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
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### SHADOW - Grafischer Kalender

Berechnung: GB\_Werder/Lübz



WEA

10: W9



Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Übertrager Anwenner:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 1 - W1

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1.037 1.051 712 568 7.990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1   08:29	07:59	07:02	16:48-17:15/27	06:40	18:14-19:17/63	05:40
16:03	16:34	17:49		19:46		19:36-20:55/77
2   08:29	07:57	07:00	16:46-17:14/26	06:48	18:13-19:21/68	20:41
16:04	16:56	17:51		19:48		06:46-07:22/76
3   08:28	07:56	06:58	16:49-17:14/25	06:43	18:13-19:23/70	05:36
16:05	16:58	17:52		19:50		06:14-06:34/20
4   08:28	07:54	06:56	16:51-17:14/23	06:41	18:13-19:25/72	05:34
16:07	17:00	17:54		19:52		06:14-06:32/19
5   08:28	07:52	06:53	16:53-17:13/20	06:39	18:13-19:27/74	05:32
16:08	17:02	17:56		19:54		06:15-06:30/15
6   08:27	07:50	06:51	16:54-17:12/18	06:36	18:14-19:28/74	05:30
16:09	17:03	17:58		19:55		06:16-06:28/12
7   08:27	07:49	06:48	16:54-17:12/16	06:34	18:14-19:29/75	05:28
16:10	17:05	18:00		19:57		06:15-06:26/8
8   08:26	07:47	06:46	16:56-17:08/12	06:31	18:15-19:31/76	05:26
16:12	17:07	18:02		19:59		06:17-07:15/24
9   08:26	07:45	06:44	17:00-17:05/9	06:29	18:17-19:32/75	05:24
16:13	17:09	18:04		20:01		06:13-06:29/22
10   08:25	07:43	06:41		06:27	18:17-19:32/75	05:22
16:15	17:11	18:06		20:03		06:55-07:12/17
11   08:25	07:41	06:39		06:24	18:19-19:35/76	05:20
16:16	17:13	18:08		20:04		19:27-20:26/59
12   08:24	07:39	06:37		06:22	18:20-19:37/79	05:18
16:18	17:15	18:09		20:06		18:22-18:30/14
13   08:23	07:37	06:34	17:32-17:38/6	06:20	07:01-07:15/14	05:17
16:19	17:17	18:11		20:08		19:27-20:29/62
14   08:22	07:35	06:32	17:27-17:41/14	06:17	06:58-07:18/20	21:02
16:21	17:19	18:13		20:10		19:28-20:31/63
15   08:21	07:33	06:29	17:25-17:43/18	06:15	06:56-07:20/24	21:00
16:23	17:21	18:15		20:12		18:42-19:43/61
16   08:20	07:31	06:27	17:23-17:44/21	06:13	06:54-07:22/28	21:00
16:24	17:23	18:17		20:14		18:45-19:44/59
17   08:19	07:29	06:25	17:22-17:47/25	06:10	06:52-07:22/30	21:00
16:26	17:25	18:19		20:15		19:29-20:35/64
18   08:18	07:27	06:22	17:20-17:48/27	06:08	06:51-07:23/32	21:00
16:28	17:27	18:21		20:17		18:43-19:47/64
19   08:17	07:25	06:20	17:20-17:53/33	06:06	06:50-07:24/34	21:00
16:29	17:29	18:22		20:19		18:44-19:48/65
20   08:16	07:22	06:17	17:20-17:57/37	06:04	06:28-06:33/5	18:44-19:50/66
16:31	17:31	18:24		20:21		06:49-07:25/36
21   08:15	07:20	06:15	17:19-17:58/39	06:01	06:26-06:30/10	18:44-19:51/67
16:33	17:33	18:26		20:23		06:49-07:25/36
22   08:14	07:18	06:12	17:19-18:00/41	05:59	06:24-06:37/13	18:43-19:51/68
16:35	17:35	18:28		20:24		06:48-07:23/37
23   08:12	07:16	06:10	17:19-18:00/41	05:57	06:22-06:30/16	18:44-19:54/70
16:37	17:37	18:30		20:26		06:47-07:23/38
24   08:11	07:14	06:08	17:19-18:01/42	05:55	06:19-06:30/19	18:44-19:56/72
16:38	17:39	18:32		20:28		06:46-07:23/39
25   08:10	07:11	06:05	17:18-18:03/47	05:53	06:17-06:30/21	18:45-19:58/73
16:40	17:41	18:33		20:30		06:46-07:23/39
26   08:08	07:09	06:03	17:17-18:07/50	05:50	06:15-06:30/23	18:46-20:00/74
16:42	17:43	18:35		20:32		06:46-07:23/39
27   08:07	07:07	06:00	17:17-18:11/54	05:48	06:14-06:30/24	18:47-20:02/75
16:44	17:45	18:37		20:34		06:46-07:24/38
28   08:05	07:05	05:58	17:15-18:12/57	05:46	06:13-06:30/25	18:48-20:03/75
16:46	17:47	18:39		20:35		06:46-07:24/38
29   08:04		05:55	18:15-19:14/59	05:44	06:13-06:37/24	18:50-20:06/76
16:48		18:41		20:37		06:46-07:24/38
30   08:02		05:53	18:14-19:16/62	05:42	06:13-06:37/24	18:52-20:08/76
16:50		19:43		20:39		06:46-07:23/37
31   08:01		05:51	18:14-19:17/63	05:40		
16:52		19:44		21:29		
Sonnenscheinstunden	252	274	367	419	492	508
Anzahl Minuten mit Schatten	0	378	908	2098	2506	2460

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer Anwenner:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 1 - W1

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:47 19:45-21:08/83	05:27 07:11-07:16/5	06:20 18:18-19:33/75	07:12	07:10	08:04
	21:45	21:10 19:37-20:38/61	20:04	18:51	16:42	15:58
2	04:48 19:46-21:08/82	05:28 07:06-07:20/14	06:22 18:16-19:31/75	07:14	07:12	08:06
	21:44	21:08 19:37-20:37/60	20:02	18:49	16:40	15:57
3	04:49 19:45-21:07/82	05:30 07:05-07:23/18	06:23 18:14-19:29/75	07:16	07:14	08:07
	21:44	21:06 19:37-20:36/59	20:00	18:47	16:38	15:57
4	04:50 19:45-21:07/82	05:31 07:02-07:24/22	06:25 18:12-19:28/76	07:18	07:16	08:08
	21:43	21:05 19:27-20:33/66	19:57	18:44	16:36	15:56
5	04:50 19:46-21:07/81	05:33 06:30-06:34/4 19:25-20:31/66	06:27 18:11-19:26/75	07:20 17:34-17:44/10	07:17	08:10
	21:43	21:03 07:01-07:26/25	19:55	18:42	16:34	15:55
6	04:51 19:46-21:07/81	05:35 06:27-06:37/10 19:22-20:28/66	06:29 18:09-19:24/75	07:21 17:32-17:46/14	07:19	08:11
	21:42	21:01 07:00-07:28/28	19:52	18:39	16:32	15:55
7	04:52 19:46-21:07/81	05:37 06:25-06:38/13 19:21-20:27/66	06:30 18:09-19:22/73	07:23 17:29-17:47/18	07:21	08:13
	21:42	20:59 06:59-07:28/29	19:50	18:37	16:30	15:54
8	04:53 19:46-21:06/80	05:38 06:24-06:40/16 19:20-20:25/65	06:32 18:08-19:20/72	07:25 17:28-17:47/19	07:23	08:14
	21:41	20:57 06:58-07:29/31	19:48	18:35	16:29	15:54
9	04:54 19:46-21:06/80	05:40 06:23-06:41/18 19:19-20:22/63	06:34 18:06-19:17/71	07:27 17:27-17:48/21	07:25	08:15
	21:40	20:55 06:56-07:29/33	19:45	18:32	16:27	15:54
10	04:55 19:47-21:05/78	05:42 06:22-06:43/21 19:17-20:20/63	06:36 18:06-19:14/68	07:29 17:24-17:48/24	07:27	08:16
	21:39	20:53 06:56-07:30/34	19:43	18:30	16:25	15:53
11	04:57 19:47-21:04/77	05:43 06:22-06:45/23 19:15-20:18/63	06:37 18:06-19:10/64	07:30 17:23-17:48/25	07:29	08:17
	21:38	20:51 06:56-07:31/35	19:40	18:28	16:23	15:53
12	04:58 19:47-21:03/76	05:45 06:21-06:45/24 19:02-20:17/75	06:39 18:05-19:08/63	07:32 17:21-17:48/27	07:31	08:18
	21:38	20:49 06:55-07:31/36	19:38	18:25	16:22	15:53
13	04:59 19:47-21:02/75	05:47 06:21-06:45/24 18:59-20:16/77	06:41 18:05-19:07/62	07:34 17:21-17:48/27	07:33	08:20
	21:37	20:47 06:54-07:32/38	19:35	18:23	16:20	15:53
14	05:00 19:47-21:01/74	05:49 06:22-06:46/24 18:57-20:13/76	06:43 18:05-19:05/60	07:36 17:17-17:47/30	07:35	08:21
	21:36	20:45 06:53-07:31/38	19:33	18:21	16:18	15:53
15	05:01 19:47-21:00/73	05:50 06:21-06:46/25 18:55-20:10/75	06:44 18:05-19:03/58	07:38 17:14-17:46/32	07:36	08:21
	21:35	20:43 06:53-07:32/39	19:31	18:18	16:17	15:53
16	05:03 19:47-20:59/72	05:52 06:22-06:46/24 18:54-20:09/75	06:46 18:05-19:00/55	07:40 17:13-17:45/32	07:38	08:22
	21:33	20:41 06:53-07:32/39	19:28	18:16	16:15	15:53
17	05:04 19:47-20:59/72	05:54 06:22-06:45/23 18:52-20:06/74	06:48 18:06-18:57/51	07:41 17:11-17:43/32	07:40	08:23
	21:32	20:38 06:53-07:31/38	19:26	18:14	16:14	15:53
18	05:05 19:47-20:57/70	05:56 06:24-06:45/21 18:51-20:04/73	06:50 18:06-18:54/48	07:43 17:08-17:40/32	07:42	08:24
	21:31	20:36 06:53-07:31/38	19:23	18:11	16:13	15:53
19	05:07 19:45-20:56/71	05:57 06:26-06:44/18 18:51-20:03/72	06:51 18:06-18:48/42	07:45 17:07-17:37/30	07:44	08:25
	21:30	20:34 06:53-07:31/38	19:21	18:09	16:11	15:54
20	05:08 19:45-20:55/70	05:59 06:27-06:43/16 18:49-20:00/71	06:53 18:05-18:47/42	07:47 17:07-17:36/29	07:46	08:25
	21:29	20:32 06:52-07:30/38	19:18	18:07	16:10	15:54
21	05:09 19:43-20:54/71	06:01 06:29-06:42/13 18:49-19:57/68	06:55 18:05-18:46/41	07:49 17:06-17:34/28	07:47	08:26
	21:27	20:30 06:53-07:30/37	19:16	18:05	16:08	15:54
22	05:11 19:42-20:52/70	06:02 06:31-06:40/9 18:48-19:55/67	06:57 18:05-18:44/39	07:51 17:06-17:32/26	07:49	08:27
	21:26	20:27 06:53-07:30/37	19:13	18:03	16:07	15:55
23	05:12 19:42-20:51/69	06:04 06:32-06:36/4 18:47-19:54/67	06:58 18:04-18:41/37	07:53 17:06-17:30/24	07:51	08:27
	21:24	20:25 06:53-07:28/35	19:11	18:00	16:06	15:55
24	05:14 19:41-20:49/68	06:06 06:54-07:28/34	07:00 18:04-18:38/34	07:55 17:06-17:28/22	07:53	08:27
	21:23	20:23 18:47-19:52/65	19:08	17:58	16:05	15:56
25	05:15 19:40-20:47/67	06:08 06:55-07:27/32	07:02 18:04-18:32/28	06:56 16:07-16:25/18	07:54	08:28
	21:22	20:21 18:46-19:50/64	19:06	16:56	16:04	15:57
26	05:17 19:40-20:46/66	06:09 06:55-07:25/30	07:04 18:05-18:30/25	06:58 16:08-16:24/16	07:56	08:28
	21:20	20:18 18:46-19:48/62	19:04	16:54	16:03	15:57
27	05:19 19:39-20:45/66	06:11 06:56-07:24/28	07:05 18:05-18:26/21	07:00 16:10-16:22/12	07:58	08:28
	21:18	20:16 18:47-19:46/59	19:01	16:52	16:02	15:58
28	05:20 19:39-20:44/65	06:13 06:58-07:22/24	07:07 18:06-18:25/19	07:02 16:11-16:20/9	07:59	08:29
	21:17	20:14 18:43-19:44/61	18:59	16:50	16:01	15:59
29	05:22 19:38-20:42/64	06:15 06:59-07:19/20	07:09 18:07-18:23/16	07:04	08:01	08:29
	21:15	20:11 18:40-19:42/62	18:56	16:48	16:00	16:00
30	05:23 19:38-20:40/62	06:16 07:02-07:16/14	07:11 18:10-18:20/10	07:06	08:02	08:29
	21:13	20:09 18:39-19:40/61	18:54	16:46	15:59	16:01
31	05:25 19:37-20:39/62	06:18 18:37-19:36/59		07:08		08:29
	21:12	20:07 18:21-18:35/14		16:44		16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	2270	3312	1550	557	0	0

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

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

Projekt: **180926\_Werder-Lübz\_II**      Beschreibung: Windpark Werder

Lizenzierter Anwender:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 2 - W2

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29 16:03	07:59 16:54	07:02 16:36-17:21/45 17:49	06:48 19:46	05:40 06:16-06:43/27 20:41 18:51-20:05/74	04:51 18:46-20:47/121 21:30
2	08:29 16:04	07:57 16:56	07:00 16:36-17:23/47 17:50	06:46 19:48	05:38 06:16-06:43/27 20:43 18:52-20:05/73	04:50 18:47-20:49/122 21:31
3	08:28 16:05	07:56 16:58	06:58 16:37-17:25/48 17:52	06:43 18:52-19:06/14 19:50	05:36 06:16-06:43/27 20:44 18:54-20:07/73	04:49 18:47-20:50/123 21:32
4	08:28 16:06	07:54 17:00	06:55 16:38-17:27/49 17:54	06:41 18:48-19:08/20 19:52	05:34 06:17-06:43/26 20:46 18:55-20:08/73	04:49 18:47-20:50/123 21:33
5	08:28 16:08	07:52 17:01	06:53 16:38-17:28/50 17:56	06:39 18:46-19:10/24 19:54	05:32 06:16-06:43/27 20:48 18:56-20:10/74	04:48 18:48-20:52/124 21:34
6	08:27 16:09	07:50 17:03	06:51 16:40-17:30/50 17:58	06:36 18:45-19:12/27 19:55	05:30 06:16-06:42/26 20:50 18:56-20:11/75	04:47 18:48-20:53/125 21:35
7	08:27 16:10	07:49 17:05	06:48 16:41-17:31/50 18:00	06:34 18:42-19:12/30 19:57	05:28 06:16-06:42/26 20:51 18:56-20:12/76	04:46 18:48-20:53/125 21:36
8	08:26 16:12	07:47 17:07	06:46 16:43-17:33/50 18:02	06:31 18:41-19:21/40 19:59	05:26 06:17-06:41/24 20:53 18:54-20:13/79	04:46 18:48-20:55/127 21:37
9	08:26 16:13	07:45 17:09	06:44 16:46-17:34/48 18:04	06:29 18:41-19:25/44 20:01	05:24 06:18-06:41/23 20:55 18:54-20:19/85	04:45 18:49-20:56/127 21:38
10	08:25 16:15	07:43 17:11	06:41 16:50-17:34/44 18:06	06:27 18:39-19:26/47 20:03	05:22 06:18-06:40/22 20:57 18:52-20:20/88	04:45 18:49-20:56/127 21:39
11	08:25 16:16	07:41 17:13	06:39 16:50-17:35/45 18:08	06:24 18:38-19:28/50 20:04	05:21 06:19-06:38/19 20:58 18:51-20:21/90	04:44 18:49-20:57/128 21:40
12	08:24 16:18	07:39 17:15	06:37 16:50-17:34/44 18:09	06:22 18:38-19:29/51 20:06	05:19 06:20-06:38/18 21:00 18:51-20:23/92	04:44 18:50-20:58/128 21:41
13	08:23 16:19	07:37 17:17	06:34 16:51-17:34/43 18:11	06:20 18:37-19:29/52 20:08	05:17 06:21-06:36/15 21:02 18:50-20:23/93	04:44 18:49-20:58/129 21:41
14	08:22 16:21	07:35 17:19	06:32 16:52-17:33/41 18:13	06:17 18:37-19:30/53 20:10	05:15 06:24-06:35/11 21:03 18:50-20:25/95	04:43 18:50-20:59/129 21:42
15	08:21 16:22	07:33 17:21	06:29 16:53-17:33/40 18:15	06:15 18:37-19:31/54 20:12	05:14 06:26-06:31/5 21:05 18:49-20:25/96	04:43 18:50-21:00/130 21:43
16	08:20 16:24	07:31 17:23	06:27 16:55-17:32/37 18:17	06:13 18:37-19:39/62 20:14	05:12 18:49-20:27/98 21:07	04:43 18:50-21:01/131 21:43
17	08:19 16:26	07:29 17:25	06:25 16:57-17:31/34 18:19	06:10 18:36-19:41/65 20:15	05:10 18:48-20:28/100 21:08	04:43 18:50-21:01/131 21:44
18	08:18 16:28	07:27 17:27	06:22 16:58-17:30/32 18:21	06:08 18:36-19:43/67 20:17	05:09 18:48-20:31/103 21:10	04:43 18:51-21:02/131 21:44
19	08:17 16:29	07:25 16:47-16:54/7 17:29	06:20 16:58-17:27/29 18:22	06:06 18:37-19:45/68 20:19	05:07 18:47-20:32/105 21:12	04:43 18:51-21:02/131 21:44
20	08:16 16:31	07:22 16:43-17:01/18 17:31	06:17 16:59-17:23/24 18:24	06:04 18:37-19:47/70 20:21	05:06 18:47-20:33/106 21:13	04:43 18:51-21:02/131 21:45
21	08:15 16:33	07:20 16:41-17:05/24 17:33	06:15 17:00-17:20/20 18:26	06:01 18:38-19:49/71 20:23	05:04 18:47-20:34/107 21:15	04:43 18:51-21:02/131 21:45
22	08:14 16:35	07:18 16:40-17:07/27 17:35	06:12 17:02-17:19/17 18:28	05:59 18:38-19:49/71 20:24	05:03 18:46-20:34/108 21:16	04:43 18:52-21:03/131 21:45
23	08:12 16:36	07:16 16:39-17:09/30 17:37	06:10 17:04-17:15/11 18:30	05:57 06:28-06:34/6 20:26 18:39-19:52/73	05:02 18:46-20:36/110 21:18	04:43 18:52-21:03/131 21:45
24	08:11 16:38	07:14 16:37-17:10/33 17:39	06:08 18:32	05:55 06:24-06:37/13 20:28 18:40-19:54/74	05:00 18:46-20:38/112 21:19	04:44 18:52-21:03/131 21:46
25	08:10 16:40	07:11 16:37-17:12/35 17:41	06:05 18:33	05:52 06:22-06:39/17 20:30 18:41-19:56/75	04:59 18:46-20:39/113 21:21	04:44 18:53-21:04/131 21:46
26	08:08 16:42	07:09 16:37-17:16/39 17:43	06:03 18:35	05:50 06:21-06:40/19 20:32 18:43-19:58/75	04:58 18:46-20:40/114 21:22	04:44 18:52-21:03/131 21:46
27	08:07 16:44	07:07 16:36-17:17/41 17:45	06:00 18:37	05:48 06:19-06:41/22 20:34 18:45-19:59/74	04:56 18:46-20:41/115 21:23	04:45 18:53-21:03/130 21:45
28	08:05 16:46	07:05 16:36-17:19/43 17:47	05:58 18:39	05:46 06:18-06:42/24 20:35 18:47-20:01/74	04:55 18:46-20:41/115 21:25	04:45 18:53-21:02/129 21:45
29	08:04 16:48	 17:47	05:55 19:41	05:44 06:18-06:43/25 20:37 18:48-20:02/74	04:54 18:47-20:42/115 21:26	04:46 18:53-21:02/129 21:45
30	08:02 16:50	 17:47	05:53 19:43	05:42 06:17-06:43/26 20:39 18:49-20:03/74	04:53 18:47-20:44/117 21:27	04:47 18:53-21:01/128 21:45
31	08:01 16:52	 17:47	05:51 19:44	 19:44	04:52 18:47-20:46/119 21:29	 21:45
Sonnenscheinstunden	252	274	367	419	492	508
Anzahl Minuten mit Schatten	0	297	898	1725	3316	3845

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenzierter Anwender:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Betreuer:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 2 - W2

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:47 18:53-21:01/128	05:26 06:30-06:49/19	06:20 18:37-19:27/50	07:12 17:29-18:13/44	07:10	08:04
	21:45	21:10 19:02-20:33/91	20:04	18:51	16:42	15:58
2	04:48 18:54-21:01/127	05:28 06:29-06:49/20	06:22 18:38-19:25/47	07:14 17:28-18:13/45	07:12	08:06
	21:44	21:08 19:02-20:31/89	20:02	18:49	16:40	15:57
3	04:49 18:53-21:00/127	05:30 06:28-06:50/22	06:23 18:38-19:22/44	07:16 17:28-18:12/44	07:14	08:07
	21:44	21:06 19:03-20:30/87	20:00	18:47	16:38	15:57
4	04:50 18:54-21:00/126	05:31 06:27-06:51/24	06:25 18:38-19:18/40	07:18 17:25-18:11/46	07:16	08:08
	21:43	21:05 19:04-20:27/83	19:57	18:44	16:36	15:56
5	04:50 18:54-21:00/126	05:33 06:27-06:51/24	06:27 18:39-19:10/31	07:20 17:21-18:10/49	07:17	08:10
	21:43	21:03 19:05-20:22/77	19:55	18:42	16:34	15:55
6	04:51 18:54-20:59/125	05:35 06:27-06:52/25	06:29 18:40-19:07/27	07:21 17:19-18:09/50	07:19	08:11
	21:42	21:01 19:06-20:21/75	19:52	18:39	16:32	15:55
7	04:52 18:54-20:59/125	05:37 06:26-06:52/26	06:30 18:41-19:06/25	07:23 17:16-18:06/50	07:21	08:13
	21:42	20:59 19:06-20:20/74	19:50	18:37	16:30	15:54
8	04:53 18:55-20:58/123	05:38 06:26-06:52/26	06:32 18:43-19:03/20	07:25 17:14-18:04/50	07:23	08:14
	21:41	20:57 19:05-20:19/74	19:48	18:35	16:29	15:54
9	04:54 18:55-20:57/122	05:40 06:25-06:52/27	06:34 18:45-18:59/14	07:27 17:13-18:02/49	07:25	08:15
	21:40	20:55 19:04-20:17/73	19:45	18:32	16:27	15:54
10	04:55 18:55-20:57/122	05:42 06:25-06:52/27	06:36	07:29 17:11-18:00/49	07:27	08:16
	21:39	20:53 19:03-20:16/73	19:43	18:30	16:25	15:53
11	04:57 18:55-20:56/121	05:43 06:26-06:52/26	06:37	07:30 17:10-17:58/48	07:29	08:17
	21:38	20:51 19:00-20:14/74	19:40	18:28	16:23	15:53
12	04:58 18:55-20:55/120	05:45 06:25-06:51/26	06:39	07:32 17:10-17:56/46	07:31	08:18
	21:38	20:49 18:59-20:13/74	19:38	18:25	16:22	15:53
13	04:59 18:55-20:54/119	05:47 06:26-06:51/25	06:41	07:34 17:09-17:53/44	07:33	08:20
	21:37	20:47 18:57-20:12/75	19:35	18:23	16:20	15:53
14	05:00 18:55-20:52/117	05:49 06:25-06:50/25	06:43	07:36 17:09-17:52/43	07:35	08:20
	21:36	20:45 18:55-20:09/74	19:33	18:21	16:18	15:53
15	05:01 18:55-20:50/115	05:50 06:26-06:49/23	06:44	07:38 17:09-17:49/40	07:36	08:21
	21:35	20:43 18:54-20:08/74	19:31	18:18	16:17	15:53
16	05:03 18:55-20:50/115	05:52 06:27-06:49/22	06:46	07:40 17:09-17:47/38	07:38	08:22
	21:33	20:41 18:52-20:06/74	19:28	18:16	16:15	15:53
17	05:04 18:56-20:50/114	05:54 06:28-06:47/19	06:48	07:41 17:09-17:43/34	07:40	08:23
	21:32	20:38 18:49-20:04/75	19:26	18:14	16:14	15:53
18	05:05 18:56-20:49/113	05:55 06:29-06:45/16	06:49	07:43 17:09-17:41/32	07:42	08:24
	21:31	20:36 18:47-20:02/75	19:23	18:11	16:12	15:53
19	05:07 18:56-20:48/112	05:57 06:31-06:43/12	06:51	07:45 17:09-17:39/30	07:44	08:25
	21:30	20:34 18:46-19:59/73	19:21	18:09	16:11	15:54
20	05:08 18:56-20:47/111	05:59 06:35-06:38/3	06:53 17:52-18:00/8	07:47 17:10-17:37/27	07:46	08:25
	21:29	20:32 18:44-19:57/73	19:18	18:07	16:10	15:54
21	05:09 18:57-20:46/109	06:01 18:43-19:54/71	06:55 17:48-18:04/16	07:49 17:12-17:34/22	07:47	08:26
	21:27	20:30	19:16	18:05	16:08	15:54
22	05:11 18:57-20:45/108	06:02 18:41-19:52/71	06:56 17:46-18:05/19	07:51 17:14-17:27/13	07:49	08:26
	21:26	20:27	19:13	18:03	16:07	15:55
23	05:12 18:57-20:44/107	06:04 18:41-19:50/69	06:58 17:43-18:06/23	07:53 17:18-17:22/4	07:51	08:27
	21:24	20:25	19:11	18:00	16:06	15:55
24	05:14 18:57-20:43/106	06:06 18:40-19:48/68	07:00 17:42-18:09/27	07:55	07:53	08:27
	21:23	20:23	19:08	17:58	16:05	15:56
25	05:15 18:57-20:41/104	06:08 18:39-19:45/66	07:02 17:41-18:12/31	06:56	07:54	08:28
	21:21	20:21	19:06	16:56	16:04	15:57
26	05:17 18:58-20:40/102	06:09 18:39-19:43/64	07:04 17:40-18:13/33	06:58	07:56	08:28
	21:20	20:18	19:04	16:54	16:03	15:57
27	05:18 18:58-20:38/100	06:11 18:39-19:40/61	07:05 17:38-18:13/35	07:00	07:58	08:28
	21:18	20:16	19:01	16:52	16:02	15:58
28	05:20 18:59-20:37/98	06:13 18:38-19:31/53	07:07 17:35-18:14/39	07:02	07:59	08:29
	21:17	20:14	18:59	16:50	16:01	15:59
29	05:22 06:35-06:43/8	06:15 18:38-19:31/53	07:09 17:33-18:14/41	07:04	08:01	08:29
	21:15	20:12	18:56	16:48	16:00	16:00
30	05:23 06:33-06:46/13	06:16 18:38-19:30/52	07:11 17:32-18:14/42	07:06	08:02	08:29
	21:13	20:09	18:54	16:46	15:59	16:01
31	05:25 06:31-06:47/16	06:18 18:37-19:28/51		07:08		08:29
	21:12	20:07		16:44		16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	3564	2653	612	897	0	0

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lieferanten Anweisung:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Betreuer:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 3 - W3

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1.037 1.051 712 568 7.990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29 09:27-09:46/19	07:59	07:02 07:27-07:48/21	06:48	05:40 19:11-20:11/60	04:51 05:33-05:58/25
	16:03	16:54	17:49	19:46	20:41	21:30 20:02-20:55/53
2	08:29 09:28-09:46/18	07:57	07:00 07:25-07:48/23	06:46 19:10-19:18/8	05:38 19:11-20:13/62	04:50 05:33-05:57/24
	16:04	16:56	17:51	19:48	20:43	21:31 20:13-20:57/45
3	08:28 09:29-09:47/18	07:56	06:58 07:22-07:47/25	06:43 19:07-19:21/14	05:36 19:12-20:14/62	04:49 05:33-05:57/24
	16:05	16:58	17:52	19:50	20:44	21:32 20:12-20:58/46
4	08:28 09:29-09:46/17	07:54	06:56 07:20-07:47/27	06:41 19:05-19:22/17	05:34 19:14-20:16/62	04:49 05:33-05:56/23
	16:07	17:00	17:54 17:26-17:27/1	19:52	20:46	21:33 20:12-20:59/47
5	08:28 09:30-09:47/17	07:52	06:53 07:17-07:46/29	06:39 19:04-19:24/20	05:32 19:15-20:18/63	04:48 05:34-05:56/22
	16:08	17:02	17:56 17:20-17:29/9	19:54	20:48	21:35 20:13-21:00/47
6	08:27 09:31-09:46/15	07:50	06:51 07:16-07:45/29	06:36 19:03-19:29/26	05:30 19:16-20:19/63	04:47 05:34-05:56/22
	16:09	17:03	17:58 17:19-17:32/13	19:55	20:50	21:36 20:13-21:01/48
7	08:27 09:32-09:47/15	07:49	06:49 07:16-07:44/28	06:34 19:01-19:30/29	05:28 19:18-20:21/63	04:46 05:35-05:56/21
	16:10	17:05	18:00 17:17-17:33/16	19:57	20:51	21:37 20:13-21:01/48
8	08:26 09:33-09:46/13	07:47	06:46 07:15-07:42/27	06:31 19:01-19:32/31	05:26 19:17-20:22/65	04:46 05:35-05:55/20
	16:12	17:07	18:02 17:16-17:34/18	19:59	20:53 19:20-19:28/9	21:37 20:13-21:02/49
9	08:26 09:34-09:46/12	07:45	06:44 07:15-07:40/25	06:29 19:01-19:33/32	05:24 19:17-20:24/67	04:45 05:36-05:55/19
	16:13	17:09	18:04 17:16-17:35/19	20:01	20:55	21:38 20:14-21:04/50
10	08:25 09:35-09:45/10	07:43	06:41 07:15-07:38/23	06:27 19:00-19:33/33	05:22 19:17-20:26/69	04:45 05:35-05:54/19
	16:15	17:11	18:06 17:15-17:36/24	20:03	20:57	21:39 20:14-21:04/50
11	08:25 09:37-09:44/7	07:41	06:39 07:15-07:36/21	06:24 19:00-19:37/37	05:21 19:17-20:27/70	04:44 05:36-05:54/18
	16:16	17:13	18:08 17:15-17:41/26	20:04	20:58	21:40 20:14-21:05/51
12	08:24	07:39	06:37 07:15-07:34/19	06:22 19:01-19:39/38	05:19 19:17-20:29/72	04:44 05:37-05:53/16
	16:18	17:15	18:09 17:15-17:42/27	20:06	21:00	21:41 20:15-21:06/51
13	08:23	07:37	06:34 07:17-07:31/14	06:20 19:00-19:40/40	05:17 05:44-05:49/5	04:44 05:37-05:53/16
	16:19	17:17	18:11 17:16-17:43/27	20:08	21:02 19:17-20:30/53	21:41 20:15-21:06/51
14	08:22	07:35	06:32 07:19-07:29/10	06:17 19:01-19:42/41	05:15 05:43-05:52/9	04:43 05:37-05:52/15
	16:21	17:19	18:13 17:16-17:46/30	20:10	21:03 19:38-20:32/54	21:42 20:15-21:06/51
15	08:21	07:33	06:29 17:18-17:49/31	06:15 19:03-19:44/41	05:14 05:41-05:53/12	04:43 05:38-05:52/14
	16:23	17:21	18:15	20:12	21:05 19:37-20:33/56	21:43 20:15-21:07/52
16	08:20	07:31	06:27 17:21-17:49/28	06:13 19:05-19:46/41	05:12 05:40-05:55/15	04:43 05:38-05:53/15
	16:24	17:23	18:17	20:14	21:07 19:38-20:35/57	21:43 20:16-21:08/52
17	08:19	07:29	06:25 17:24-17:50/26	06:10 19:06-19:47/41	05:10 05:38-05:55/17	04:43 05:38-05:54/16
	16:26	17:25	18:19	20:15	21:08 19:38-20:36/58	21:44 20:16-21:08/52
18	08:18	07:27	06:22 17:34-17:51/27	06:08 19:07-19:47/40	05:09 05:37-05:56/19	04:43 05:39-05:55/16
	16:28	17:27	18:21	20:17	21:10 19:39-20:38/59	21:44 20:16-21:08/52
19	08:17	07:25	06:20 17:25-17:51/26	06:06 19:09-19:51/42	05:07 05:36-05:57/21	04:43 05:39-05:55/16
	16:29	17:29	18:22	20:19	21:12 19:39-20:39/60	21:45 20:17-21:09/53
20	08:16	07:22	06:17 17:26-17:51/25	06:04 19:12-19:53/41	05:06 05:34-05:57/23	04:43 05:39-05:55/16
	16:31	17:31	18:24	20:21	21:13 19:40-20:41/61	21:45 20:17-21:09/53
21	08:15	07:20	06:15 17:28-17:50/22	06:01 19:12-19:55/43	05:04 05:33-05:57/24	04:43 05:40-05:56/16
	16:33	17:33	18:26	20:23	21:15 19:41-20:42/61	21:45 20:17-21:09/53
22	08:14	07:18	06:12 17:30-17:50/20	05:59 19:11-19:56/45	05:03 05:33-05:58/25	04:43 05:40-05:56/16
	16:35	17:35	18:28	20:24	21:16 19:41-20:43/62	21:45 20:18-21:10/53
23	08:13	07:16	06:10 17:30-17:48/18	05:57 19:11-19:57/46	05:02 05:32-05:57/25	04:43 05:40-05:56/16
	16:37	17:37	18:30	20:26	21:18 19:42-20:45/63	21:45 20:18-21:10/53
24	08:11	07:14	06:08 17:31-17:47/16	05:55 19:10-19:59/49	05:00 05:32-05:57/25	04:44 05:40-05:56/16
	16:38	17:38	18:32	20:28	21:19 19:44-20:46/62	21:46 20:19-21:11/53
25	08:10	07:12 07:36-07:43/7	06:05 17:32-17:45/13	05:53 19:10-20:01/51	04:59 05:32-05:58/26	04:44 05:41-05:56/15
	16:40	17:41	18:33	20:30	21:21 19:45-20:47/62	21:46 20:18-21:10/53
26	08:08	07:34-07:40/12	06:03 17:35-17:42/7	05:50 19:10-20:03/53	04:58 05:32-05:58/26	04:45 05:40-05:56/16
	16:42	17:43	18:35	20:32	21:22 19:47-20:49/62	21:46 20:18-21:10/53
27	08:07	07:32-07:47/15	06:00	05:48 19:10-20:04/54	04:56 05:32-05:58/26	04:45 05:41-05:56/16
	16:44	17:45	18:37	20:34	21:23 19:49-20:50/61	21:46 20:19-21:11/53
28	08:05	07:05 07:29-07:47/18	05:58	05:46 19:10-20:06/56	04:55 05:32-05:58/26	04:45 05:40-05:55/15
	16:46	17:47	18:39	20:35	21:25 19:50-20:51/63	21:45 20:18-21:10/53
29	08:04		05:55	05:44 19:10-20:08/58	04:54 05:32-05:57/25	04:46 05:41-05:56/15
	16:48		19:41	20:37	21:26 19:50-20:52/63	21:45 20:19-21:10/53
30	08:02		05:53	05:42 19:10-20:09/59	04:53 05:32-05:57/25	04:47 05:40-05:56/16
	16:50		19:43	20:39	21:27 20:00-20:54/64	21:45 20:18-21:10/53
31	08:01		05:51		04:52 05:32-05:57/25	
	16:52		19:44		21:29 20:01-20:55/64	
Sonnenscheinstunden	252	224	197	149	102	508
Anzahl Minuten mit Schatten	163	52	790	1126	2190	2056

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Übertrager Anwenner:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 3 - W3

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1.037 1.051 712 568 7.990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:47 05:40-05:57/17 21:45 20:19-21:09/50	05:27 19:48-20:39/51 21:10	06:20 18:59-19:36/37 20:04	07:12 07:56-08:13/17 18:51 17:54-18:22/28	07:10 16:42	08:04 09:20-09:25/5 15:58	
2	04:48 05:41-05:59/18 21:44 20:19-21:09/50	05:28 19:47-20:37/50 21:08	06:22 18:59-19:32/33 20:02	07:14 07:53-08:14/21 18:49 17:53-18:20/27	07:12 16:40	08:06 08:19-09:28/9 15:57	
3	04:49 05:41-06:00/19 21:44 20:18-21:08/50	05:30 19:47-20:36/49 21:06	06:23 18:58-19:30/32 20:00	07:16 07:53-08:15/22 18:47 17:53-18:18/25	07:14 16:38	08:07 09:18-09:30/12 15:57	
4	04:50 05:40-06:00/20 21:43 20:19-21:08/49	05:31 19:47-20:33/46 21:05	06:25 18:58-19:29/31 19:57	07:18 07:52-08:16/24 18:44 17:53-18:15/22	07:16 16:36	08:08 09:17-09:30/13 15:56	
5	04:50 05:40-06:01/21 21:43 20:19-21:08/49	05:33 19:47-20:32/45 21:03	06:27 18:58-19:27/29 19:55	07:20 07:52-08:18/26 18:42 17:53-18:11/18	07:17 16:34	08:10 09:17-09:32/15 15:55	
6	04:51 05:40-06:02/22 21:42 20:19-21:07/48	05:35 19:26-20:30/64 21:01	06:29 18:58-19:24/26 19:52	07:21 07:52-08:19/27 18:39 17:53-18:10/17	07:19 16:32	08:11 09:17-09:33/16 15:55	
7	04:52 05:40-06:02/22 21:42 20:19-21:07/48	05:37 19:25-20:28/63 20:59	06:30 18:59-19:19/20 19:50	07:23 07:52-08:21/29 18:37 17:53-18:08/15	07:21 16:30	08:13 09:17-09:34/17 15:54	
8	04:53 05:40-06:03/23 21:41 20:19-21:06/47	05:38 19:24-20:27/63 20:57	06:32 19:00-19:17/17 19:48	07:25 07:53-08:22/29 18:35 17:54-18:05/11	07:23 16:29	08:14 09:17-09:34/17 15:54	
9	04:54 05:40-06:04/24 21:40 20:20-21:06/46	05:40 19:22-20:24/62 20:55	06:34 19:00-19:15/15 19:45	07:27 07:53-08:21/28 18:32 17:57-18:03/6	07:25 16:27	08:15 09:17-09:35/18 15:54	
10	04:55 05:40-06:04/24 20:14-20:17/3 21:39 20:20-21:05/45	05:42 19:21-20:23/62 20:53	06:36 19:03-19:12/9 19:43	07:29 07:55-08:21/26 18:30	07:27 16:25	08:16 09:17-09:35/18 15:53	
11	04:57 05:40-06:05/25 21:39 20:11-21:04/53	05:43 19:19-20:21/62 20:51	06:37 19:00-19:14/14 19:40	07:30 07:57-08:21/24 18:28	07:29 16:23	08:17 09:18-09:37/19 15:53	
12	04:58 05:40-06:05/25 21:38 20:10-21:03/53	05:45 19:19-20:19/60 20:49	06:39 19:00-19:14/14 19:38	07:32 07:59-08:21/22 18:25	07:31 16:22	08:18 09:18-09:37/19 15:53	
13	04:59 05:40-06:06/26 21:37 20:09-21:02/53	05:47 19:19-20:17/58 20:47	06:41 19:00-19:14/14 19:35	07:34 08:01-08:21/20 18:23	07:33 16:20	08:20 09:18-09:38/20 15:53	
14	05:00 05:40-06:06/26 21:36 20:08-21:01/53	05:49 19:18-20:15/57 20:45	06:43 19:00-19:14/14 19:33	07:36 08:03-08:20/17 18:21	07:35 16:18	08:21 09:19-09:38/19 15:53	
15	05:01 05:40-06:06/26 21:35 20:07-21:00/53	05:50 19:17-20:13/56 20:43	06:44 19:00-19:14/14 19:31	07:38 08:05-08:19/14 18:18	07:36 16:17	08:21 09:19-09:39/20 15:53	
16	05:03 05:41-06:07/26 19:58-20:05/7 21:33 20:06-20:59/53	05:52 19:17-20:12/55 20:41	06:46 19:00-19:14/14 19:28	07:40 08:07-08:17/10 18:16	07:38 16:15	08:22 09:19-09:40/21 15:53	
17	05:04 05:41-06:07/26 21:32 19:57-20:59/62	05:54 19:16-20:09/53 20:38	06:48 18:25-18:29/4 19:26	07:41 08:09-08:15/6 18:14	07:40 16:14	08:23 09:20-09:40/20 15:53	
18	05:05 05:41-06:07/26 21:31 19:55-20:58/63	05:56 19:17-20:07/50 20:36	06:50 18:21-18:33/12 19:23	07:43 18:11 16:13	07:42 16:13	08:24 09:20-09:40/20 15:53	
19	05:07 05:41-06:07/26 21:30 19:54-20:56/62	05:57 19:17-20:04/47 20:34	06:51 18:18-18:33/15 19:21	07:45 18:09 16:11	07:44 16:11	08:25 09:20-09:41/21 15:54	
20	05:08 05:42-06:08/26 21:29 19:53-20:55/62	05:59 19:16-20:03/47 20:32	06:53 18:17-18:34/17 19:18	07:47 18:07 16:10	07:46 16:10	08:25 09:21-09:42/21 15:54	
21	05:09 05:42-06:07/25 21:27 19:52-20:54/62	06:01 19:17-20:01/44 20:30	06:55 18:16-18:35/19 19:16	07:49 18:05 16:08	07:47 16:08	08:26 09:21-09:42/21 15:54	
22	05:11 05:42-06:07/25 21:26 19:51-20:53/62	06:02 19:16-19:58/42 20:27	06:57 18:14-18:36/22 19:13	07:51 18:03 16:07	07:49 16:07	08:27 09:22-09:43/21 15:55	
23	05:12 05:44-06:07/23 21:24 19:51-20:52/61	06:04 19:15-19:56/41 20:25	06:58 18:10-18:35/25 19:11	07:53 18:00 16:06	07:51 16:06	08:27 09:22-09:43/21 15:55	
24	05:14 05:45-06:07/22 21:23 19:50-20:50/60	06:06 19:13-19:54/41 20:23	07:00 18:09-18:34/25 19:09	07:55 17:58 16:05	07:53 16:05	08:27 09:22-09:43/21 15:56	
25	05:15 05:47-06:07/20 21:22 19:49-20:49/60	06:08 19:10-19:50/40 20:21	07:02 18:07-18:34/27 19:06	07:56 16:56 16:04	07:54 16:04	08:28 09:24-09:44/20 15:57	
26	05:17 05:48-06:06/18 21:20 19:49-20:48/59	06:09 19:09-19:49/40 20:18	07:04 18:07-18:33/26 19:04	07:58 16:54 16:03	07:56 16:03	08:28 09:24-09:44/20 15:57	
27	05:19 05:49-06:05/16 21:18 19:48-20:46/58	06:11 19:06-19:48/42 20:16	07:05 18:05-18:31/26 19:01	07:59 16:52 16:02	07:58 16:02	08:28 09:24-09:44/20 15:58	
28	05:20 05:51-06:05/14 21:17 19:48-20:45/57	06:13 19:03-19:45/42 20:14	07:07 18:00-18:30/30 18:59	07:59 16:50 16:01	07:59 16:01	08:29 09:25-09:45/20 15:59	
29	05:22 05:52-06:03/11 21:15 19:48-20:43/55	06:15 19:02-19:43/41 20:11	07:09 08:00-08:08/8 18:56 17:57-18:28/31	07:04 16:48 16:00	07:04 16:00	08:29 09:25-09:45/20 16:00	
30	05:23 05:54-06:01/7 21:14 19:48-20:42/54	06:16 19:01-19:41/40 20:09	07:11 07:57-08:10/13 18:54 17:56-18:24/28	07:06 16:46 16:00	07:06 16:00	08:29 09:26-09:46/20 16:01	
31	05:25 19:47-20:40/53 21:12	06:18 19:00-19:38/38 20:07		07:08 16:44 16:02	07:08 16:02	08:29 09:27-09:46/19 16:02	
	Sonnenscheinstunden Anzahl Minuten mit Schatten	510 2349	459 1561	382 577	329 531	260 0	235 563

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lieferanten Anwesen: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 4 - W4

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:29 09:02-09:38/36 16:03	07:59 16:54 07:57 17:49	07:02 17:51 07:00 17:51	06:48 07:31-07:53/22 19:46	05:40 19:39-20:10/31 20:41	04:51 20:05-20:53/48 21:30	
2	08:29 09:02-09:39/37 16:04	07:57 16:56 07:56 17:51	07:00 17:51 07:00 17:51	06:46 07:31-07:50/19 19:48	05:38 19:39-20:10/31 20:43	04:50 20:07-20:54/47 21:31	
3	08:28 09:02-09:40/38 16:05	07:56 16:58 07:54 17:52	06:58 17:52 06:56 17:52	06:43 07:33-07:47/14 19:50	05:36 20:11-20:13/2 20:44 19:40-20:10/30	04:49 20:07-20:55/48 21:32	
4	08:28 09:01-09:40/39 16:07	07:54 17:00 07:52 17:54	06:56 17:54 06:54 17:54	06:41 07:35-07:45/10 19:52	05:34 19:41-20:16/35 20:46	04:49 20:08-20:55/47 21:33	
5	08:28 09:01-09:41/40 16:08	07:52 17:02 07:50 17:56	06:53 17:56 06:51 17:56	06:39 19:54 06:36	05:32 19:44-20:18/34 20:48	04:48 20:09-20:56/47 21:35	
6	08:27 09:01-09:42/41 16:09	07:50 17:03 07:49 17:58	06:51 17:58 06:49 17:58	06:36 19:55 06:34	05:30 19:45-20:19/34 20:50	04:47 20:23-20:55/32 21:36 20:10-20:22/12	
7	08:27 09:01-09:43/42 16:10	07:49 17:05 07:47 18:00	06:49 18:00 06:46 18:00	06:34 19:57 06:31	05:28 19:46-20:21/35 20:51	04:46 20:23-20:55/32 21:37 20:10-20:23/11	
8	08:27 08:59-09:43/44 16:12	07:47 17:07 07:45 18:02	06:46 18:02 06:44 07:09-07:13/4	06:31 19:59 06:29	05:26 19:48-20:22/34 20:53	04:46 20:58-21:02/4 20:12-20:21/9 21:37 20:24-20:56/32	
9	08:26 08:58-09:43/45 16:13	07:45 17:09 07:43 18:04	06:44 18:04 06:41 07:05-07:16/11	06:29 20:01 06:27	05:24 19:51-20:24/33 20:55	04:45 20:24-21:04/40 21:38 20:14-20:20/6	
10	08:25 08:57-09:44/47 16:15	07:43 17:11 07:41 18:06	06:41 18:06 06:39 07:03-07:18/15	06:27 20:03 06:24	05:22 19:51-20:26/35 20:57	04:45 20:24-21:04/40 21:39 20:16-20:17/1	
11	08:25 08:56-09:44/48 16:16	07:41 17:13 07:39 18:08	06:39 18:08 06:37 07:06-07:19/19	06:24 20:04 06:22	05:21 19:52-20:27/35 20:58	04:44 20:25-21:05/40 21:40	
12	08:24 08:56-09:45/49 16:18	07:39 17:15 07:37 18:09	06:37 18:09 06:34 06:58-07:20/22	06:22 20:06 06:20	05:19 19:54-20:29/35 21:00	04:44 20:25-21:06/41 21:41	
13	08:23 08:55-09:46/51 16:19	07:37 17:17 07:35 18:11	06:34 18:11 06:32 06:57-07:20/23	06:20 20:08 06:17	05:17 19:55-20:30/35 21:02	04:44 20:25-21:06/41 21:41	
14	08:22 08:53-09:45/52 16:21	07:35 17:19 07:33 18:13	06:32 18:13 06:29 06:53-07:20/27	06:17 20:10 06:15	05:15 19:58-20:32/34 21:03	04:43 20:25-21:06/41 21:42	
15	08:21 08:53-09:45/52 16:23	07:33 17:21 07:31 18:15	06:29 18:15 06:27 06:51-07:20/29	06:15 20:12 06:13	05:14 20:01-20:33/32 21:05	04:43 20:26-21:07/41 21:43	
16	08:21 08:53-09:46/53 16:24	07:31 17:23 07:29 18:17	06:27 18:17 06:25 06:48-07:19/31	06:13 20:14 06:10	05:12 20:02-20:35/33 21:07	04:43 20:26-21:08/42 21:43	
17	08:20 08:53-09:46/53 16:26	07:29 17:25 07:27 18:19	06:25 18:19 06:22 06:47-07:18/31	06:10 20:15 06:08	05:10 20:01-20:36/35 21:08	04:43 20:26-21:08/42 21:44	
18	08:18 08:54-09:46/52 16:28	07:27 17:27 07:25 18:21	06:22 18:21 06:20 06:44-07:17/33	06:08 20:17 06:06	05:09 20:01-20:38/37 21:10	04:43 20:26-21:08/42 21:44	
19	08:17 08:53-09:46/53 16:29	07:25 17:29 07:23 18:22	06:20 18:22 06:17 06:42-07:18/34	06:06 20:19 06:04	05:07 20:00-20:39/39 21:12	04:43 20:27-21:09/42 21:45	
20	08:16 08:54-09:46/52 16:31	07:23 17:31 07:21 18:24	06:17 18:24 06:15 06:39-07:13/34	06:04 20:21 06:01 19:46-19:55/9	05:06 20:01-20:41/40 21:13	04:43 20:27-21:09/42 21:45	
21	08:15 08:54-09:46/52 16:33	07:20 17:33 07:18 18:26	06:15 18:26 06:12 06:37-07:11/34	06:01 20:23 05:59 19:43-19:56/13	05:04 20:01-20:42/41 21:15	04:43 20:27-21:09/42 21:45	
22	08:14 08:54-09:45/51 16:35	07:18 17:35 07:16 18:28	06:12 18:28 06:10 06:36-07:10/34	05:59 20:25 05:57 19:41-19:57/16	05:03 20:00-20:43/43 21:16	04:43 20:28-21:10/42 21:45	
23	08:13 08:55-09:45/50 16:37	07:16 17:37 07:14 18:30	06:10 18:30 06:08 06:33-07:08/35	05:57 20:26 05:55 19:40-19:59/19	05:02 20:01-20:45/44 21:18	04:43 20:28-21:10/42 21:46	
24	08:11 08:55-09:44/49 16:38	07:14 17:39 07:12 18:32	06:08 18:32 06:05 06:33-07:07/34	05:55 20:28 05:53 19:40-20:01/21	05:00 20:01-20:46/45 21:19	04:44 20:28-21:10/42 21:46	
25	08:10 08:56-09:43/47 16:40	07:12 17:41 07:09 18:33	06:05 18:33 06:03 06:31-07:04/33	05:53 20:30 05:50 19:39-20:03/24	04:59 20:02-20:47/45 21:21	04:44 20:28-21:10/42 21:46	
26	08:08 08:56-09:25/29 16:42	07:09 17:43 07:07 18:35	06:03 18:35 06:00 06:31-07:03/32	05:50 20:32 05:48 19:39-20:04/25	04:58 20:02-20:49/47 21:22	04:45 20:28-21:10/42 21:46	
27	08:07 08:57-09:25/28 16:44	07:07 17:45 07:05 18:37	06:00 18:37 05:58 06:30-07:00/30	05:48 20:34 05:46 19:39-20:06/27	04:56 20:03-20:50/47 21:23	04:45 20:29-21:10/41 21:46	
28	08:05 08:58-09:23/25 16:46	07:05 17:47 07:03 18:39	05:58 18:39 05:55 07:30-07:58/28	05:46 20:35 05:44 19:39-20:08/29	04:55 20:03-20:51/48 21:25	04:45 20:28-21:10/42 21:45	
29	08:04 08:59-09:21/22 16:48	07:03 17:49 07:01 19:41	05:55 19:41 05:53 07:30-07:57/27	05:44 20:37 05:42 19:39-20:09/30	04:54 20:04-20:52/48 21:26	04:46 20:29-21:10/41 21:45	
30	08:02 09:00-09:13/13 16:50	07:01 17:43 06:59 19:43	05:53 19:43 05:51 07:30-07:55/25	05:42 20:39 05:40 19:39-20:09/30	04:53 20:04-20:53/49 21:27	04:47 20:28-21:09/41 21:45	
31	08:01 09:03-09:11/8 16:52	07:00 17:44 06:58 19:44	05:51 19:44 05:49 07:30-07:55/25	05:40 20:40 05:38 19:39-20:09/30	04:52 20:05-20:53/48 21:29	04:47 20:28-21:09/41 21:45	
	Sonnenscheinstunden Anzahl Minuten mit Schatten	252 1313	274 0	367 625	419 278	492 1194	508 1287

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 4 - W4

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:47 20:29-21:09/40 21:45	05:27 20:03-20:39/36 21:10	06:20 20:04	07:12 07:39-07:59/20 18:31	07:10 16:42	08:04 08:38-09:26/48 15:58
2	04:48 20:29-21:09/40 21:44	05:28 20:02-20:37/35 21:08	06:22 20:02	07:14 07:40-07:57/17 18:49	07:12 16:40	08:06 08:40-09:27/47 15:57
3	04:49 20:29-21:08/39 21:44 20:19-20:23/4	05:30 20:01-20:36/35 21:07	06:23 20:00	07:16 07:42-07:55/13 18:47	07:14 16:38	08:07 08:42-09:27/45 15:57
4	04:50 21:02-21:08/6 20:18-20:25/7 21:43 20:29-21:01/32	05:31 20:00-20:33/33 21:05	06:25 19:57	07:18 07:44-07:53/9 18:44	07:16 16:36	08:08 08:43-09:27/44 15:56
5	04:50 20:29-21:02/33 21:43 20:17-20:27/10	05:33 19:57-20:32/35 21:03	06:27 19:55	07:20 18:42	07:17 16:34	08:10 08:46-09:28/42 15:55
6	04:51 20:30-21:02/32 21:42 20:16-20:28/12	05:35 19:55-20:30/35 21:01	06:29 19:52	07:21 18:39	07:19 16:32	08:11 08:47-09:28/41 15:55
7	04:52 20:30-21:02/32 21:42 20:16-20:29/13	05:37 19:54-20:28/34 20:59	06:30 19:50	07:23 18:37	07:21 16:30	08:13 08:48-09:29/41 15:54
8	04:53 20:15-21:02/47 21:41	05:38 19:52-20:27/35 20:57	06:32 07:30-07:39/9 19:48	07:25 18:35	07:22 16:29	08:14 08:49-09:28/39 15:54
9	04:54 20:15-21:02/47 21:40	05:40 19:50-20:24/34 20:55	06:34 07:27-07:41/14 19:45	07:27 18:32	07:25 16:27	08:15 08:50-09:28/38 15:54
10	04:55 20:14-21:02/48 21:39	05:42 19:49-20:20/31 20:53	06:36 07:24-07:43/19 19:43	07:29 18:30	07:27 16:25	08:16 08:51-09:28/37 15:53
11	04:57 20:14-21:02/48 21:39	05:43 19:48-20:18/30 20:51	06:37 07:23-07:45/22 19:40	07:30 18:28	07:29 08:34-08:42/8 16:23	08:17 08:53-09:29/36 15:53
12	04:58 20:13-21:02/49 21:38	05:45 19:47-20:18/31 20:49	06:39 07:22-07:47/25 19:38	07:32 18:25	07:31 08:33-08:45/13 16:22	08:19 08:54-09:30/36 15:53
13	04:59 20:13-21:01/48 21:37	05:47 19:47-20:17/30 20:47	06:41 07:21-07:47/26 19:35	07:34 18:23	07:33 08:31-08:53/22 16:20	08:20 08:55-09:30/35 15:53
14	05:00 20:12-21:01/49 21:36	05:49 19:46-20:15/29 20:45	06:43 07:20-07:48/28 19:33	07:36 18:21	07:35 08:30-08:55/25 16:18	08:21 08:56-09:30/34 15:53
15	05:01 20:12-21:00/48 21:35	05:50 19:46-20:13/27 20:43	06:44 07:20-07:50/20 19:31	07:38 18:18	07:36 08:29-08:57/28 16:17	08:22 08:57-09:30/33 15:53
16	05:03 20:11-20:59/48 21:34	05:52 19:46-20:12/26 20:41	06:46 07:19-07:51/32 19:28	07:40 18:16	07:38 08:29-08:58/29 16:15	08:22 08:58-09:31/33 15:53
17	05:04 20:12-20:59/47 21:32	05:54 19:46-20:09/23 20:39	06:48 07:20-07:52/32 19:26	07:41 18:14	07:40 08:29-09:16/47 16:14	08:23 08:59-09:31/32 15:53
18	05:05 20:11-20:58/47 21:31	05:56 19:46-20:07/21 20:36	06:50 07:20-07:54/34 19:23	07:43 18:11	07:42 08:29-09:18/49 16:13	08:24 08:59-09:31/32 15:53
19	05:07 20:11-20:56/45 21:30	05:57 19:47-20:05/18 20:34	06:51 07:21-07:55/34 19:21	07:45 18:09	07:44 08:29-09:19/50 16:11	08:25 09:00-09:32/32 15:54
20	05:08 20:11-20:55/44 21:29	05:59 19:47-20:03/16 20:32	06:53 07:21-07:55/34 19:18	07:47 18:07	07:46 08:29-09:20/51 16:10	08:25 09:01-09:32/31 15:54
21	05:09 20:11-20:54/43 21:27	06:01 19:49-20:01/12 20:30	06:55 07:22-07:56/34 19:16	07:49 18:05	07:47 08:29-09:21/52 16:08	08:26 09:01-09:32/31 15:54
22	05:11 20:11-20:53/42 21:26	06:02 19:50-19:58/8 20:27	06:57 07:24-07:58/34 19:13	07:51 18:03	07:49 08:30-09:22/52 16:07	08:27 09:02-09:33/31 15:55
23	05:12 20:11-20:52/41 21:25	06:04 20:25	06:58 07:25-07:59/34 19:11	07:53 18:00	07:51 08:30-09:23/53 16:06	08:27 09:02-09:33/31 15:55
24	05:14 20:11-20:50/39 21:23	06:06 20:23	07:00 07:27-08:00/33 19:09	07:55 17:58	07:53 08:31-09:24/53 16:05	08:27 09:02-09:34/32 15:56
25	05:15 20:11-20:49/38 21:22	06:08 20:21	07:02 07:29-08:01/32 19:06	07:56 16:56	07:54 08:31-09:24/53 16:04	08:28 09:03-09:35/32 15:57
26	05:17 20:11-20:48/37 21:20	06:09 20:18	07:04 07:31-08:01/30 19:04	07:58 16:54	07:56 08:32-09:25/53 16:03	08:28 09:03-09:35/32 15:57
27	05:18 20:11-20:46/35 21:18	06:11 20:16	07:05 07:32-08:02/30 19:01	07:59 16:52	07:58 08:33-09:26/53 16:02	08:28 09:03-09:36/33 15:58
28	05:20 20:12-20:45/33 21:17	06:13 20:14	07:07 07:33-08:00/27 18:59	07:59 16:50	07:59 08:33-09:25/52 16:01	08:29 09:03-09:36/33 15:59
29	05:22 20:12-20:43/31 21:15	06:15 20:11	07:09 07:36-08:00/24 18:56	07:59 16:48	08:01 08:35-09:26/51 16:00	08:29 09:03-09:37/34 16:00
30	05:23 20:07-20:42/35 21:14	06:16 20:09	07:11 07:37-08:00/23 18:54	07:56 16:46	08:03 08:37-09:26/49 15:59	08:29 09:03-09:38/35 16:01
31	05:25 20:04-20:40/38 21:12	06:18 20:07	07:08 18:54	07:56 16:44	08:04 08:38-09:26/49 15:58	08:29 09:03-09:38/35 16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	1325	614	640	59	861	1115

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

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



Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 5 - W5

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:29 16:03	07:59 08:27-08:46/19 16:54	07:02 17:49	06:48 18:57-19:19/22 19:46	05:40 19:28-19:33/5 20:41	04:51 20:11-20:55/44 21:30	
2	08:29 16:04	07:57 08:25-08:47/22 16:56	07:00 17:51	06:46 18:56-19:21/25 19:48	05:38 19:28-19:33/5 20:43	04:50 20:12-20:57/45 21:31	
3	08:28 16:05	07:56 08:23-08:47/24 16:58	06:58 17:52	06:43 18:56-19:23/27 19:50	05:36 19:28-19:33/5 20:44	04:49 20:12-20:58/46 21:32	
4	08:28 16:06	07:54 08:21-08:47/26 17:00	06:56 17:54	06:41 18:55-19:25/30 19:52	05:34 19:28-19:33/5 20:46	04:49 20:12-20:59/47 21:33	
5	08:28 16:08	07:52 08:19-08:47/28 17:01	06:53 17:56	06:39 18:55-19:27/32 19:54	05:32 19:28-19:33/5 20:48	04:48 20:13-21:00/47 21:35	
6	08:27 16:09	07:50 08:17-08:47/30 17:03	06:51 17:58	06:36 18:55-19:29/34 19:55	05:30 19:28-19:33/5 20:50	04:47 20:13-21:01/48 21:36	
7	08:27 16:10	07:49 08:16-08:47/31 17:05	06:49 18:00	06:34 18:55-19:30/35 19:57	05:28 19:28-19:33/5 20:51	04:46 20:13-21:01/48 21:37	
8	08:27 16:12	07:47 08:16-08:47/31 17:07	06:46 18:02	06:31 18:55-19:32/37 19:59	05:26 19:28-19:33/5 20:53	04:46 20:13-21:03/50 21:37	
9	08:26 16:13	07:45 08:16-08:47/31 17:09	06:44 18:04	06:29 18:56-19:33/37 20:01	05:24 19:28-19:33/5 20:55	04:45 20:14-21:04/50 21:38	
10	08:25 16:15	07:43 08:16-08:47/31 17:11	06:41 18:06	06:27 18:56-19:33/37 20:03	05:22 19:28-19:33/5 20:57	04:45 20:14-21:04/50 21:39	
11	08:25 16:16	07:41 08:16-08:47/31 17:13	06:39 18:08	06:24 18:57-19:34/37 20:04	05:21 19:28-19:33/5 20:58	04:44 20:15-21:05/50 21:40	
12	08:24 16:18	07:39 08:17-08:46/29 17:15	06:37 18:09	06:22 18:58-19:34/35 20:06	05:19 19:28-19:33/5 21:00	04:44 20:15-21:06/51 21:41	
13	08:23 16:19	07:37 08:18-08:45/27 17:17	06:34 18:11	06:20 19:00-19:33/33 20:08	05:17 20:25-20:29/4 21:02	04:44 20:15-21:06/51 21:41	
14	08:22 16:21	07:35 08:19-08:44/25 17:19	06:32 18:13	06:17 19:02-19:39/37 20:10	05:15 20:21-20:32/11 21:03	04:43 20:15-21:06/51 21:42	
15	08:21 16:22	07:33 08:21-08:42/21 17:21	06:29 18:15	06:15 19:10-19:41/31 20:12	05:14 20:18-20:33/15 21:05	04:43 20:16-21:07/51 21:43	
16	08:20 16:24	07:31 08:24-08:30/6 17:23	06:27 18:17	06:13 19:10-19:43/33 20:14	05:12 20:16-20:35/19 21:07	04:43 20:16-21:08/52 21:43	
17	08:20 16:26	07:29 17:25 17:25	06:25 18:19	06:10 19:09-19:43/34 20:15	05:10 20:14-20:36/22 21:08	04:43 20:16-21:08/52 21:44	
18	08:18 16:28	07:27 17:27 17:27	06:22 18:21	06:08 19:10-19:44/34 20:17	05:09 20:14-20:38/24 21:10	04:43 20:17-21:08/51 21:44	
19	08:17 16:29	07:25 17:29 17:29	06:20 18:22	06:06 19:10-19:44/34 20:19	05:07 20:12-20:39/27 21:12	04:43 20:17-21:09/52 21:45	
20	08:16 16:31	07:22 17:31 17:31	06:17 18:24	06:04 19:11-19:45/34 20:21	05:06 20:12-20:41/29 21:13	04:43 20:17-21:09/52 21:45	
21	08:15 16:33	07:20 17:33 17:33	06:15 18:26	06:01 19:13-19:45/32 20:23	05:04 20:12-20:42/30 21:15	04:43 20:17-21:09/52 21:45	
22	08:14 16:35	07:18 17:35 17:35	06:12 18:28	05:59 19:14-19:44/30 20:24	05:03 20:11-20:43/32 21:16	04:43 20:18-21:10/52 21:45	
23	08:13 16:36	07:16 17:37 17:37	06:10 18:30	05:57 19:19-19:44/25 20:26	05:02 20:11-20:45/34 21:18	04:43 20:18-21:10/52 21:45	
24	08:11 16:38	07:14 17:39 17:39	06:08 18:32	05:55 19:20-19:43/23 20:28	05:00 20:11-20:46/35 21:19	04:44 20:18-21:10/52 21:46	
25	08:10 16:40	07:11 17:41 17:41	06:05 18:33	05:52 19:20-19:43/23 20:30	04:59 20:11-20:47/36 21:21	04:44 20:19-21:10/51 21:46	
26	08:08 16:42	07:09 17:43 17:43	06:03 18:35	05:50 19:20-19:42/22 20:32	04:58 20:11-20:49/38 21:22	04:44 20:18-21:10/52 21:46	
27	08:07 16:44	07:07 17:45 17:45	06:00 18:37	05:48 19:21-19:41/20 20:34	04:56 20:11-20:50/39 21:23	04:45 20:19-21:10/51 21:46	
28	08:05 16:46	08:34-08:40/6 07:05	05:58 18:39	05:46 19:22-19:40/18 20:35	04:55 20:11-20:51/40 21:25	04:45 20:18-21:10/52 21:45	
29	08:04 16:48	08:32-08:42/10 07:07	05:55 18:41	05:44 19:23-19:39/16 20:37	04:54 20:11-20:52/41 21:26	04:46 20:19-21:10/51 21:45	
30	08:02 16:50	08:30-08:43/13 07:09	05:53 18:43	05:42 19:25-19:37/12 20:39	04:53 20:11-20:54/43 21:27	04:47 20:18-21:09/51 21:45	
31	08:01 16:52	08:29-08:45/16 07:11	05:51 18:44	05:40 18:59-19:18/19 19:44	04:52 20:11-20:55/44 21:29	04:47 20:18-21:09/51 21:45	
	Sonnenscheinstunden Anzahl Minuten mit Schatten	252 45	274 412	367 47	419 879	492 568	508 1504

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer Anwennder:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Betreuer:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 5 - W5

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1.037 1.051 712 568 7.990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:47 20:19-21:09/50	05:26 21:10	06:20 18:56-19:33/37	07:12 18:51	07:10 07:46-08:17/31	08:04 15:58
2	04:48 20:19-21:09/50	05:28 21:08	06:22 18:55-19:32/37	07:14 18:49	07:12 07:46-08:17/31	08:06 15:57
3	04:49 20:19-21:08/49	05:30 21:06	06:23 18:53-19:31/38	07:16 18:47	07:14 07:46-08:17/31	08:07 15:57
4	04:50 20:19-21:08/49	05:31 21:05	06:25 18:52-19:29/37	07:18 18:44	07:16 07:46-08:17/31	08:08 15:56
5	04:50 20:19-21:08/49	05:33 21:03	06:27 18:52-19:27/35	07:20 18:42	07:17 07:47-08:17/30	08:10 15:55
6	04:51 20:19-21:07/48	05:35 21:01	06:29 18:50-19:24/34	07:21 18:39	07:19 07:50-08:18/28	08:11 15:55
7	04:52 20:19-21:07/48	05:37 20:59	06:30 18:50-19:22/32	07:23 18:37	07:21 07:52-08:18/26	08:13 15:54
8	04:53 20:19-21:06/47	05:38 20:57	06:32 18:50-19:20/30	07:25 18:35	07:23 07:54-08:18/24	08:14 15:54
9	04:54 20:19-21:06/47	05:40 20:55	06:34 18:49-19:17/28	07:27 18:32	07:25 07:56-08:17/21	08:15 15:54
10	04:55 20:19-21:05/46	05:42 20:53	06:36 18:49-19:15/26	07:29 18:30	07:27 07:58-08:17/19	08:16 15:53
11	04:56 20:19-21:04/45	05:43 20:51	06:37 18:50-19:13/23	07:30 18:28	07:29 08:00-08:16/16	08:17 15:53
12	04:58 20:19-21:03/44	05:45 20:49	06:39 18:50-19:09/19	07:32 18:25	07:31 08:02-08:15/13	08:19 15:53
13	04:59 20:19-21:03/44	05:47 19:33-19:46/13	06:41 18:51-19:07/16	07:34 18:23	07:33 08:04-08:14/10	08:20 15:53
14	05:00 20:19-21:01/42	05:49 19:30-19:47/17	06:43 18:53-19:05/12	07:36 18:21	07:35 08:06-08:12/6	08:21 15:53
15	05:01 20:19-21:00/41	05:50 19:29-19:48/19	06:44 19:00-19:02/2	07:38 18:18	07:36 16:17	08:21 15:53
16	05:03 20:19-20:59/40	05:52 19:28-19:49/21	06:46 19:18	07:40 18:16	07:38 16:15	08:22 15:53
17	05:04 20:20-20:59/39	05:54 19:27-19:49/22	06:48 19:16	07:41 18:14	07:40 16:14	08:23 15:53
18	05:05 20:20-20:58/38	05:55 19:26-19:50/24	06:50 19:14	07:43 18:11	07:42 16:14	08:24 15:53
19	05:07 20:20-20:56/36	05:57 19:25-19:49/24	06:51 19:12	07:45 18:09	07:44 16:11	08:25 15:53
20	05:08 20:20-20:55/35	05:59 19:23-19:49/26	06:53 19:10	07:47 18:07	07:46 16:10	08:25 15:54
21	05:09 20:21-20:54/33	06:01 19:19-19:50/31	06:55 19:08	07:49 18:05	07:47 16:08	08:26 15:54
22	05:11 20:21-20:53/32	06:02 19:16-19:49/33	06:57 19:06	07:51 18:03	07:49 16:07	08:27 15:55
23	05:12 20:23-20:52/29	06:04 19:15-19:48/33	06:58 19:04	07:53 18:00	07:51 16:06	08:27 15:55
24	05:14 20:23-20:50/27	06:06 19:14-19:48/34	07:00 19:02	07:55 17:58	07:53 16:05	08:27 15:56
25	05:15 20:23-20:49/26	06:08 19:12-19:46/34	07:02 19:00	07:56 17:56	07:54 16:04	08:28 15:57
26	05:17 20:25-20:48/23	06:09 19:12-19:46/34	07:04 19:00	07:58 16:54	07:56 16:03	08:28 15:57
27	05:18 20:25-20:46/21	06:11 19:12-19:44/32	07:05 19:00	07:59 16:52	07:58 16:02	08:28 15:58
28	05:20 20:27-20:45/18	06:13 19:11-19:42/31	07:07 19:00	07:59 16:50	07:59 16:01	08:29 15:59
29	05:22 20:29-20:43/14	06:15 19:03-19:39/36	07:09 19:00	07:59 16:48	08:01 16:00	08:29 16:00
30	05:23 20:33-20:42/9	06:16 19:01-19:34/33	07:11 19:00	07:59 16:46	08:02 15:59	08:29 16:01
31	05:25 20:37-20:41/7	06:18 18:58-19:33/35	07:13 19:00	07:59 16:44	08:03 15:59	08:29 16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	1119	543	406	146	317	0

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt: **180926\_Werder-Lübz\_II**      Beschreibung: Windpark Werder

Lizenznehmer Anwenner:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 6 - W11

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1.037 1.051 712 568 7.990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29 16:03	07:59 16:54	07:02 17:49	06:48 19:46	18:22-19:14/52 20:41	05:40 21:30
2	08:29 16:04	07:57 16:56	07:00 17:50	06:46 19:48	18:24-19:14/50 20:43	05:38 21:31
3	08:28 16:05	07:56 16:58	06:58 17:52	06:43 19:50	18:26-19:15/49 20:44	05:36 21:32
4	08:28 16:06	07:54 16:59	06:55 17:54	06:41 19:52	18:26-19:14/48 20:46	05:34 21:33
5	08:28 16:08	07:52 17:01	06:53 17:56	06:39 19:54	18:28-19:14/46 20:48	05:32 21:34
6	08:27 16:09	07:50 17:03	06:51 17:58	06:36 19:55	18:32-19:17/45 20:50	05:30 21:36
7	08:27 16:10	07:49 17:05	06:48 18:00	06:34 19:57	18:37-19:18/41 20:51	05:28 21:37
8	08:26 16:12	07:47 17:07	06:46 18:02	06:31 19:59	18:37-19:20/43 20:53	05:26 21:37
9	08:26 16:13	07:45 17:09	06:44 18:04	06:29 20:01	18:38-19:21/43 20:55	05:24 21:38
10	08:25 16:15	07:43 17:11	06:41 18:06	06:27 20:03	18:37-19:21/44 20:57	05:22 21:39
11	08:25 16:16	07:41 17:13	06:39 18:08	06:24 20:04	18:38-19:21/43 20:58	05:21 21:40
12	08:24 16:18	07:39 17:15	06:37 18:09	06:22 20:06	18:39-19:22/43 21:00	05:19 21:41
13	08:23 16:19	07:37 17:17	06:34 18:11	06:20 20:08	18:39-19:21/42 21:02	05:17 21:41
14	08:22 16:21	07:35 17:19	06:32 18:13	06:17 20:10	18:41-19:22/41 21:03	05:15 21:42
15	08:21 16:22	07:33 17:21	06:29 18:15	06:15 20:12	18:43-19:22/39 21:05	05:14 21:43
16	08:20 16:24	07:31 17:23	06:27 18:17	06:13 20:14	18:47-19:22/35 21:07	05:12 21:43
17	08:19 16:26	07:29 17:25	06:25 18:19	06:10 20:15	18:48-19:20/32 21:08	05:10 21:44
18	08:18 16:28	07:27 17:27	06:22 18:21	06:08 20:17	18:49-19:20/31 21:10	05:09 21:44
19	08:17 16:29	07:25 17:29	06:20 18:22	06:06 20:19	18:49-19:20/31 21:12	05:07 21:45
20	08:16 16:31	07:22 17:31	06:17 18:24	06:04 20:21	18:50-19:19/29 21:13	05:06 21:45
21	08:15 16:33	07:20 17:33	06:15 18:26	06:01 20:23	18:50-19:18/28 21:15	05:04 21:45
22	08:14 16:35	07:18 17:35	06:12 18:28	05:59 20:24	18:50-19:16/26 21:16	05:03 21:45
23	08:12 16:36	07:16 17:37	06:10 18:30	05:57 20:26	18:51-19:15/24 21:18	05:02 21:45
24	08:11 16:38	07:14 17:39	06:08 18:32	05:55 20:28	18:53-19:14/21 21:19	05:00 21:46
25	08:10 16:40	07:11 17:41	06:05 18:33	05:52 20:30	18:54-19:12/18 21:21	04:59 21:46
26	08:08 16:42	07:09 17:43	06:03 18:35	05:50 20:32	18:57-19:09/12 21:22	04:58 21:46
27	08:07 16:44	07:07 17:45	06:00 18:37	05:48 20:34	19:56-20:46/50 21:23	04:56 21:46
28	08:05 16:46	07:05 17:47	05:58 18:39	05:46 20:35	19:56-20:47/51 21:25	04:55 21:45
29	08:04 16:48		05:55 18:41	05:44 20:37	19:56-20:48/52 21:26	04:54 21:45
30	08:02 16:50		05:53 18:43	05:42 20:39	19:56-20:50/54 21:27	04:53 21:45
31	08:01 16:52		05:51 18:44	05:40 19:44	19:56-20:51/56 21:29	04:52 21:45
Sonnenscheinstunden	252	274	367	419	492	508
Anzahl Minuten mit Schatten	0	0	680	956	894	2663

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lieferanten Anweisung:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 6 - W11

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:47 05:35-05:59/24	05:26	06:20 18:37-19:20/43	07:12 18:12-18:20/8	07:10	08:04
	21:45 20:01-21:06/65	21:10	20:04	18:51	16:42	15:58
2	04:48 05:35-06:00/25	05:28	06:22 18:36-19:20/44	07:14	07:12	08:06
	21:44 20:01-21:06/65	21:08	20:02	18:49	16:40	15:57
3	04:49 05:35-05:59/24	05:30	06:23 18:35-19:18/43	07:16	07:14	08:07
	21:44 20:01-21:05/64	21:06	20:00	18:47	16:38	15:57
4	04:50 05:35-06:00/25	05:31	06:25 18:34-19:17/43	07:18	07:16	08:08
	21:43 20:01-21:05/64	21:05	19:57	18:44	16:36	15:56
5	04:50 05:35-06:00/25	05:33	06:27 18:34-19:15/41	07:20	07:17	08:10
	21:43 20:01-21:05/64	21:03	19:55	18:42	16:34	15:55
6	04:51 05:36-06:00/24	05:35	06:29 18:28-19:12/44	07:21	07:19	08:11
	21:42 20:02-21:04/62	21:01	19:52	18:39	16:32	15:55
7	04:52 05:36-06:01/25	05:37	06:30 18:24-19:09/45	07:23	07:21	08:13
	21:42 20:02-21:04/62	20:59	19:50	18:37	16:30	15:54
8	04:53 05:36-06:01/25	05:38	06:32 18:22-19:09/47	07:25	07:23	08:14
	21:41 20:02-21:03/61	20:57	19:48	18:35	16:29	15:54
9	04:54 05:37-06:01/24	05:40	06:34 18:19-19:08/49	07:27	07:25	08:15
	21:40 20:03-21:03/60	20:55	19:45	18:32	16:27	15:54
10	04:55 05:37-06:01/24	05:42	06:36 18:17-19:08/51	07:29	07:27	08:16
	21:39 20:03-21:02/59	20:53	19:43	18:30	16:25	15:53
11	04:56 05:37-06:01/24	05:43	06:37 18:15-19:07/52	07:30	07:29	08:17
	21:38 20:03-21:01/58	20:51	19:40	18:28	16:23	15:53
12	04:58 05:37-06:01/24	05:45	06:39 18:13-19:05/52	07:32	07:31	08:18
	21:38 20:04-21:00/56	20:49	19:38	18:25	16:22	15:53
13	04:59 05:38-06:01/23	05:47	06:41 18:12-19:04/52	07:34	07:33	08:20
	21:37 20:04-21:00/56	20:47	19:35	18:23	16:20	15:53
14	05:00 05:38-06:00/22	05:49	06:43 18:11-19:01/50	07:36	07:35	08:21
	21:36 20:04-20:59/55	20:45	19:33	18:21	16:18	15:53
15	05:01 05:38-06:00/22	05:50	06:44 18:11-19:00/49	07:38	07:36	08:21
	21:35 20:04-20:57/53	20:43	19:31	18:18	16:17	15:53
16	05:03 05:39-06:01/22	05:52 19:08-19:13/5	06:46 18:09-18:57/48	07:40	07:38	08:22
	21:33 20:05-20:56/51	20:41	19:28	18:16	16:15	15:53
17	05:04 05:40-06:00/20	05:54 19:03-19:16/13	06:48 18:09-18:55/46	07:41	07:40	08:23
	21:32 20:06-20:56/50	20:38	19:26	18:14	16:14	15:53
18	05:05 05:40-05:59/19	05:55 19:01-19:19/18	06:49 18:09-18:54/45	07:43	07:42	08:24
	21:31 20:06-20:54/48	20:36	19:23	18:11	16:12	15:53
19	05:07 05:40-05:58/18	05:57 18:58-19:20/22	06:51 18:08-18:50/42	07:45	07:44	08:25
	21:30 20:06-20:53/47	20:34	19:21	18:09	16:11	15:54
20	05:08 05:42-05:58/16	05:59 18:57-19:21/24	06:53 18:08-18:49/41	07:47	07:46	08:25
	21:29 20:07-20:51/44	20:32	19:18	18:07	16:10	15:54
21	05:09 05:43-05:57/14	06:01 18:56-19:22/26	06:55 18:08-18:46/38	07:49	07:47	08:26
	21:27 20:08-20:50/42	20:30	19:16	18:05	16:08	15:54
22	05:11 05:44-05:56/12	06:02 18:54-19:22/28	06:56 18:09-18:43/34	07:51	07:49	08:27
	21:26 20:09-20:48/39	20:27	19:13	18:03	16:07	15:55
23	05:12 05:46-05:54/8	06:04 18:53-19:23/30	06:58 18:08-18:41/33	07:53	07:51	08:27
	21:24 20:10-20:47/37	20:25	19:11	18:00	16:06	15:55
24	05:14 20:11-20:44/33	06:06 18:53-19:23/30	07:00 18:08-18:39/31	07:55	07:53	08:27
	21:23	20:23	19:08	17:58	16:05	15:56
25	05:15 20:12-20:41/29	06:08 18:51-19:23/32	07:02 18:08-18:37/29	06:56	07:54	08:28
	21:22	20:21	19:06	16:56	16:04	15:57
26	05:17 20:14-20:40/26	06:09 18:51-19:23/32	07:04 18:08-18:34/26	06:58	07:56	08:28
	21:20	20:18	19:04	16:54	16:03	15:57
27	05:18 20:16-20:38/22	06:11 18:48-19:23/35	07:05 18:08-18:31/23	07:00	07:58	08:28
	21:18	20:16	19:01	16:52	16:02	15:58
28	05:20 20:20-20:37/17	06:13 18:44-19:23/39	07:07 18:08-18:28/20	07:02	07:59	08:29
	21:17	20:14	18:59	16:50	16:01	15:59
29	05:22 20:25-20:34/9	06:15 18:42-19:22/40	07:09 18:09-18:26/17	07:04	08:01	08:29
	21:15	20:11	18:56	16:48	16:00	16:00
30	05:23	06:16 18:40-19:22/42	07:11 18:11-18:24/13	07:06	08:02	08:29
	21:13	20:09	18:54	16:46	15:59	16:01
31	05:25	06:18 18:38-19:21/43		07:08		08:29
	21:12	20:07		16:44		16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	1887	459	1191	8	0	0

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lieferanten Anweisung:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Betreuer:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 7 - W6

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO S SO SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni	
1	08:29 16:03	07:59 16:54	07:02 17:49	08:01-08:25/24 17:49	06:48 19:46	05:40 20:41	
2	08:29 16:04	07:57 16:56	07:00 17:51	08:08-08:22/14 17:48	06:46 19:48	05:38 20:43	
3	08:28 16:05	07:56 16:58	06:58 17:52	08:12-08:18/6 17:50	06:43 19:50	05:36 20:44	
4	08:28 16:06	07:54 17:00	06:56 17:54	06:41 19:52	06:41 20:46	05:34 20:46	
5	08:28 16:08	07:52 17:01	06:53 17:56	06:39 19:54	05:32 20:48	05:32 20:48	
6	08:27 16:09	07:50 17:03	06:51 17:58	06:36 19:55	07:00-07:06/6 20:50	05:30 21:36	
7	08:27 16:10	07:49 17:05	06:49 18:00	06:34 19:57	06:57-07:08/11 20:51	05:28 21:37	
8	08:27 16:12	07:47 17:07	06:46 18:02	06:31 19:59	06:55-07:09/14 20:52	05:26 21:38	
9	08:26 16:13	07:45 17:09	08:14-08:23/9 18:04	06:44 20:01	06:29 20:53	05:24 21:38	
10	08:25 16:15	07:43 17:11	08:10-08:26/16 18:06	06:41 20:03	06:53-07:10/17 20:55	05:24 21:39	
11	08:25 16:16	07:41 17:13	08:08-08:28/20 18:08	06:39 20:04	06:48-07:10/22 20:58	05:21 21:40	
12	08:24 16:18	07:39 17:15	08:07-08:30/23 18:09	06:37 20:06	06:46-07:10/24 21:00	05:19 21:41	
13	08:23 16:19	07:37 17:17	08:06-08:31/25 18:11	06:34 20:08	06:43-07:09/26 21:02	05:17 21:41	
14	08:22 16:21	07:35 17:19	08:03-08:32/29 18:13	06:32 20:10	06:41-07:09/28 21:03	05:15 21:42	
15	08:21 16:22	07:33 17:21	07:59-08:33/34 18:15	06:29 20:12	06:39-07:08/29 21:05	05:14 21:43	
16	08:21 16:24	07:31 17:23	07:58-08:33/35 18:17	06:27 20:14	06:37-07:07/30 21:07	05:12 21:43	
17	08:20 16:26	07:29 17:25	07:56-08:33/37 18:19	06:25 20:15	06:34-07:05/31 21:08	05:10 21:44	
18	08:18 16:28	07:27 17:27	07:55-08:33/38 18:21	06:22 20:17	06:32-07:03/31 21:10	05:09 21:44	
19	08:17 16:29	07:25 17:29	07:54-08:33/39 18:22	06:20 20:19	06:31-07:02/31 21:12	05:07 21:45	
20	08:16 16:31	07:22 17:31	07:54-08:33/39 18:24	06:17 20:21	06:31-07:00/29 21:13	05:06 21:45	
21	08:15 16:33	07:20 17:33	07:53-08:32/39 18:26	06:15 20:23	06:31-06:58/27 21:15	05:04 21:45	
22	08:14 16:35	07:18 17:35	07:53-08:31/38 18:28	06:12 20:25	06:31-06:57/26 21:16	05:03 21:45	
23	08:13 16:36	07:16 17:37	07:54-08:31/37 18:30	06:10 20:26	06:30-06:53/23 21:18	05:02 21:46	
24	08:11 16:38	07:14 17:39	07:54-08:31/37 18:32	06:08 20:28	06:30-06:52/22 21:19	05:00 21:46	
25	08:10 16:40	07:12 17:41	07:54-08:30/36 18:33	06:05 20:30	06:30-06:50/20 21:21	04:59 21:46	
26	08:08 16:42	07:09 17:43	07:55-08:29/34 18:35	06:03 20:32	06:31-06:49/18 21:22	04:58 21:46	
27	08:07 16:44	07:07 17:45	07:57-08:28/31 18:37	06:00 20:34	06:32-06:47/15 21:24	04:56 21:46	
28	08:06 16:46	07:05 17:47	07:59-08:26/27 18:39	05:58 20:35	06:34-06:44/10 21:25	04:55 21:45	
29	08:04 16:48			18:39 06:55	19:33-20:02/29 21:26	21:25 04:54	20:48-20:52/4 21:45
30	08:02 16:50		06:53 19:43	19:43 05:44	19:35-20:08/33 21:26	21:26 04:53	20:46-20:54/8 21:45
31	08:01 16:52		06:51 19:44	19:44 05:42	19:41-20:09/28 21:28	21:28 04:52	20:44-20:55/11 21:45
Sonnenscheinstunden	252	274	367	419	492	508	
Anzahl Minuten mit Schatten	0	623	44	946	359	674	

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenzierter Anwender:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 7 - W6

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1.037 1.051 712 568 7.990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	July	August	September	Oktober	November	Dezember	
1	04:47 20:46-21:09/23 21:45	05:26 20:04-20:21/17 21:10	06:20 06:47-07:09/22 20:04	07:12 18:51	07:10 07:40-07:55/15 16:42	08:04 15:58	
2	04:48 20:47-21:09/22 21:44	05:28 20:03-20:22/19 21:08	06:22 06:49-07:09/20 20:02	07:14 18:49	07:12 07:44-07:52/9 16:40	08:06 15:57	
3	04:49 20:46-21:08/22 21:44	05:30 20:03-20:22/19 21:07	06:23 06:51-07:08/17 20:00	07:16 18:47	07:14 16:38	08:07 15:57	
4	04:50 20:47-21:08/21 21:43	05:31 20:02-20:22/20 21:05	06:25 06:52-07:06/14 19:57	07:18 18:44	07:16 16:36	08:09 15:56	
5	04:50 20:48-21:08/20 21:43	05:33 20:02-20:23/21 21:03	06:27 06:54-07:05/11 19:55	07:20 18:42	07:17 16:34	08:10 15:55	
6	04:51 20:48-21:07/19 21:42	05:35 19:56-20:22/26 21:01	06:29 06:56-07:02/6 19:52	07:21 18:39	07:19 16:32	08:11 15:55	
7	04:52 20:49-21:07/18 21:42	05:37 19:54-20:22/28 20:59	06:30 19:50	07:23 18:37	07:21 16:30	08:13 15:54	
8	04:53 20:49-21:06/17 21:41	05:38 19:53-20:22/29 20:57	06:32 19:48	07:25 18:35	07:23 16:29	08:14 15:54	
9	04:54 20:50-21:06/16 21:40	05:40 19:52-20:21/29 20:55	06:34 19:45	07:27 18:32	07:25 16:27	08:15 15:54	
10	04:55 20:51-21:05/14 21:39	05:42 19:51-20:21/30 20:53	06:36 19:43	07:29 18:30	07:27 16:25	08:16 15:53	
11	04:56 20:51-21:04/13 21:39	05:43 19:50-20:20/30 20:51	06:37 19:40	07:30 08:44-08:54/10 18:28	07:29 16:23	08:17 15:53	
12	04:58 20:52-21:03/11 21:38	05:45 19:50-20:19/29 20:49	06:39 19:38	07:32 08:37-08:57/20 18:25	07:31 16:22	08:19 15:53	
13	04:59 20:53-21:03/10 21:37	05:47 19:50-20:17/27 20:47	06:41 19:35	07:34 08:33-08:59/26 18:23	07:33 16:20	08:20 15:53	
14	05:00 20:55-21:02/7 21:36	05:49 06:43-06:49/6 20:45	06:43 19:33	07:36 08:31-09:00/29 18:21	07:35 16:18	08:21 15:53	
15	05:01 21:35	05:50 06:41-06:52/11 20:43	06:44 19:31	07:38 08:29-09:01/32 18:18	07:36 16:17	08:22 15:53	
16	05:03 21:34	05:52 06:39-06:55/16 20:41	06:46 19:28	07:40 08:27-09:02/35 18:16	07:38 16:15	08:22 15:53	
17	05:04 21:32	05:54 06:37-06:56/19 20:38	06:48 19:26	07:41 08:26-09:02/36 18:14	07:40 16:14	08:23 15:53	
18	05:05 21:31	05:55 06:37-06:57/20 20:36	06:50 19:23	07:43 08:25-09:02/37 18:11	07:42 16:12	08:24 15:53	
19	05:07 21:30	05:57 06:36-06:59/23 20:34	06:51 19:21	07:45 08:25-09:02/37 18:09	07:44 16:11	08:25 15:54	
20	05:08 21:29	05:59 06:35-06:59/24 20:32	06:53 19:18	07:47 08:25-09:03/38 18:07	07:46 16:10	08:25 15:54	
21	05:09 21:27	06:01 06:35-07:01/26 19:33-19:55/23 20:30	06:55 19:16	07:49 08:25-09:03/38 18:05	07:47 16:08	08:26 15:54	
22	05:11 21:26	06:02 06:35-07:03/28 20:27	06:57 19:13	07:51 08:25-09:03/38 18:03	07:49 16:07	08:27 15:55	
23	05:12 21:25	06:04 06:35-07:04/29 20:25	06:58 19:11	07:53 08:25-09:03/38 18:00	07:51 16:06	08:27 15:55	
24	05:14 21:23	06:06 06:35-07:06/31 20:23	07:00 19:09	07:55 08:25-09:03/38 17:58	07:53 16:05	08:27 15:56	
25	05:15 21:22	06:08 06:36-07:07/31 20:21	07:02 19:06	06:56 07:28-08:03/37 17:56	07:54 16:04	08:28 15:57	
26	05:17 21:20	06:09 06:37-07:08/31 20:18	07:04 19:04	07:58 07:27-08:03/36 17:54	07:56 16:03	08:28 15:57	
27	05:18 21:18	06:11 06:39-07:09/30 20:16	07:05 19:01	07:59 07:29-08:02/33 17:52	07:58 16:02	08:28 15:58	
28	05:20 20:10-20:16/6 21:17	06:13 06:41-07:10/29 20:14	07:07 18:59	07:02 07:33-08:01/28 17:50	07:59 16:01	08:29 15:59	
29	05:22 20:07-20:18/11 21:15	06:15 06:42-07:10/28 20:11	07:09 18:56	07:04 07:36-08:00/24 17:48	08:01 16:00	08:29 16:00	
30	05:23 20:06-20:20/14 21:14	06:16 06:44-07:10/26 20:09	07:11 18:54	07:06 07:37-07:59/22 17:46	08:03 15:59	08:29 16:01	
31	05:25 20:05-20:20/15 21:12	06:18 06:46-07:10/24 20:07	07:13 18:44	07:08 07:38-07:58/20 17:44	08:05 15:58	08:29 16:02	
	Sonneneinstrahlung Anzahl Minuten mit Schatten	510 279	459 1165	382 90	329 652	260 23	235 0

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer Anweisung:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 8 - W7

#### Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mal	Juni
1	08:29 14:26-15:08/42 16:03	07:59 16:54	07:02 07:56-08:50/54 17:49	06:48 19:46	05:40 06:07-06:47/40 20:41	04:51 21:30
2	08:29 14:28-15:08/40 16:04	07:58 16:56	07:00 07:57-08:49/52 17:51	06:46 19:48	05:38 06:05-06:45/40 20:43	04:50 21:31
3	08:28 14:30-15:09/39 16:05	07:56 16:58	06:58 07:58-08:49/51 17:52	06:43 19:50	05:36 06:04-06:43/39 20:44	04:49 21:32
4	08:28 14:31-15:09/38 16:06	07:54 17:00	06:56 07:59-08:48/49 17:54	06:41 19:52	05:34 06:02-06:42/40 20:46	04:49 21:33
5	08:28 14:34-15:10/36 16:08	07:52 17:02	06:53 08:00-08:47/47 17:56	06:39 19:54	05:32 06:01-06:41/40 20:48	04:48 21:35
6	08:27 14:35-15:10/35 16:09	07:51 17:03	06:51 08:02-08:46/44 17:58	06:36 19:55	05:30 05:59-06:40/41 20:50	04:47 21:36
7	08:27 14:40-15:11/31 16:10	07:49 17:05	06:49 08:04-08:45/41 18:00	06:34 19:57	05:28 05:58-06:38/40 20:51	04:46 21:37
8	08:27 14:41-15:11/30 16:12	07:47 17:07	06:46 08:07-08:43/36 18:02	06:31 19:59	05:26 05:57-06:37/40 20:53	04:46 21:38
9	08:26 14:43-15:11/28 16:13	07:45 08:23-08:38/15 17:09	06:44 08:14-08:41/27 18:04	06:29 20:01	05:24 05:57-06:36/39 20:55	04:45 21:38
10	08:25 14:45-15:11/26 16:15	07:43 08:19-08:42/23 17:11	06:41 08:15-08:38/23 18:06	06:27 20:03	05:22 05:56-06:34/38 20:57	04:45 21:39
11	08:25 14:46-15:11/25 16:16	07:41 08:17-08:44/27 17:13	06:39 08:18-08:36/18 18:08	06:24 20:05	05:21 05:56-06:32/36 20:58	04:44 21:40
12	08:24 14:47-15:11/24 16:18	07:39 08:15-08:46/31 17:15	06:37 08:22-08:30/8 18:09	06:22 20:06	05:19 05:56-06:32/36 21:00	04:44 21:41
13	08:23 14:49-15:11/22 16:19	07:37 08:14-08:47/33 17:17	06:34 18:11	06:20 20:08	05:17 05:56-06:30/34 21:02	04:44 21:42
14	08:22 14:51-15:11/20 16:21	07:35 08:13-08:49/36 17:19	06:32 18:13	06:17 20:10	05:15 05:56-06:29/33 21:03	04:43 21:42
15	08:21 14:52-15:11/19 16:22	07:33 08:11-08:50/39 17:21	06:29 18:15	06:15 06:41-06:52/11 20:12	05:14 05:56-06:27/31 21:05	04:43 21:43
16	08:21 14:53-15:11/18 16:24	07:31 08:05-08:50/45 17:23	06:27 18:17	06:13 06:39-06:54/15 20:14	05:12 05:56-06:26/30 21:07	04:43 21:43
17	08:20 14:54-15:10/16 16:26	07:29 08:02-08:50/48 17:25	06:25 18:19	06:10 06:36-06:54/18 20:15	05:10 05:56-06:24/28 21:08	04:43 21:44
18	08:19 14:56-15:10/14 16:28	07:27 08:00-08:51/51 17:27	06:22 18:21	06:08 06:34-06:55/21 20:17	05:09 05:57-06:24/27 21:10	04:43 21:44
19	08:17 14:57-15:08/11 16:29	07:25 07:59-08:51/52 17:29	06:20 18:22	06:06 06:32-06:56/24 20:19	05:07 05:57-06:22/25 21:12	04:43 21:45
20	08:16 15:01-15:05/4 16:31	07:23 07:58-08:52/54 17:31	06:17 18:24	06:04 06:31-06:56/25 20:21	05:06 05:57-06:22/25 21:13	04:43 21:45
21	08:15 16:33 16:33	07:20 07:57-08:51/54 17:33	06:15 18:26	06:01 06:29-06:57/28 20:23	05:04 05:58-06:21/23 21:15	04:43 21:45
22	08:14 16:35 16:35	07:18 07:56-08:51/55 17:35	06:13 18:28	05:59 06:26-06:57/31 20:25	05:03 05:59-06:20/21 21:16	04:43 21:45
23	08:13 16:37 16:37	07:16 07:56-08:51/55 17:37	06:10 18:30	05:57 06:24-06:56/32 20:26	05:02 05:59-06:18/19 21:18	04:43 21:46
24	08:11 16:38 16:38	07:14 07:56-08:51/55 17:39	06:08 18:32	05:55 06:21-06:55/34 20:28	05:00 06:01-06:17/16 21:19	04:44 21:46
25	08:10 16:40 16:40	07:12 07:55-08:50/55 17:41	06:05 18:33	05:53 06:19-06:55/36 20:30	04:59 06:02-06:16/14 21:21	04:44 21:46
26	08:08 16:42 16:42	07:09 07:55-08:51/56 17:43	06:03 18:35	05:50 06:17-06:54/37 20:32	04:58 06:03-06:14/11 21:22	04:44 21:46
27	08:07 16:44 16:44	07:07 07:56-08:51/55 17:45	06:00 18:37	05:48 06:15-06:53/38 20:34	04:56 06:06-06:12/6 21:24	04:45 21:46
28	08:06 16:46 16:46	07:05 07:55-08:50/55 17:47	05:58 18:39	05:46 06:13-06:52/39 20:35	04:55 21:25	04:45 21:45
29	08:04 16:48 16:48		05:55 19:41	05:44 06:11-06:50/39 20:37	04:54 21:26	04:46 21:45
30	08:02 16:50 16:50		05:53 19:43	05:42 06:09-06:49/40 20:39	04:53 21:28	04:47 21:45
31	08:01 16:52 16:52		05:51 19:44		04:52 21:29	
Sonnenscheinstunden	252	274	367	419	492	508
Anzahl Minuten mit Schatten	518	894	450	468	812	0

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer Anwender:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 8 - W7

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1.037 1.051 712 568 7.990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:47	05:27 06:06-06:42/36	06:20	07:12	07:10 07:49-08:11/22	08:04 14:28-14:53/25
	21:45	21:10	20:04	18:51	16:42	15:58
2	04:48	05:28 06:06-06:43/37	06:22	07:14 08:58-09:12/14	07:12 07:53-08:07/14	08:06 14:28-14:54/26
	21:44	21:08	20:02	18:49	16:40	15:57
3	04:49	05:30 06:07-06:45/38	06:23	07:16 08:54-09:15/21	07:14	08:07 14:27-14:55/28
	21:44	21:07	20:00	18:47	16:38	15:57
4	04:50	05:31 06:08-06:47/39	06:25	07:18 08:52-09:17/25	07:16	08:09 14:26-14:55/29
	21:43	21:05	19:57	18:44	16:36	15:56
5	04:50	05:33 06:08-06:47/39	06:27	07:20 08:48-09:19/31	07:18	08:10 14:25-14:56/31
	21:43	21:03	19:55	18:42	16:34	15:55
6	04:51	05:35 06:09-06:49/40	06:29	07:21 08:42-09:20/38	07:19	08:11 14:22-14:56/34
	21:42	21:01	19:52	18:39	16:32	15:55
7	04:52	05:37 06:09-06:50/41	06:30	07:23 08:39-09:21/42	07:21	08:13 14:21-14:57/36
	21:42	20:59	19:50	18:37	16:30	15:54
8	04:53	05:38 06:10-06:51/41	06:32	07:25 08:37-09:21/44	07:23	08:14 14:19-14:57/38
	21:41	20:57	19:48	18:35	16:29	15:54
9	04:54	05:40 06:11-06:51/40	06:34	07:27 08:34-09:22/48	07:25	08:15 14:18-14:57/39
	21:40	20:55	19:45	18:32	16:27	15:54
10	04:55	05:42 06:13-06:52/39	06:36	07:29 08:32-09:23/51	07:27	08:16 14:17-14:58/41
	21:39	20:53	19:43	18:30	16:25	15:53
11	04:57	05:43 06:15-06:55/40	06:37	07:30 08:31-09:23/52	07:29	08:17 14:18-14:59/41
	21:39	20:51	19:40	18:28	16:23	15:53
12	04:58	05:45 06:16-06:56/40	06:39	07:32 08:30-09:23/53	07:31	08:19 14:17-14:59/42
	21:38	20:49	19:38	18:25	16:22	15:53
13	04:59	05:47 06:18-06:57/39	06:41	07:34 08:29-09:23/54	07:33	08:20 14:17-14:59/42
	21:37	20:47	19:35	18:23	16:20	15:53
14	05:00	05:49 06:19-06:58/39	06:43	07:36 08:28-09:23/55	07:35	08:21 14:17-15:00/43
	21:36	20:45	19:33	18:21	16:18	15:53
15	05:01	05:50 06:21-07:00/39	06:44	07:38 08:28-09:23/55	07:36	08:22 14:17-15:00/43
	21:35	20:43	19:31	18:18	16:17	15:53
16	05:03 06:17-06:19/2	05:52 06:23-07:01/38	06:46	07:40 08:27-09:23/56	07:38	08:22 14:17-15:01/44
	21:34	20:41	19:28	18:16	16:15	15:53
17	05:04 06:14-06:22/8	05:54 06:24-07:01/37	06:48	07:41 08:27-09:23/56	07:40	08:23 14:16-15:00/44
	21:32	20:39	19:26	18:14	16:14	15:53
18	05:05 06:12-06:24/12	05:56 06:26-07:01/35	06:50	07:43 08:27-09:22/55	07:42	08:24 14:16-15:01/45
	21:31	20:36	19:23	18:11	16:13	15:53
19	05:07 06:11-06:28/15	05:57 06:28-07:02/34	06:51	07:45 08:27-09:23/56	07:44	08:25 14:16-15:02/46
	21:30	20:34	19:21	18:09	16:11	15:54
20	05:08 06:11-06:28/17	05:59 06:29-07:01/32	06:53	07:47 08:28-09:22/54	07:46	08:25 14:17-15:03/46
	21:29	20:32	19:18	18:07	16:10	15:54
21	05:09 06:09-06:29/20	06:01 06:31-07:01/30	06:55	07:49 08:28-09:22/54	07:47	08:26 14:17-15:03/46
	21:27	20:30	19:16	18:05	16:08	15:54
22	05:11 06:08-06:30/22	06:02 06:34-07:01/27	06:57	07:51 08:29-09:22/53	07:49 14:37-14:41/4	08:27 14:18-15:04/46
	21:26	20:28	19:13	18:03	16:07	15:55
23	05:12 06:08-06:32/24	06:04 06:34-07:00/26	06:58	07:53 08:30-09:22/52	07:51 14:34-14:45/11	08:27 14:18-15:04/46
	21:25	20:25	19:11	18:00	16:06	15:55
24	05:14 06:08-06:33/25	06:06 06:36-07:00/24	07:00	07:55 08:31-09:21/50	07:53 14:33-14:47/14	08:28 14:18-15:04/46
	21:23	20:23	19:09	17:58	16:05	15:56
25	05:15 06:08-06:33/25	06:08 06:38-06:59/21	07:02	06:56 07:33-08:21/48	07:54 14:32-14:48/16	08:28 14:20-15:05/45
	21:22	20:21	19:06	16:56	16:04	15:57
26	05:17 06:07-06:35/28	06:09 06:39-06:57/18	07:04	06:58 07:35-08:20/45	07:56 14:32-14:50/18	08:28 14:20-15:05/45
	21:20	20:18	19:04	16:54	16:03	15:57
27	05:18 06:06-06:35/29	06:11 06:41-06:56/15	07:05	07:00 07:42-08:19/37	07:58 14:31-14:50/19	08:28 14:21-15:06/45
	21:18	20:16	19:01	16:52	16:02	15:58
28	05:20 06:07-06:37/30	06:13 06:43-06:54/11	07:07	07:02 07:43-08:18/35	07:59 14:31-14:51/20	08:29 14:22-15:06/44
	21:17	20:14	18:59	16:50	16:01	15:59
29	05:22 06:06-06:38/32	06:15	07:09	07:04 07:44-08:17/33	08:01 14:30-14:52/22	08:29 14:24-15:07/43
	21:15	20:11	18:56	16:48	16:00	16:00
30	05:23 06:06-06:40/34	06:16	07:11	07:06 07:45-08:15/30	08:03 14:30-14:53/23	08:29 14:25-15:07/42
	21:14	20:09	18:54	16:46	15:59	16:01
31	05:25 06:06-06:41/35	06:18		07:08 07:47-08:13/26		08:29 14:26-15:08/42
	21:12	20:07		16:44		16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	358	935	0	1323	183	1253

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

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



Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer Anwalter:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 9 - W8

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29 13:17-13:33/16	07:59 17:02	07:02 17:49	06:48 19:46	05:40 20:41	04:51 20:14-20:49/35
	16:03	16:54	17:49	19:46	20:41	21:30
2	08:29 13:18-13:33/15	07:57 17:00	07:00 17:49	06:46 19:46	05:38 20:41	04:50 20:14-20:50/36
	16:04	16:56	17:51	19:48	20:43	21:31
3	08:28 13:20-13:33/13	07:56 17:52	06:58 17:52	06:43 19:50	05:36 20:44	04:49 20:52-20:55/3
	16:05	16:58	17:52	19:50	20:44	21:32 20:16-20:50/34
4	08:28 13:21-13:31/10	07:54 17:54	06:56 17:54	06:41 19:52	05:34 20:46	04:48 20:17-20:57/40
	16:06	16:59	17:54	19:52	20:46	21:33
5	08:28 13:24-13:30/6	07:52 17:56	06:53 07:19-07:22/3	06:39 19:54	05:32 20:48	04:48 20:17-20:59/42
	16:08	17:01	17:56	19:54	20:48	21:35
6	08:27 17:03	07:50 17:58	06:51 07:15-07:27/12	06:36 19:55	05:30 20:11-20:19/8	04:47 20:18-21:00/42
	16:09	17:03	17:58	19:55	20:50	21:36
7	08:27 17:05	07:49 18:00	06:49 07:13-07:29/16	06:34 19:57	05:28 20:09-20:21/12	04:46 20:19-21:00/41
	16:10	17:05	18:00	19:57	20:51	21:37
8	08:27 17:07	07:47 18:02	06:46 07:10-07:29/19	06:31 19:59	05:26 20:08-20:22/14	04:46 20:20-21:01/41
	16:12	17:07	18:02	19:59	20:53	21:38
9	08:26 17:09	07:45 18:04	06:44 07:08-07:31/23	06:29 20:01	05:24 20:08-20:25/17	04:45 20:21-21:02/41
	16:13	17:09	18:04	20:01	20:55	21:38
10	08:25 17:11	07:43 18:06	06:41 07:05-07:30/25	06:27 20:03	05:22 20:07-20:26/19	04:45 20:21-21:02/41
	16:15	17:11	18:06	20:03	20:57	21:39
11	08:25 17:13	07:41 18:08	06:39 07:04-07:31/27	06:24 20:04	05:21 20:06-20:27/21	04:44 20:23-21:03/40
	16:16	17:13	18:08	20:04	20:58	21:40
12	08:24 17:15	07:39 18:09	06:37 07:02-07:30/28	06:22 20:06	05:19 20:06-20:28/22	04:44 20:24-21:04/40
	16:18	17:15	18:09	20:06	21:00	21:41
13	08:23 17:17	07:37 18:11	06:34 07:01-07:30/29	06:20 20:08	05:17 20:05-20:29/24	04:44 20:30-21:04/34
	16:19	17:17	18:11	20:08	21:02	21:42 20:24-20:29/5
14	08:22 17:19	07:35 18:13	06:32 07:01-07:30/29	06:17 20:10	05:15 20:05-20:30/25	04:43 20:30-21:04/34
	16:21	17:19	18:13	20:10	21:03	21:42 20:27-20:28/1
15	08:21 17:21	07:33 18:15	06:29 07:00-07:29/29	06:15 20:12	05:14 20:05-20:32/27	04:43 20:31-21:05/34
	16:22	17:21	18:15	20:12	21:05	21:43
16	08:21 17:23	07:31 18:17	06:27 06:59-07:29/30	06:13 20:14	05:12 20:05-20:32/27	04:43 20:31-21:05/34
	16:24	17:23	18:17	20:14	21:07	21:43
17	08:20 17:25	07:29 18:19	06:25 06:58-07:28/30	06:10 20:15	05:10 20:06-20:33/27	04:43 20:31-21:05/34
	16:26	17:25	18:19	20:15	21:08	21:44
18	08:18 17:27	07:27 18:21	06:22 06:57-07:27/30	06:08 20:17	05:09 20:06-20:34/28	04:43 20:31-21:06/35
	16:28	17:27	18:21	20:17	21:10	21:44
19	08:17 17:29	07:25 18:22	06:20 06:56-07:25/29	06:06 20:19	05:07 20:06-20:34/28	04:43 20:32-21:06/34
	16:29	17:29	18:22	20:19	21:12	21:45
20	08:16 17:31	07:22 18:24	06:17 06:57-07:23/26	06:04 20:21	05:06 20:06-20:34/28	04:43 20:32-21:06/34
	16:31	17:31	18:24	20:21	21:13	21:45
21	08:15 17:33	07:20 18:26	06:15 06:56-07:21/25	06:01 20:23	05:04 20:07-20:35/28	04:43 20:32-21:06/34
	16:33	17:33	18:26	20:23	21:15	21:45
22	08:14 17:35	07:18 18:28	06:12 06:57-07:20/23	05:59 20:25	05:03 20:07-20:41/34	04:43 20:33-21:07/34
	16:35	17:35	18:28	20:25	21:16	21:45
23	08:13 17:37	07:16 18:30	06:10 06:58-07:20/22	05:57 20:26	05:01 20:07-20:43/36	04:43 20:33-21:07/34
	16:36	17:37	18:30	20:26	21:18	21:46
24	08:11 17:39	07:14 18:32	06:08 06:58-07:18/20	05:55 20:28	05:00 20:08-20:45/37	04:44 20:32-21:07/35
	16:38	17:39	18:32	20:28	21:19	21:46
25	08:10 17:41	07:12 18:33	06:05 06:59-07:17/18	05:52 20:30	04:59 20:09-20:46/37	04:44 20:33-21:08/35
	16:40	17:41	18:33	20:30	21:21	21:46
26	08:08 17:43	07:09 18:35	06:03 07:00-07:14/14	05:50 20:32	04:58 20:10-20:47/37	04:44 20:33-21:07/34
	16:42	17:43	18:35	20:32	21:22	21:46
27	08:07 17:45	07:07 18:37	06:00 07:04-07:10/6	05:48 20:34	04:56 20:10-20:48/38	04:45 20:34-21:08/34
	16:44	17:45	18:37	20:34	21:24	21:46
28	08:05 17:47	07:05 18:39	05:58 18:39	05:46 20:35	04:55 20:11-20:48/37	04:45 20:33-21:07/34
	16:46	17:47	18:39	20:35	21:25	21:45
29	08:04 19:41	06:55 19:41	06:55 19:41	05:44 20:37	04:54 20:12-20:49/37	04:46 20:34-21:08/34
	16:48	19:41	19:41	20:37	21:26	21:45 20:29-20:33/4
30	08:02 19:43	06:53 19:43	06:53 19:43	05:42 20:39	04:53 20:13-20:49/36	04:47 20:34-21:07/33
	16:50	19:43	19:43	20:39	21:28	21:45 20:28-20:33/5
31	08:01 19:44	06:51 19:44	06:51 19:44	05:42 21:29	04:52 20:13-20:49/36	04:47 20:28-20:33/5
	16:52	19:44	19:44	21:29	21:29	21:45
Sonnenscheinstunden	251	274	367	419	492	508
Anzahl Minuten mit Schatten	60	0	513	0	720	1105

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 9 - W8

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:47 20:27-21:08/41	05:26 20:16-20:38/22	06:20	07:12 07:41-08:10/29	07:10	08:04
	21:45	21:10	20:04	18:51	16:42	15:58
2	04:48 20:27-21:08/41	05:28 20:16-20:37/21	06:22	07:14 07:41-08:09/28	07:12	08:06
	21:44	21:08	20:02	18:49	16:40	15:57
3	04:49 20:26-21:07/41	05:30 20:17-20:36/19	06:23	07:16 07:42-08:09/27	07:14	08:07
	21:44	21:07	20:00	18:47	16:38	15:57
4	04:50 20:25-21:07/42	05:31 20:17-20:33/16	06:25	07:18 07:44-08:08/24	07:16	08:09
	21:43	21:05	19:57	18:44	16:36	15:56
5	04:50 20:25-21:07/42	05:33 20:19-20:32/13	06:27	07:20 07:46-08:07/21	07:17	08:10
	21:43	21:03	19:55	18:42	16:34	15:55
6	04:51 20:25-21:06/41	05:35 20:19-20:30/11	06:29	07:21 07:48-08:06/18	07:19	08:11
	21:42	21:01	19:52	18:39	16:32	15:55
7	04:52 20:25-21:06/41	05:36 20:22-20:28/6	06:30	07:23 07:50-08:04/14	07:21	08:13 13:12-13:17/5
	21:42	20:59	19:50	18:37	16:30	15:54
8	04:53 20:24-21:05/41	05:38	06:32	07:25 07:52-08:01/9	07:23	08:14 13:09-13:19/10
	21:41	20:57	19:48	18:35	16:28	15:54
9	04:54 20:24-21:04/40	05:40	06:34	07:27	07:25	08:15 13:08-13:21/13
	21:40	20:55	19:45	18:32	16:27	15:54
10	04:55 20:23-20:58/35	05:42	06:36	07:29	07:27	08:16 13:07-13:22/15
	21:39	20:53	19:43	18:30	16:25	15:53
11	04:56 20:22-20:58/36	05:43	06:37	07:30	07:29	08:17 13:08-13:24/16
	21:39	20:51	19:40	18:28	16:23	15:53
12	04:58 20:22-20:58/36	05:45	06:39	07:32	07:31	08:19 13:07-13:25/18
	21:38	20:49	19:38	18:25	16:22	15:53
13	04:59 20:21-20:58/37	05:47	06:41	07:34	07:33	08:20 13:07-13:27/20
	21:37	20:47	19:35	18:23	16:20	15:53
14	05:00 20:21-20:57/36	05:49	06:43	07:36	07:35	08:21 13:07-13:29/22
	21:36	20:45	19:33	18:21	16:18	15:53
15	05:01 20:20-20:57/37	05:50	06:44	07:38	07:36	08:22 13:07-13:30/23
	21:35	20:43	19:31	18:18	16:17	15:53
16	05:03 20:19-20:56/37	05:52	06:46	07:40	07:38	08:22 13:08-13:31/23
	21:34	20:41	19:28	18:16	16:15	15:53
17	05:04 20:19-20:57/38	05:54	06:48 07:49-08:01/12	07:41	07:40	08:23 13:07-13:31/24
	21:32	20:38	19:26	18:14	16:14	15:53
18	05:05 20:19-20:56/37	05:55	06:50 07:47-08:04/17	07:43	07:42	08:24 13:07-13:32/25
	21:31	20:36	19:23	18:11	16:12	15:53
19	05:07 20:18-20:55/37	05:57	06:51 07:45-08:05/20	07:45	07:44	08:25 13:08-13:33/25
	21:30	20:34	19:21	18:09	16:11	15:54
20	05:08 20:17-20:54/37	05:59	06:53 07:43-08:05/22	07:47	07:46	08:25 13:09-13:34/25
	21:29	20:32	19:18	18:07	16:10	15:54
21	05:09 20:17-20:53/36	06:01	06:55 07:42-08:06/24	07:49	07:47	08:26 13:09-13:34/25
	21:27	20:30	19:16	18:05	16:08	15:54
22	05:11 20:17-20:51/34	06:02	06:56 07:42-08:06/24	07:51	07:49	08:27 13:10-13:35/25
	21:26	20:27	19:13	18:03	16:07	15:55
23	05:12 20:16-20:44/28	06:04	06:58 07:40-08:06/26	07:53	07:51	08:27 13:10-13:35/25
	21:25	20:25	19:11	18:00	16:06	15:55
24	05:14 20:17-20:45/28	06:06	07:00 07:40-08:08/28	07:55	07:53	08:27 13:10-13:35/25
	21:23	20:23	19:08	17:58	16:05	15:56
25	05:15 20:16-20:44/28	06:08	07:02 07:40-08:09/29	06:56	07:54	08:28 13:11-13:36/25
	21:22	20:21	19:06	16:56	16:04	15:57
26	05:17 20:17-20:44/27	06:09	07:04 07:40-08:10/30	06:58	07:56	08:28 13:12-13:36/24
	21:20	20:18	19:04	16:54	16:03	15:57
27	05:18 20:16-20:43/27	06:11	07:05 07:40-08:10/30	07:00	07:58	08:28 13:12-13:36/24
	21:18	20:16	19:01	16:52	16:02	15:58
28	05:20 20:16-20:43/27	06:13	07:07 07:40-08:10/30	07:02	07:59	08:29 13:13-13:36/23
	21:17	20:14	18:59	16:50	16:01	15:59
29	05:22 20:16-20:41/25	06:15	07:09 07:40-08:10/30	07:04	08:01	08:29 13:14-13:36/22
	21:15	20:11	18:56	16:48	16:00	16:00
30	05:23 20:16-20:41/25	06:16	07:11 07:41-08:10/29	07:06	08:03	08:29 13:15-13:35/20
	21:14	20:09	18:54	16:46	15:59	16:01
31	05:25 20:16-20:39/23	06:18		07:08		08:29 13:16-13:35/19
	21:12	20:07		16:44		16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	1081	108	351	170	0	521

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 10 - W9

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	Mai	Juni
1	08:29 10:01-10:13/12	07:59 07:02	07:02	06:48 05:40	05:40	04:51 20:08-20:53/45
	16:03	16:54 17:49	17:49	19:46 20:41	20:41	21:30
2	08:29 10:03-10:12/9	07:57 07:00	07:00	06:46 05:38	05:38	04:50 20:09-20:54/45
	16:04	16:56 17:50	17:50	19:48 20:43	20:43	21:31
3	08:28	07:56 06:58	06:58	06:43 05:36	05:36	04:49 20:10-20:55/45
	16:05	16:57 17:52	17:52	19:50 20:44	20:44	21:32
4	08:28	07:54 06:55	06:55	06:41 05:34 20:04-20:12/8	05:34	04:48 20:11-20:55/44
	16:06	16:59 17:54	17:54	19:52 20:46	20:46	21:33
5	08:28	07:52 06:53	06:53	06:39 05:32 20:02-20:16/14	05:32	04:48 20:13-20:56/43
	16:08	17:01 17:56	17:56	19:54 20:48	20:48	21:35
6	08:27	07:50 06:51	06:51	06:36 05:30 20:00-20:17/17	05:30	04:47 20:14-20:57/43
	16:09	17:03 17:58	17:58	19:55 20:50	20:50	21:36
7	08:27	07:49 06:48	06:48	06:34 05:28 19:59-20:19/20	05:28	04:46 20:14-20:57/43
	16:10	17:05 18:00	18:00	19:57 20:51	20:51	21:37
8	08:27	07:47 06:46	06:46	06:31 05:26 19:58-20:21/23	05:26	04:46 20:15-20:58/43
	16:12	17:07 18:02	18:02	19:59 20:53	20:53	21:37
9	08:26	07:45 06:44	06:44	06:29 05:24 19:58-20:23/25	05:24	04:45 20:15-20:58/43
	16:13	17:09 18:04	18:04	20:01 20:55	20:55	21:38
10	08:25	07:43 06:41	06:41	06:27 05:22 19:57-20:24/27	05:22	04:45 20:16-20:58/42
	16:15	17:11 18:06	18:06	20:03 20:57	20:57	21:39
11	08:25	07:41 06:39 07:03-07:06/3	06:39	06:24 05:20 19:56-20:25/29	05:20	04:44 20:17-20:59/42
	16:16	17:13 18:08	18:08	20:04 20:58	20:58	21:40
12	08:24	07:39 06:37 07:00-07:09/9	06:37	06:22 05:19 19:56-20:27/31	05:19	04:44 20:18-21:00/42
	16:18	17:15 18:09	18:09	20:06 21:00	21:00	21:41
13	08:23	07:37 06:34 06:58-07:10/12	06:34	06:20 05:17 19:56-20:28/32	05:17	04:44 20:17-20:59/42
	16:19	17:17 18:11	18:11	20:08 21:02	21:02	21:41
14	08:22	07:35 06:32 06:56-07:12/16	06:32	06:17 05:15 19:55-20:30/35	05:15	04:43 20:18-21:00/42
	16:21	17:19 18:13	18:13	20:10 21:03	21:03	21:42
15	08:21	07:33 06:29 06:53-07:11/18	06:29	06:15 05:14 19:56-20:32/36	05:14	04:43 20:19-21:00/41
	16:22	17:21 18:15	18:15	20:12 21:05	21:05	21:43
16	08:20	07:31 06:27 06:53-07:12/19	06:27	06:13 05:12 19:55-20:33/38	05:12	04:43 20:19-21:01/42
	16:24	17:23 18:17	18:17	20:14 21:07	21:07	21:43
17	08:19	07:29 06:25 06:52-07:11/19	06:25	06:10 05:10 19:56-20:35/39	05:10	04:43 20:19-21:01/42
	16:26	17:25 18:19	18:19	20:15 21:08	21:08	21:44
18	08:18	07:27 06:22 06:53-07:11/18	06:22	06:08 05:09 19:57-20:36/39	05:09	04:43 20:20-21:01/41
	16:27	17:27 18:21	18:21	20:17 21:10	21:10	21:44
19	08:17	07:25 06:20 06:52-07:10/18	06:20	06:06 05:07 19:56-20:37/41	05:07	04:43 20:20-21:01/41
	16:29	17:29 18:22	18:22	20:19 21:12	21:12	21:45
20	08:16	07:22 06:17 06:53-07:09/16	06:17	06:04 05:06 19:57-20:39/42	05:06	04:43 20:20-21:01/41
	16:31	17:31 18:24	18:24	20:21 21:13	21:13	21:45
21	08:15	07:20 06:15 06:54-07:07/13	06:15	06:01 05:04 19:58-20:41/43	05:04	04:43 20:20-21:01/41
	16:33	17:33 18:26	18:26	20:23 21:15	21:15	21:45
22	08:14	07:18 06:12 06:56-07:05/9	06:12	05:59 05:03 19:58-20:41/43	05:03	04:43 20:21-21:02/41
	16:35	17:35 18:28	18:28	20:24 21:16	21:16	21:45
23	08:13	07:16 06:10	06:10	05:57 05:01 19:59-20:43/44	05:01	04:43 20:21-21:02/41
	16:36	17:37 18:30	18:30	20:26 21:18	21:18	21:46
24	08:11	07:14 06:08	06:08	05:55 05:00 20:00-20:44/44	05:00	04:44 20:21-21:02/41
	16:38	17:39 18:32	18:32	20:28 21:19	21:19	21:46
25	08:10	07:11 06:05	06:05	05:52 04:59 20:01-20:45/44	04:59	04:44 20:21-21:03/42
	16:40	17:41 18:33	18:33	20:30 21:21	21:21	21:46
26	08:08	07:09 06:03	06:03	05:50 04:58 20:02-20:46/44	04:58	04:44 20:21-21:03/42
	16:42	17:43 18:35	18:35	20:32 21:22	21:22	21:46
27	08:07	07:07 06:00	06:00	05:48 04:56 20:03-20:47/44	04:56	04:45 20:21-21:03/42
	16:44	17:45 18:37	18:37	20:34 21:23	21:23	21:46
28	08:05	07:05 05:58	05:58	05:46 04:55 20:04-20:48/44	04:55	04:45 20:21-21:03/42
	16:46	17:47 18:39	18:39	20:35 21:25	21:25	21:45
29	08:04	06:55	06:55	05:44 04:54 20:05-20:48/43	04:54	04:46 20:22-21:04/42
	16:48	19:41	19:41	20:37 21:26	21:26	21:45
30	08:02	06:53	06:53	05:42 04:53 20:06-20:51/45	04:53	04:47 20:21-21:03/42
	16:50	19:43	19:43	20:39 21:27	21:27	21:45
31	08:01	06:51	06:51	04:52 20:07-20:52/45	04:52	21:29
	16:52	19:44	19:44	21:29	21:29	
Sonnenscheinstunden	251	274	367	419	492	508
Anzahl Minuten mit Schatten	21	0	170	0	979	1268

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenznehmer: **I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet: 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 10 - W9

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:47 20:21-21:03/42	05:26 20:07-20:37/30	06:20	07:12 07:39-07:49/10	07:10	08:04
	21:45	21:10	20:04	18:51	16:42	15:58
2	04:48 20:21-21:04/43	05:28 20:07-20:35/28	06:22	07:14 07:40-07:46/6	07:12	08:06
	21:44	21:08	20:02	18:49	16:40	15:57
3	04:49 20:21-21:03/42	05:30 20:07-20:34/27	06:23	07:16	07:14	08:07
	21:44	21:06	20:00	18:47	16:38	15:57
4	04:50 20:21-21:03/42	05:31 20:07-20:32/25	06:25	07:18	07:16	08:08
	21:43	21:05	19:57	18:44	16:36	15:56
5	04:50 20:21-21:03/42	05:33 20:08-20:31/23	06:27	07:20	07:17	08:10
	21:43	21:03	19:55	18:42	16:34	15:55
6	04:51 20:21-21:03/42	05:35 20:09-20:27/18	06:29	07:21	07:19	08:11
	21:42	21:01	19:52	18:39	16:32	15:55
7	04:52 20:21-21:03/42	05:36 20:10-20:26/16	06:30	07:23	07:21	08:13
	21:42	20:59	19:50	18:37	16:30	15:54
8	04:53 20:19-21:03/44	05:38 20:12-20:24/12	06:32	07:25	07:23	08:14
	21:41	20:57	19:48	18:35	16:28	15:54
9	04:54 20:18-21:03/45	05:40 20:15-20:20/5	06:34	07:27	07:25	08:15
	21:40	20:55	19:45	18:32	16:27	15:54
10	04:55 20:17-21:02/45	05:42	06:36	07:29	08:16	09:52-10:01/9
	21:39	20:53	19:43	18:30	16:25	15:53
11	04:56 20:17-21:02/45	05:43	06:37	07:30	08:17	09:52-10:04/12
	21:39	20:51	19:40	18:28	16:23	15:53
12	04:58 20:16-21:01/45	05:45	06:39	07:32	08:19	09:51-10:05/14
	21:38	20:49	19:38	18:25	16:22	15:53
13	04:59 20:15-21:00/45	05:47	06:41	07:34	08:20	09:51-10:06/15
	21:37	20:47	19:35	18:23	16:20	15:53
14	05:00 20:14-20:58/44	05:48	06:43	07:36	08:21	09:51-10:07/16
	21:36	20:45	19:33	18:21	16:18	15:53
15	05:01 20:13-20:56/43	05:50	06:44	07:38	08:21	09:51-10:08/17
	21:35	20:43	19:31	18:18	16:17	15:53
16	05:03 20:12-20:56/44	05:52	06:46	07:40	08:22	09:51-10:09/18
	21:33	20:41	19:28	18:16	16:15	15:53
17	05:04 20:12-20:56/44	05:54	06:48	07:41	08:23	09:52-10:10/18
	21:32	20:38	19:26	18:14	16:14	15:53
18	05:05 20:11-20:55/44	05:55	06:49	07:43	08:24	09:51-10:10/19
	21:31	20:36	19:23	18:11	16:12	15:53
19	05:07 20:10-20:54/44	05:57	06:51	07:45	08:25	09:52-10:11/19
	21:30	20:34	19:21	18:09	16:11	15:54
20	05:08 20:09-20:53/44	05:59	06:53	07:47	08:25	09:53-10:12/19
	21:29	20:32	19:18	18:07	16:10	15:54
21	05:09 20:09-20:52/43	06:01	06:55 07:42-07:50/8	07:49	08:26	09:52-10:12/20
	21:27	20:30	19:16	18:05	16:08	15:54
22	05:11 20:08-20:51/43	06:02	06:56 07:40-07:52/12	07:51	08:27	09:53-10:13/20
	21:26	20:27	19:13	18:03	16:07	15:55
23	05:12 20:07-20:50/43	06:04	06:58 07:37-07:53/16	07:53	08:27	09:53-10:13/20
	21:24	20:25	19:11	18:00	16:06	15:55
24	05:14 20:07-20:49/42	06:06	07:00 07:36-07:53/17	07:55	08:27	09:54-10:13/19
	21:23	20:23	19:08	17:58	16:05	15:56
25	05:15 20:07-20:47/40	06:08	07:02 07:35-07:54/19	08:00	08:28	09:55-10:14/19
	21:22	20:21	19:06	17:56	16:04	15:57
26	05:17 20:07-20:46/39	06:09	07:03 07:35-07:54/19	08:08	08:28	09:55-10:14/19
	21:20	20:18	19:04	17:54	16:03	15:57
27	05:18 20:06-20:45/39	06:11	07:05 07:34-07:53/19	08:00	08:28	09:56-10:14/18
	21:18	20:16	19:01	17:52	16:02	15:58
28	05:20 20:07-20:44/37	06:13	07:07 07:34-07:52/18	08:02	08:29	09:57-10:14/17
	21:17	20:14	18:59	17:50	16:01	15:59
29	05:22 20:06-20:41/35	06:15	07:09 07:35-07:52/17	08:04	08:29	09:58-10:14/16
	21:15	20:11	18:56	17:48	16:00	16:00
30	05:23 20:07-20:40/33	06:16	07:11 07:37-07:51/14	08:06	08:29	09:59-10:14/15
	21:14	20:09	18:54	17:46	15:59	16:01
31	05:25 20:06-20:38/32	06:18		08:08	08:29	10:00-10:14/14
	21:12	20:07		16:44		16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	1297	184	159	16	0	373

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lieferanten Anwesenheit:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Betreuer:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 11 - W10

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1,037 1,051 712 568 7,990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Januar	Februar	März	April	May	Juni
1	08:29	07:59	07:02	06:48	05:40	19:18-20:05/47
	16:03	16:54	17:49	19:46	20:41	21:30
2	08:29	07:57	07:00	06:46	05:38	19:18-20:05/47
	16:04	16:56	17:50	19:48	20:43	21:31
3	08:28	07:56	06:58	06:43	05:36	19:18-20:05/47
	16:05	16:58	17:52	19:50	20:44	21:32
4	08:28	07:54	06:55	06:41	05:34	19:18-20:05/47
	16:06	16:59	17:54	19:52	20:46	21:33
5	08:28	07:52	06:53	06:39	05:32	19:20-20:06/46
	16:08	17:01	17:56	19:54	20:48	21:34
6	08:27	07:50	06:51	06:36	05:30	19:20-20:08/48
	16:09	17:03	17:58	19:55	20:50	21:36
7	08:27	07:49	06:48	06:34	05:28	19:20-20:10/50
	16:10	17:05	18:00	19:57	20:51	21:37
8	08:26	07:47	06:46	06:31	05:26	19:21-20:11/50
	16:12	17:07	18:02	19:59	20:53	21:37
9	08:26	07:45	06:44	06:29	05:24	19:22-20:13/51
	16:13	17:09	18:04	20:01	20:55	21:38
10	08:25	07:43	06:41	06:27	05:22	19:22-20:14/52
	16:15	17:11	18:06	20:03	20:57	21:39
11	08:25	07:41	06:39	06:24	05:21	19:22-20:14/52
	16:16	17:13	18:08	20:04	20:58	21:40
12	08:24	07:39	06:37	06:22	05:19	19:24-20:15/51
	16:18	17:15	18:09	20:06	21:00	21:41
13	08:23	07:37	06:34	06:20	05:17	19:25-20:15/50
	16:19	17:17	18:11	20:08	21:02	21:41
14	08:22	07:35	06:32	06:17	05:15	19:25-20:15/50
	16:21	17:19	18:13	20:10	21:03	21:42
15	08:21	07:33	06:29	06:15	05:14	19:27-20:16/49
	16:22	17:21	18:15	20:12	21:05	21:43
16	08:20	07:31	06:27	06:13	05:12	19:28-20:16/48
	16:24	17:23	18:17	20:14	21:07	21:43
17	08:19	07:29	06:25	06:10	05:10	19:29-20:17/48
	16:26	17:25	18:19	20:15	21:08	21:44
18	08:18	07:27	06:22	06:08	05:09	20:18-20:23/5
	16:28	17:27	18:21	20:17	21:10	19:31-20:17/46
19	08:17	07:25	06:20	06:06	05:07	19:32-20:26/54
	16:29	17:29	18:22	20:19	21:12	21:45
20	08:16	07:22	06:17	06:04	05:06	19:34-20:29/55
	16:31	17:31	18:24	20:21	21:13	21:45
21	08:15	07:20	06:15	06:01	05:04	19:37-20:31/54
	16:33	17:33	18:26	20:23	21:15	21:45
22	08:14	07:18	06:12	05:59	05:03	19:44-20:31/47
	16:35	17:35	18:28	20:24	21:16	21:45
23	08:12	07:16	06:10	05:57	05:01	19:45-20:32/47
	16:36	17:37	18:30	20:26	21:18	21:45
24	08:11	07:14	06:08	05:55	05:00	19:45-20:33/48
	16:38	17:39	18:32	20:28	21:19	21:46
25	08:10	07:11	06:05	05:52	04:59	19:46-20:34/48
	16:40	17:41	18:33	20:30	21:21	21:46
26	08:08	07:09	06:03	05:50	04:58	19:46-20:35/49
	16:42	17:43	18:35	20:32	21:22	21:46
27	08:07	07:07	06:00	05:48	04:56	19:46-20:36/50
	16:44	17:45	18:37	20:34	21:23	21:46
28	08:05	07:05	05:58	05:46	04:55	19:47-20:36/49
	16:46	17:47	18:39	20:35	21:25	21:45
29	08:04		06:55	05:44	04:54	19:47-20:37/50
	16:48		19:41	20:37	21:26	21:45
30	08:02		06:53	05:42	04:53	19:48-20:37/49
	16:50		19:43	20:39	21:27	21:45
31	08:01		06:51		04:52	19:48-20:37/49
	16:52		19:44		21:29	
Sonnenscheinstunden	252	274	367	419	492	508
Anzahl Minuten mit Schatten	0	0	0	818	1533	1364

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

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

Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lieferanten Anweisung:  
**I17-Wind GmbH & Co. KG**  
 Am Westersielzug 11  
 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Betreuer:  
 28.01.2019 15:06/3.2.737

### SHADOW - Kalender pro WEA

Berechnung: GB\_Werder/LübzWEA: 11 - W10

Voraussetzungen für Berechnung des Schattenwurfs

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

Betriebsdauer je Sektor  
 N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 407 284 469 652 800 659 587 764 1.037 1.051 712 568 7.990  
 Startwindgeschwindigkeit: Startwindgeschw. aus Leistungskennlinie

	Jul	August	September	Oktober	November	Dezember
1	04:47 19:59-20:45/46	05:26 19:34-20:25/51	06:20 19:10-19:33/23	07:12 18:51	07:10 16:42	08:04 15:58
	21:45	21:10	20:04	18:51	16:42	15:58
2	04:48 19:59-20:45/46	05:28 19:33-20:24/51	06:22 19:10-19:31/21	07:14 18:49	07:12 16:40	08:06 15:57
	21:44	21:08	20:02	18:49	16:40	15:57
3	04:49 19:58-20:45/47	05:30 19:32-20:24/52	06:23 19:11-19:28/17	07:16 18:47	07:14 16:38	08:07 15:57
	21:44	21:06	20:00	18:47	16:38	15:57
4	04:50 19:58-20:45/47	05:31 19:31-20:22/51	06:25 19:12-19:26/14	07:18 18:44	07:16 16:36	08:08 15:56
	21:43	21:05	19:57	18:44	16:36	15:56
5	04:50 19:58-20:46/48	05:33 19:31-20:21/50	06:27 19:15-19:24/9	07:20 18:42	07:17 16:34	08:10 15:55
	21:43	21:03	19:55	18:42	16:34	15:55
6	04:51 19:58-20:46/48	05:35 19:30-20:19/49	06:29 19:16-19:23/7	07:21 18:39	07:19 16:32	08:11 15:55
	21:42	21:01	19:52	18:39	16:32	15:55
7	04:52 19:58-20:46/48	05:36 19:29-20:17/48	06:30 19:17-19:24/6	07:23 18:37	07:21 16:30	08:13 15:54
	21:42	20:59	19:50	18:37	16:30	15:54
8	04:53 19:58-20:46/48	05:38 19:29-20:15/46	06:32 19:18-19:25/5	07:25 18:35	07:23 16:28	08:14 15:54
	21:41	20:57	19:48	18:35	16:28	15:54
9	04:54 19:57-20:46/49	05:40 19:28-20:14/46	06:34 19:19-19:26/4	07:27 18:33	07:25 16:26	08:15 15:54
	21:40	20:55	19:45	18:32	16:27	15:54
10	04:55 19:57-20:46/49	05:42 19:28-20:14/46	06:36 19:20-19:27/3	07:29 18:31	07:27 16:24	08:16 15:53
	21:39	20:53	19:43	18:30	16:25	15:53
11	04:56 19:57-20:46/49	05:43 19:27-20:13/46	06:37 19:21-19:28/2	07:30 18:29	07:29 16:22	08:17 15:53
	21:39	20:51	19:40	18:28	16:23	15:53
12	04:58 19:57-20:46/49	05:45 19:27-20:13/46	06:39 19:22-19:29/1	07:32 18:27	07:31 16:20	08:18 15:53
	21:38	20:49	19:38	18:25	16:22	15:53
13	04:59 19:56-20:46/50	05:47 19:27-20:12/45	06:41 19:23-19:30/0	07:34 18:25	07:33 16:18	08:20 15:53
	21:37	20:47	19:35	18:23	16:20	15:53
14	05:00 19:56-20:45/49	05:49 19:26-20:11/45	06:43 19:24-19:31/0	07:36 18:23	07:35 16:16	08:21 15:53
	21:36	20:45	19:33	18:21	16:18	15:53
15	05:01 19:55-20:45/50	05:50 19:26-20:09/43	06:44 19:25-19:32/0	07:38 18:21	07:36 16:14	08:21 15:53
	21:35	20:43	19:31	18:18	16:17	15:53
16	05:03 19:55-20:44/49	05:52 19:27-20:08/41	06:46 19:26-19:33/0	07:40 18:17	07:38 16:12	08:22 15:53
	21:33	20:41	19:28	18:16	16:15	15:53
17	05:04 19:56-20:45/49	05:54 19:25-20:04/39	06:48 19:27-19:34/0	07:41 18:15	07:40 16:10	08:23 15:53
	21:32	20:38	19:26	18:14	16:14	15:53
18	05:05 19:55-20:44/49	05:55 19:23-20:04/41	06:49 19:28-19:35/0	07:43 18:13	07:42 16:08	08:24 15:53
	21:31	20:36	19:23	18:11	16:12	15:53
19	05:07 19:55-20:43/48	05:57 19:20-20:01/41	06:51 19:29-19:36/0	07:45 18:11	07:44 16:06	08:25 15:54
	21:30	20:34	19:21	18:09	16:11	15:54
20	05:08 19:54-20:42/48	05:59 19:19-20:00/41	06:53 19:30-19:37/0	07:47 18:09	07:46 16:04	08:25 15:54
	21:29	20:32	19:18	18:07	16:10	15:54
21	05:09 19:55-20:42/47	06:01 19:17-19:58/41	06:55 19:31-19:38/0	07:49 18:07	07:47 16:02	08:26 15:54
	21:27	20:30	19:16	18:05	16:08	15:54
22	05:11 19:55-20:41/46	06:02 19:15-19:56/41	06:56 19:32-19:39/0	07:51 18:05	07:49 16:00	08:27 15:55
	21:26	19:49-19:53/4	19:13	18:03	16:07	15:55
23	05:12 19:45-20:40/55	06:04 19:14-19:53/39	06:58 19:33-19:40/0	07:53 18:03	07:51 16:00	08:27 15:55
	21:24	20:25	19:11	18:00	16:06	15:55
24	05:14 19:43-20:38/55	06:06 19:13-19:52/39	07:00 19:34-19:41/0	07:55 18:01	07:53 16:00	08:27 15:56
	21:23	20:23	19:08	17:58	16:05	15:56
25	05:15 19:42-20:36/54	06:08 19:11-19:50/39	07:02 19:35-19:42/0	07:57 18:00	07:56 16:00	08:28 15:57
	21:22	20:21	19:06	17:56	16:04	15:57
26	05:17 19:41-20:28/47	06:09 19:11-19:47/36	07:04 19:36-19:43/0	07:59 18:00	07:58 16:00	08:28 15:57
	21:20	20:18	19:04	17:54	16:03	15:57
27	05:18 19:39-20:27/48	06:11 19:10-19:45/35	07:05 19:37-19:44/0	07:59 18:00	07:58 16:00	08:28 15:58
	21:18	20:16	19:01	17:52	16:02	15:58
28	05:20 19:39-20:27/48	06:13 19:09-19:42/33	07:07 19:38-19:45/0	07:59 18:00	07:59 16:00	08:29 15:59
	21:17	20:14	18:59	17:50	16:01	15:59
29	05:22 19:37-20:27/50	06:15 19:09-19:41/32	07:09 19:39-19:46/0	07:59 18:00	08:01 16:00	08:29 15:59
	21:15	20:11	18:56	17:48	16:00	16:00
30	05:23 19:36-20:27/51	06:16 19:09-19:40/31	07:11 19:40-19:47/0	07:59 18:00	08:02 16:00	08:29 15:59
	21:14	20:09	18:54	17:46	15:59	16:01
31	05:25 19:34-20:26/52	06:18 19:09-19:37/28	07:13 19:41-19:48/0	07:59 18:00	08:03 16:00	08:29 15:59
	21:12	20:07	18:52	17:44	16:00	16:02
Sonnenscheinstunden	510	459	382	329	260	235
Anzahl Minuten mit Schatten	1523	1312	84	0	0	0

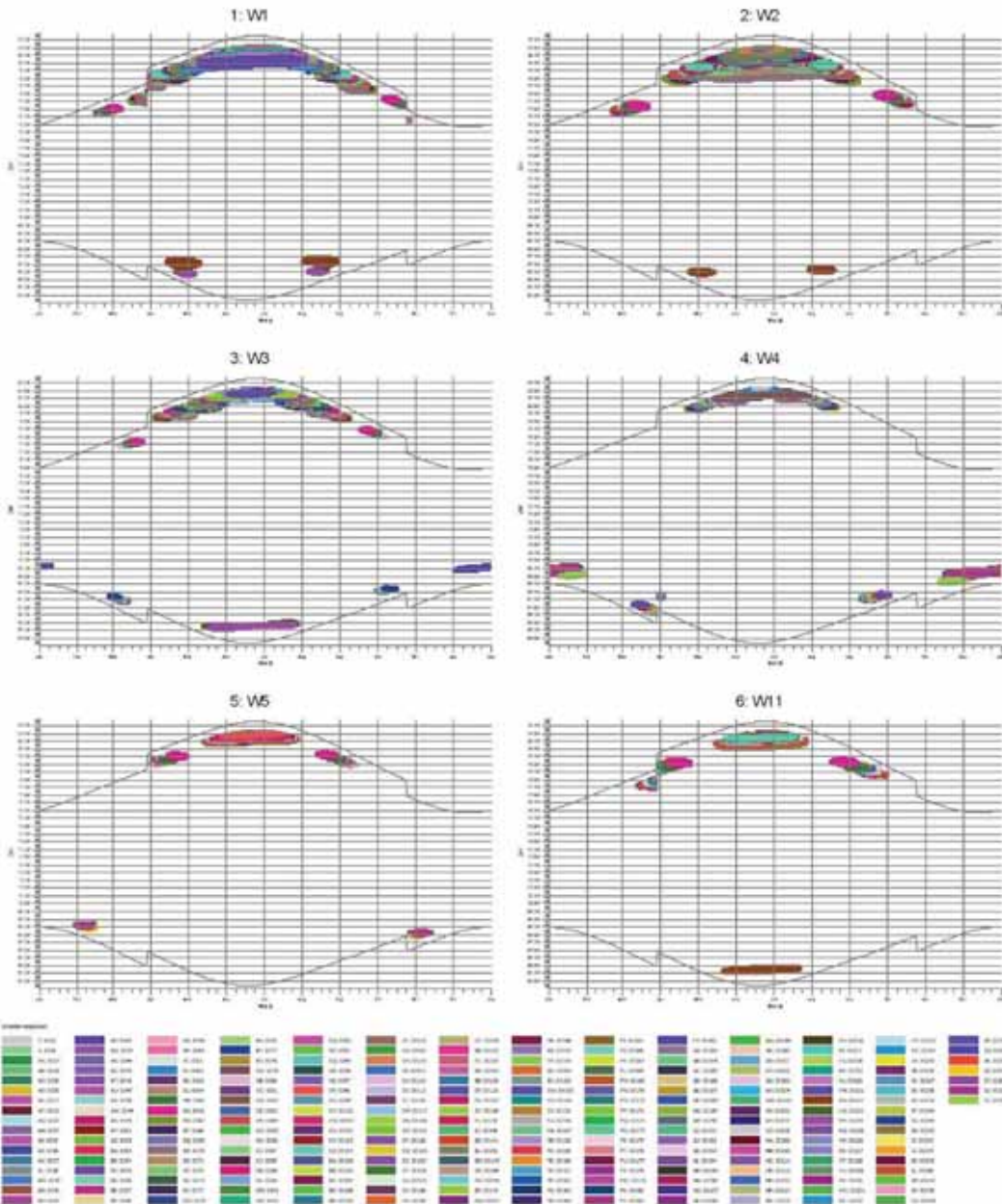
Tabellen-Layout: Die Daten für jeden Tag sind in folgender Matrix wiedergegeben (Sommerzeit wie Bezugsjahr):

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Zeitpunkt (SS:MM)	Schattenanfang-Zeitpunkt (SS:MM)	Schattenende/Minuten mit Schatten
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Projekt: **180926\_Werder-Lübz\_II**      Beschreibung: **Windpark Werder**

Lizenzierter Anwender:  
**I17-Wind GmbH & Co. KG**  
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 DE-25840 Friedrichstadt  
 -  
 Dennis Kramer / dennis.kramer@i17-wind.de  
 Berechnet:  
 28.01.2019 15:06/3.2.737

**SHADOW - Grafischer Kalender pro WEA**  
 Berechnung: GB\_Werder/Lübz

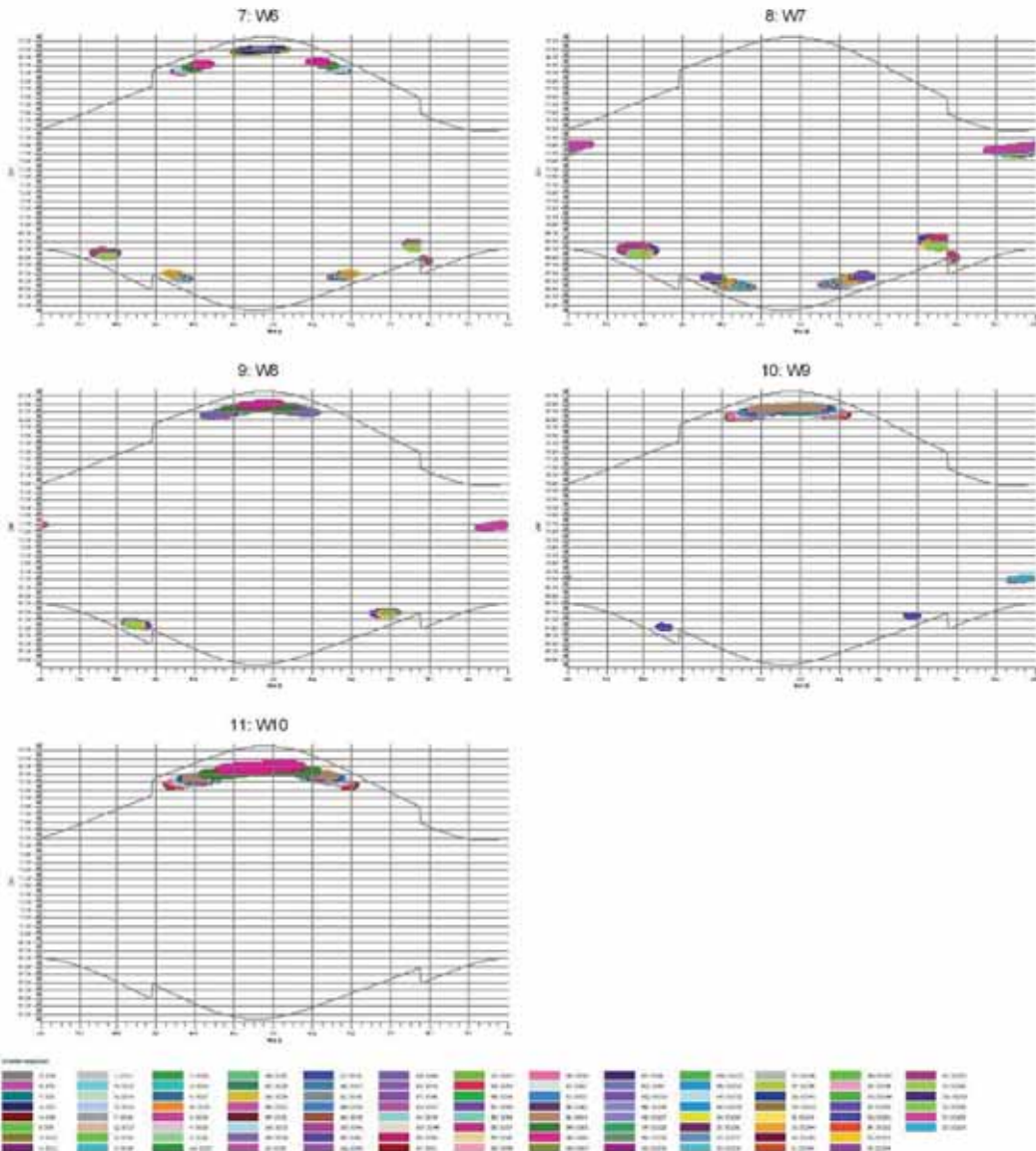


Projekt: **180926\_Werder-Lübz\_II** Beschreibung: Windpark Werder

Lizenzierter Anwender:  
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 Berechnet:  
 28.01.2019 15:06/3.2.737

### SHADOW - Grafischer Kalender pro WEA

Berechnung: GB\_Werder/Lübz





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## **Anhang 3/ Fotodokumentation der Immissionsorte**

Die Fotodokumentation der Immissionsorte ist im Ergänzungsdokument für die Berichte I17-SCHATTEN-2019-08, I17-SCHATTEN-2019-09 und I17-SCHATTEN-2019-10 zu finden.