



Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ A - Koksberg 1, Haaren (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	July	August	September	Oktober	November	Dezember
1	05:12 21:46	05:48 21:15	06:36 20:14	07:25 19:05	07:18 17:00	08:34 (WP Hirsch-14) 16:20
2	05:12 21:46	05:49 21:14	06:38 20:12	07:26 19:03	07:19 16:58	08:34 (WP Hirsch-14) 16:20
3	05:13 21:46	05:51 21:12	06:40 20:10	07:28 19:01	07:21 16:56	08:34 (WP Hirsch-14) 16:19
4	05:14 21:45	05:52 21:10	06:41 20:07	07:30 18:59	07:23 16:55	08:34 (WP Hirsch-14) 16:19
5	05:15 21:45	05:54 21:09	06:43 20:05	07:31 18:56	07:25 16:53	08:34 (WP Hirsch-14) 16:18
6	05:15 21:44	05:55 21:07	06:44 20:03	07:33 18:54	07:27 16:51	08:35 (WP Hirsch-14) 16:18
7	05:16 21:44	05:57 21:05	06:46 20:01	07:35 18:52	07:28 16:50	08:35 (WP Hirsch-14) 16:17
8	05:17 21:43	05:58 21:03	06:48 19:58	07:36 18:50	07:30 16:48	08:36 (WP Hirsch-14) 16:17
9	05:18 21:43	06:00 21:01	06:49 19:56	07:38 18:47	07:32 16:46	08:36 (WP Hirsch-14) 16:17
10	05:19 21:42	06:01 21:00	06:51 19:54	07:40 18:45	07:34 16:45	08:36 (WP Hirsch-14) 16:16
11	05:20 21:41	06:03 20:58	06:52 19:51	07:41 18:43	07:35 16:43	08:36 (WP Hirsch-14) 16:16
12	05:21 21:40	06:05 20:56	06:54 19:49	07:43 18:41	07:37 16:42	08:37 (WP Hirsch-14) 16:16
13	05:22 21:39	06:06 20:54	06:56 19:47	07:45 18:39	07:39 16:40	08:38 (WP Hirsch-14) 16:16
14	05:23 21:39	06:08 20:52	06:57 19:45	07:46 18:36	07:41 16:39	08:39 (WP Hirsch-14) 16:16
15	05:25 21:38	06:09 20:50	06:59 19:42	07:48 18:34	07:42 16:37	08:40 (WP Hirsch-14) 16:16
16	05:26 21:37	06:11 20:48	07:00 19:40	07:50 18:32	07:44 16:36	08:41 (WP Hirsch-14) 16:16
17	05:27 21:36	06:13 20:46	07:02 19:38	07:51 18:30	07:46 16:35	08:42 (WP Hirsch-14) 16:17
18	05:28 21:34	06:14 20:44	07:04 19:35	07:53 18:28	07:47 16:33	08:43 (WP Hirsch-14) 16:17
19	05:29 21:33	06:16 20:42	07:05 19:33	07:55 18:26	07:49 16:32	08:44 (WP Hirsch-14) 16:17
20	05:31 21:32	06:17 20:40	07:07 19:31	07:57 18:24	07:51 16:31	08:46 (WP Hirsch-14) 16:17
21	05:32 21:31	06:19 20:38	07:08 19:28	07:58 18:22	07:52 16:30	08:48 (WP Hirsch-14) 16:18
22	05:33 21:30	06:20 20:36	07:10 19:26	08:00 18:19	07:54 16:28	08:50 (WP Hirsch-14) 16:18
23	05:35 21:28	06:22 20:34	07:12 19:24	08:02 18:17	07:56 16:27	08:51 (WP Hirsch-14) 16:19
24	05:36 21:27	06:24 20:31	07:13 19:21	08:04 18:15	07:57 16:26	08:53 (WP Hirsch-14) 16:19
25	05:37 21:26	06:25 20:29	07:15 19:19	08:05 18:13	07:59 16:25	08:57 (WP Hirsch-14) 16:20
26	05:39 21:24	06:27 20:27	07:17 19:17	08:07 18:11	08:00 16:24	12:26 (WP Hirsch-18) 16:21
27	05:40 21:23	06:28 20:25	07:18 19:15	08:09 18:10	08:02 16:24	12:24 (WP Hirsch-18) 16:21
28	05:42 21:21	06:30 20:23	07:20 19:12	08:11 18:08	08:04 16:23	12:23 (WP Hirsch-18) 16:22
29	05:43 21:20	06:32 20:21	07:21 19:10	08:12 18:06	08:05 16:22	12:22 (WP Hirsch-18) 16:23
30	05:45 21:18	06:33 20:18	07:23 19:08	08:14 18:04	08:06 16:21	12:21 (WP Hirsch-18) 16:24
31	05:46 21:17	06:35 20:16	07:25 19:06	08:16 18:02	08:08 16:20	12:20 (WP Hirsch-18) 16:25
Sonnenscheinstunden	500	453	381	332	268	246
astr. max. mögl. Beschattung				811	2741	2991
Red. Sonnenscheinwahrsch.				0,29	0,23	0,17
Reduktion Betriebsdauer				0,84	0,84	0,84
Reduktion Windrichtung				0,60	0,64	0,66
Gesamte Reduktion				0,15	0,12	0,09
Met. wahrsch. Beschattung				119	337	283

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Berechnet:  
21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AI - Ausfallstr. Hegensdorf zu L754 (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Januar	Februar	März	April	Mai	Juni
1	08:32 16:27	08:06 17:14	07:13 18:05	07:03 19:58	06:00 20:48	07:12 (WP KLUS-02) 05:15
2	08:32 16:28	08:04 17:16	07:11 18:07	07:01 20:00	05:58 20:50	19 07:31 (WP KLUS-02) 05:14
3	08:32 16:29	08:03 17:18	07:09 18:08	06:59 20:01	05:56 20:51	18 07:30 (WP KLUS-02) 05:13
4	08:32 16:30	08:01 17:19	07:07 18:10	06:57 20:03	05:54 20:53	17 07:29 (WP KLUS-02) 05:13
5	08:31 16:31	08:00 17:21	07:05 18:12	06:54 20:05	05:52 20:54	14 07:27 (WP KLUS-02) 05:12
6	08:31 16:32	07:58 17:23	07:02 18:14	06:52 20:06	05:50 20:56	11 07:26 (WP KLUS-02) 05:11
7	08:31 16:34	07:56 17:25	07:00 18:15	06:50 20:08	05:49 20:58	7 07:24 (WP KLUS-02) 05:10
8	08:30 16:35	07:54 17:27	06:58 18:17	06:48 20:10	05:47 20:59	05:10 21:40
9	08:30 16:36	07:53 17:29	06:56 18:19	06:45 20:11	05:45 21:01	05:10 21:41
10	08:29 16:38	07:51 17:30	06:53 18:21	06:43 20:13	05:43 21:02	05:09 21:41
11	08:29 16:39	07:49 17:32	06:51 18:22	06:41 20:15	05:42 21:04	05:09 21:42
12	08:28 16:41	07:47 17:34	06:49 18:24	06:39 20:16	05:40 21:06	05:09 21:43
13	08:27 16:42	07:45 17:36	06:47 18:26	06:37 20:18	05:39 21:07	6 06:23 (WP KLUS-01) 05:08
14	08:27 16:43	07:44 17:38	06:45 18:27	06:34 20:20	05:37 21:09	6 06:22 (WP KLUS-01) 05:08
15	08:26 16:45	07:42 17:40	06:42 18:29	06:32 20:21	05:35 21:10	9 06:31 (WP KLUS-01) 05:08
16	08:25 16:47	07:40 17:41	06:40 18:31	06:30 20:23	05:34 21:12	11 06:32 (WP KLUS-01) 05:08
17	08:24 16:48	07:38 17:43	06:38 18:33	06:28 20:25	05:32 21:13	13 06:33 (WP KLUS-01) 05:08
18	08:23 16:50	07:36 17:45	06:35 18:34	06:26 20:26	05:31 21:15	13 06:33 (WP KLUS-01) 05:08
19	08:22 16:51	07:34 17:47	06:33 18:36	06:24 20:28	05:30 21:16	14 06:33 (WP KLUS-01) 05:08
20	08:21 16:53	07:32 17:49	06:31 18:38	06:22 20:30	05:28 21:18	13 06:20 (WP KLUS-01) 05:08
21	08:20 16:55	07:30 17:50	06:29 18:39	06:20 20:31	05:27 21:19	13 06:33 (WP KLUS-01) 05:08
22	08:19 16:56	07:28 17:52	06:26 18:41	06:17 20:33	05:26 21:20	13 06:20 (WP KLUS-01) 05:08
23	08:18 16:58	07:26 17:54	06:24 18:43	06:15 20:35	05:24 21:22	12 06:32 (WP KLUS-01) 05:09
24	08:17 17:00	07:24 17:56	06:22 18:44	06:13 20:36	05:23 21:23	12 06:32 (WP KLUS-01) 05:09
25	08:16 17:01	07:22 17:58	06:19 18:46	06:11 20:38	05:22 21:24	11 06:32 (WP KLUS-01) 05:09
26	08:14 17:03	07:20 17:59	06:17 18:48	06:09 20:40	05:21 21:26	9 06:31 (WP KLUS-01) 05:10
27	08:13 17:05	07:17 18:01	06:15 18:49	06:07 20:41	05:20 21:27	7 06:30 (WP KLUS-01) 05:10
28	08:12 17:07	07:15 18:03	06:13 18:51	06:05 20:43	05:19 21:28	3 06:28 (WP KLUS-01) 05:11
29	08:10 17:09		07:10 19:53	06:03 20:45	05:18 21:29	05:11 21:47
30	08:09 17:10		07:08 19:54	06:01 20:46	05:17 21:31	05:12 21:47
31	08:07 17:12		07:06 19:56		05:16 21:32	
Sonnenscheinstunden	261	278	367	415	483	497
astr.max.mögl.Beschattung				168	245	
Red.Sonnenscheinwahrsch.				0,36	0,43	
Reduktion Betriebsdauer				0,84	0,84	
Reduktion Windrichtung				0,69	0,71	
Gesamte Reduktion				0,21	0,25	
Met.wahrsch.Beschattung				36	62	

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

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

Projekt: Schattenwurf Bad Wünnenb.-Hirschweg	Beschreibung: Auftraggeber:  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	Lizenzierter Anwender: Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AI - Ausfallstr. Hegensdorf zu L754 (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

Juli	August	September	Oktober	November	Dezember
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1	05:12					06:37	07:25	07:18	08:08	
	21:47					20:14	19:06	17:01	16:21	
2	05:13					06:39	07:27	07:20	08:10	
	21:46					20:12	19:04	16:59	16:20	
3	05:14					06:40	07:28	07:22	08:11	
	21:46					20:10	19:01	16:57	16:20	
4	05:14					06:42	07:30	07:23	08:12	
	21:46					20:08	18:59	16:55	16:19	
5	05:15					06:43	07:32	07:25	08:14	
	21:45					20:05	18:57	16:53	16:19	
6	05:16					06:45	07:33	07:27	08:15	
	21:45					20:03	18:54	16:52	16:18	
7	05:17					06:47	07:35	07:29	08:16	
	21:44					20:01	18:52	16:50	16:18	
8	05:18					06:48	07:37	07:30	08:17	
	21:44					19:59	18:50	16:48	16:17	
9	05:19					06:50	07:38	07:32	08:19	
	21:43					19:56	18:48	16:47	16:17	
10	05:20					06:51	07:40	07:34	08:20	
	21:42					19:54	18:46	16:45	16:17	
11	05:21					06:53	07:42	07:36	08:21	
	21:41					19:52	18:43	16:44	16:17	
12	05:22					06:55	07:43	07:37	08:22	
	21:41					19:50	18:41	16:42	16:17	
13	05:23					06:56	07:45	07:39	08:23	
	21:40					19:47	18:39	16:41	16:17	
14	05:24					06:58	07:47	07:41	08:24	
	21:39					19:45	18:37	16:39	16:17	
15	05:25					06:59	07:48	07:43	08:25	
	21:38					19:43	18:35	16:38	16:17	
16	05:26					07:01	07:50	07:44	08:25	
	21:37					19:40	18:32	16:36	16:17	
17	05:27					07:02	07:52	07:46	08:26	
	21:36	6	06:33 (WP KLUS-01)	20:46	19	07:38 (WP KLUS-02)	19:38	18:30	16:35	16:17
18	05:29					07:04	07:54	07:48	08:27	
	21:35	8	06:40 (WP KLUS-01)	20:44	18	07:38 (WP KLUS-02)	19:36	18:28	16:34	16:17
19	05:30					07:06	07:55	07:49	08:28	
	21:34	10	06:41 (WP KLUS-01)	20:42	16	07:36 (WP KLUS-02)	19:33	18:26	16:32	16:18
20	05:31					07:07	07:57	07:51	08:28	
	21:32	11	06:42 (WP KLUS-01)	20:40	15	07:36 (WP KLUS-02)	19:31	18:24	16:31	16:18
21	05:33					07:09	07:59	07:53	08:29	
	21:31	12	06:43 (WP KLUS-01)	20:38	11	07:33 (WP KLUS-02)	19:29	18:22	16:30	16:18
22	05:34					07:10	08:00	07:54	08:30	
	21:30	13	06:43 (WP KLUS-01)	20:36	4	07:30 (WP KLUS-02)	19:26	18:20	16:29	16:19
23	05:35					07:12	08:02	07:56	08:30	
	21:29	13	06:43 (WP KLUS-01)	20:34		19:24	18:18	16:28	16:19	
24	05:37					07:14	08:04	07:58	08:30	
	21:27	14	06:44 (WP KLUS-01)	20:32		19:22	18:16	16:27	16:20	
25	05:38					07:15	07:06	07:59	08:31	
	21:26	14	06:44 (WP KLUS-01)	20:30		19:20	17:14	16:26	16:21	
26	05:39					07:17	07:07	08:01	08:31	
	21:25	13	06:43 (WP KLUS-01)	20:28		19:17	17:12	16:25	16:21	
27	05:41					07:19	07:09	08:02	08:31	
	21:23	13	06:44 (WP KLUS-01)	20:25		19:15	17:10	16:24	16:22	
28	05:42					07:20	07:11	08:04	08:32	
	21:22	12	06:43 (WP KLUS-01)	20:23		19:13	17:08	16:23	16:23	
29	05:44					07:22	07:13	08:05	08:32	
	21:20	11	06:42 (WP KLUS-01)	20:21		19:10	17:06	16:22	16:24	
30	05:45					07:23	07:14	08:07	08:32	
	21:19	8	06:41 (WP KLUS-01)	20:19		19:08	17:04	16:22	16:25	
31	05:47						07:16		08:32	
	21:17	5	06:39 (WP KLUS-01)	20:17			17:02		16:25	
Sonnenscheinstunden	500			453		381	332	268	246	
astr.max.mögl.Beschattung	163			254						
Red.Sonnenscheinwahrsch.	0,39			0,40						
Reduktion Betriebsdauer	0,84			0,84						
Reduktion Windrichtung	0,71			0,69						
Gesamte Reduktion	0,23			0,23						
Met.wahrsch.Beschattung	38			59						

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

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



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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AK - Stallbusch 20, Haaren (WA-MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

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N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

| Januar | Februar | März | April | Mai | Juni

1	08:32	15:30 (WP KLUS-33)	08:06	08:33 (WP Hirsch-14)	07:13	07:03	05:59	05:15	
	16:26	19 15:49 (WP KLUS-33)	17:13	15 08:48 (WP Hirsch-14)	18:04	18:04	19:58	20:48	21:33
2	08:32	15:30 (WP KLUS-33)	08:04	08:35 (WP Hirsch-14)	07:11	07:01	05:57	05:14	
	16:27	19 15:49 (WP KLUS-33)	17:15	13 08:48 (WP Hirsch-14)	18:06	19:59	20:49	21:34	
3	08:32	15:30 (WP KLUS-33)	08:02	08:36 (WP Hirsch-14)	07:09	06:59	05:55	05:13	
	16:28	20 15:50 (WP KLUS-33)	17:17	10 08:46 (WP Hirsch-14)	18:08	20:01	20:51	21:35	
4	08:31	15:31 (WP KLUS-33)	08:01	08:39 (WP Hirsch-14)	07:06	06:56	05:53	05:12	
	16:30	20 15:51 (WP KLUS-33)	17:19	4 08:43 (WP Hirsch-14)	18:10	20:03	20:53	21:36	
5	08:31	15:31 (WP KLUS-33)	07:59		07:04	06:54	05:52	05:12	
	16:31	20 15:51 (WP KLUS-33)	17:21		18:11	20:04	20:54	21:37	
6	08:31	15:31 (WP KLUS-33)	07:58		07:02	06:52	05:50	05:11	
	16:32	21 15:52 (WP KLUS-33)	17:23		18:13	20:06	20:56	21:38	
7	08:30	15:31 (WP KLUS-33)	07:56		07:00	06:50	05:48	05:10	
	16:33	21 15:52 (WP KLUS-33)	17:24		18:15	20:08	20:57	21:39	
8	08:30	15:32 (WP KLUS-33)	07:54		06:58	06:47	05:46	05:10	
	16:34	21 15:53 (WP KLUS-33)	17:26		18:17	20:09	20:59	21:40	
9	08:30	15:32 (WP KLUS-33)	07:52		06:55	06:45	05:45	05:09	
	16:36	21 15:53 (WP KLUS-33)	17:28		18:18	20:11	21:01	21:40	
10	08:29	15:32 (WP KLUS-33)	07:51		06:53	06:43	05:43	05:09	
	16:37	21 15:53 (WP KLUS-33)	17:30		18:20	20:13	21:02	21:41	
11	08:28	15:33 (WP KLUS-33)	07:49		06:51	06:41	05:41	05:09	
	16:39	21 15:54 (WP KLUS-33)	17:32		18:22	20:14	21:04	21:42	
12	08:28	15:33 (WP KLUS-33)	07:47		06:49	06:38	05:40	05:08	
	16:40	21 15:54 (WP KLUS-33)	17:34		18:24	20:16	21:05	21:43	
13	08:27	15:34 (WP KLUS-33)	07:45		06:46	06:36	05:38	05:08	
	16:42	20 15:54 (WP KLUS-33)	17:35		18:25	20:18	21:07	21:43	
14	08:26	15:34 (WP KLUS-33)	07:43		06:44	06:34	05:37	05:08	
	16:43	20 15:54 (WP KLUS-33)	17:37		18:27	20:19	21:08	21:44	
15	08:26	15:35 (WP KLUS-33)	07:41		06:42	06:32	05:35	05:08	
	16:45	20 15:55 (WP KLUS-33)	17:39		18:29	20:21	21:10	21:44	
16	08:25	15:35 (WP KLUS-33)	07:40		06:40	06:30	05:33	05:07	
	16:46	20 15:55 (WP KLUS-33)	17:41		18:30	20:23	21:11	21:45	
17	08:24	15:36 (WP KLUS-33)	07:38		06:37	06:28	05:32	05:07	
	16:48	19 15:55 (WP KLUS-33)	17:43		18:32	20:24	21:13	21:45	
18	08:23	15:37 (WP KLUS-33)	07:36		06:35	06:25	05:31	05:07	
	16:49	18 15:55 (WP KLUS-33)	17:45		18:34	20:26	21:14	21:46	
19	08:22	15:38 (WP KLUS-33)	07:34		06:33	06:23	05:29	05:07	
	16:51	16 15:54 (WP KLUS-33)	17:46		18:36	20:28	21:16	21:46	
20	08:21	15:40 (WP KLUS-33)	07:32		06:31	06:21	05:28	05:08	
	16:53	14 15:54 (WP KLUS-33)	17:48		18:37	20:29	21:17	21:47	
21	08:20	15:41 (WP KLUS-33)	07:30		06:28	06:19	05:26	05:08	
	16:54	12 15:53 (WP KLUS-33)	17:50		18:39	20:31	21:19	21:47	
22	08:19	15:43 (WP KLUS-33)	07:28		06:26	06:17	05:25	05:08	
	16:56	8 15:51 (WP KLUS-33)	17:52		18:41	20:33	21:20	21:47	
23	08:18	08:45 (WP Hirsch-14)	07:26		06:24	06:15	05:24	05:08	
	16:58	3 08:48 (WP Hirsch-14)	17:54		18:42	20:34	21:22	21:47	
24	08:17	08:44 (WP Hirsch-14)	07:23		06:21	06:13	05:23	05:08	
	16:59	5 08:49 (WP Hirsch-14)	17:55		18:44	20:36	21:23	21:47	
25	08:15	08:42 (WP Hirsch-14)	07:21		06:19	06:11	05:22	05:09	
	17:01	7 08:49 (WP Hirsch-14)	17:57		18:46	20:38	21:24	21:47	
26	08:14	08:41 (WP Hirsch-14)	07:19		06:17	06:09	05:20	05:09	
	17:03	9 08:50 (WP Hirsch-14)	17:59		18:47	20:39	21:25	21:47	
27	08:13	08:39 (WP Hirsch-14)	07:17		06:15	06:07	05:19	05:10	
	17:05	10 08:49 (WP Hirsch-14)	18:01		18:49	20:41	21:27	21:47	
28	08:11	08:38 (WP Hirsch-14)	07:15		06:12	06:05	05:18	05:10	
	17:06	12 08:50 (WP Hirsch-14)	18:03		18:51	20:43	21:28	21:47	
29	08:10	08:36 (WP Hirsch-14)			07:10	06:03	05:17	05:11	
	17:08	14 08:50 (WP Hirsch-14)			19:52	20:44	21:29	21:47	
30	08:09	08:35 (WP Hirsch-14)			07:08	06:01	05:16	05:11	
	17:10	15 08:50 (WP Hirsch-14)			19:54	20:46	21:30	21:47	
31	08:07	08:33 (WP Hirsch-14)			07:05		05:15		
	17:12	16 08:49 (WP Hirsch-14)			19:56		21:32		
Sonnenscheinstunden	261		278		367	415	484	497	
astr.max.mögl.Beschattung	503		42						
Red.Sonnenscheinwahrsch.	0,19		0,32						
Reduktion Betriebsdauer	0,84		0,84						
Reduktion Windrichtung	0,68		0,59						
Gesamte Reduktion	0,11		0,16						
Met.wahrsch.Beschattung	54		7						

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

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

Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AK - Stallbusch 20, Haaren (WA-MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	July	August	September	Oktober	November	Dezember	
1	05:12	05:48	06:37	07:25	07:18	08:08	15:15 (WP KLUS-33)
	21:47	21:15	20:14	19:05	17:00	16:20	21 15:36 (WP KLUS-33)
2	05:12	05:49	06:38	07:26	07:19	08:09	15:15 (WP KLUS-33)
	21:46	21:14	20:12	19:03	16:58	16:20	21 15:36 (WP KLUS-33)
3	05:13	05:51	06:40	07:28	07:21	08:11	15:16 (WP KLUS-33)
	21:46	21:12	20:10	19:01	16:56	16:19	21 15:37 (WP KLUS-33)
4	05:14	05:52	06:41	07:30	07:23	08:12	15:16 (WP KLUS-33)
	21:45	21:10	20:07	18:59	16:55	16:19	21 15:37 (WP KLUS-33)
5	05:15	05:54	06:43	07:31	07:25	08:13	15:17 (WP KLUS-33)
	21:45	21:09	20:05	18:56	16:53	16:18	21 15:38 (WP KLUS-33)
6	05:15	05:55	06:45	07:33	07:27	08:15	15:17 (WP KLUS-33)
	21:45	21:07	20:03	18:54	16:51	16:18	21 15:38 (WP KLUS-33)
7	05:16	05:57	06:46	07:35	07:28	08:16	15:18 (WP KLUS-33)
	21:44	21:05	20:01	18:52	16:50	6 08:09 (WP Hirsch-14) 16:17	20 15:38 (WP KLUS-33)
8	05:17	05:58	06:48	07:36	07:30	08:17	15:18 (WP KLUS-33)
	21:43	21:03	19:58	18:50	16:48	10 08:17 (WP Hirsch-14) 16:17	20 15:38 (WP KLUS-33)
9	05:18	06:00	06:49	07:38	07:32	08:18	15:19 (WP KLUS-33)
	21:43	21:01	19:56	18:47	16:46	14 08:19 (WP Hirsch-14) 16:17	20 15:39 (WP KLUS-33)
10	05:19	06:01	06:51	07:40	07:34	08:19	15:20 (WP KLUS-33)
	21:42	21:00	19:54	18:45	16:45	15 08:20 (WP Hirsch-14) 16:17	19 15:39 (WP KLUS-33)
11	05:20	06:03	06:53	07:41	07:35	08:21	15:20 (WP KLUS-33)
	21:41	20:58	19:51	18:43	16:43	16 08:20 (WP Hirsch-14) 16:16	19 15:39 (WP KLUS-33)
12	05:21	06:05	06:54	07:43	07:37	08:22	15:21 (WP KLUS-33)
	21:40	20:56	19:49	18:41	16:42	15 08:21 (WP Hirsch-14) 16:16	18 15:39 (WP KLUS-33)
13	05:22	06:06	06:56	07:45	07:39	08:23	15:21 (WP KLUS-33)
	21:40	20:54	19:47	18:39	16:40	13 08:21 (WP Hirsch-14) 16:16	18 15:39 (WP KLUS-33)
14	05:23	06:08	06:57	07:46	07:41	08:24	15:22 (WP KLUS-33)
	21:39	20:52	19:45	18:36	16:39	12 08:22 (WP Hirsch-14) 16:16	18 15:40 (WP KLUS-33)
15	05:25	06:09	06:59	07:48	07:42	08:24	15:23 (WP KLUS-33)
	21:38	20:50	19:42	18:34	16:37	10 08:22 (WP Hirsch-14) 16:16	17 15:40 (WP KLUS-33)
16	05:26	06:11	07:01	07:50	07:44	08:25	15:24 (WP KLUS-33)
	21:37	20:48	19:40	18:32	16:36	8 08:22 (WP Hirsch-14) 16:16	17 15:41 (WP KLUS-33)
17	05:27	06:13	07:02	07:52	07:46	08:26	15:23 (WP KLUS-33)
	21:36	20:46	19:38	18:30	16:35	7 08:23 (WP Hirsch-14) 16:17	17 15:40 (WP KLUS-33)
18	05:28	06:14	07:04	07:53	07:47	08:27	15:24 (WP KLUS-33)
	21:35	20:44	19:35	18:28	16:33	5 08:23 (WP Hirsch-14) 16:17	17 15:41 (WP KLUS-33)
19	05:29	06:16	07:05	07:55	07:49	08:28	15:25 (WP KLUS-33)
	21:33	20:42	19:33	18:26	16:32	3 08:22 (WP Hirsch-14) 16:17	16 15:41 (WP KLUS-33)
20	05:31	06:17	07:07	07:57	07:51	08:28	15:25 (WP KLUS-33)
	21:32	20:40	19:31	18:24	16:31	8 15:26 (WP KLUS-33) 16:17	16 15:41 (WP KLUS-33)
21	05:32	06:19	07:09	07:58	07:52	08:29	15:26 (WP KLUS-33)
	21:31	20:38	19:28	18:22	16:30	12 15:28 (WP KLUS-33) 16:18	16 15:42 (WP KLUS-33)
22	05:33	06:21	07:10	08:00	07:54	08:29	15:26 (WP KLUS-33)
	21:30	20:36	19:26	18:20	16:29	14 15:30 (WP KLUS-33) 16:18	16 15:42 (WP KLUS-33)
23	05:35	06:22	07:12	08:02	07:56	08:30	15:27 (WP KLUS-33)
	21:29	20:34	19:24	18:17	16:27	16 15:31 (WP KLUS-33) 16:19	16 15:43 (WP KLUS-33)
24	05:36	06:24	07:13	08:04	07:57	08:30	15:27 (WP KLUS-33)
	21:27	20:32	19:21	18:15	16:26	18 15:32 (WP KLUS-33) 16:19	16 15:43 (WP KLUS-33)
25	05:37	06:25	07:15	08:05	07:59	08:31	15:27 (WP KLUS-33)
	21:26	20:29	19:19	17:13	16:25	19 15:33 (WP KLUS-33) 16:20	17 15:44 (WP KLUS-33)
26	05:39	06:27	07:17	08:07	08:01	08:31	15:28 (WP KLUS-33)
	21:24	20:27	19:17	17:12	16:24	19 15:34 (WP KLUS-33) 16:21	17 15:45 (WP KLUS-33)
27	05:40	06:29	07:18	08:09	08:02	08:31	15:28 (WP KLUS-33)
	21:23	20:25	19:15	17:10	16:24	20 15:34 (WP KLUS-33) 16:22	17 15:45 (WP KLUS-33)
28	05:42	06:30	07:20	08:11	08:04	08:31	15:29 (WP KLUS-33)
	21:22	20:23	19:12	17:08	16:23	21 15:35 (WP KLUS-33) 16:22	17 15:46 (WP KLUS-33)
29	05:43	06:32	07:21	08:12	08:05	08:32	15:29 (WP KLUS-33)
	21:20	20:21	19:10	17:06	16:22	20 15:35 (WP KLUS-33) 16:23	17 15:46 (WP KLUS-33)
30	05:45	06:33	07:23	08:14	08:07	08:32	15:29 (WP KLUS-33)
	21:19	20:19	19:08	17:04	16:21	20 15:35 (WP KLUS-33) 16:24	18 15:47 (WP KLUS-33)
31	05:46	06:35	07:24	08:15	08:08	08:32	15:30 (WP KLUS-33)
	21:17	20:16	19:02	17:02	16:20	18 15:48 (WP KLUS-33)	
Sonnenscheinstunden	500	453	381	332	268	246	
astr.max.mögl.Beschattung					321		563
Red.Sonnenscheinwahrsch.					0,23		0,17
Reduktion Betriebsdauer					0,84		0,84
Reduktion Windrichtung					0,65		0,70
Gesamte Reduktion					0,12		0,10
Met.wahrsch.Beschattung					40		56

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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<b>Projekt:</b> Schattenwurf Bad Wünnenb.-Hirschweg	<b>Beschreibung:</b> <b>Auftraggeber:</b>  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	<b>Lizenzierter Anwender:</b> Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de <small>Berechnet:</small> 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

**Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AL - Stallbusch 7, Haaren (WA)**

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

#### Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

		Januar	Februar	März	April	Mai	Juni
1	08:32	15:22 (WP KLUS-33)	08:06	08:31 (WP Hirsch-14)	07:13	07:03	05:59
	16:26	21 15:43 (WP KLUS-33)	17:13	15 08:46 (WP Hirsch-14)	18:04	19:58	20:48
2	08:32	15:22 (WP KLUS-33)	08:04	08:31 (WP Hirsch-14)	07:11	07:01	05:57
	16:27	21 15:43 (WP KLUS-33)	17:15	15 08:46 (WP Hirsch-14)	18:06	19:59	20:49
3	08:32	15:23 (WP KLUS-33)	08:02	08:32 (WP Hirsch-14)	07:09	06:59	05:55
	16:28	21 15:44 (WP KLUS-33)	17:17	13 08:45 (WP Hirsch-14)	18:08	20:01	20:51
4	08:31	15:23 (WP KLUS-33)	08:01	08:33 (WP Hirsch-14)	07:06	06:56	05:54
	16:30	22 15:45 (WP KLUS-33)	17:19	10 08:43 (WP Hirsch-14)	18:10	20:03	20:53
5	08:31	15:23 (WP KLUS-33)	07:59	08:37 (WP Hirsch-14)	07:04	06:54	05:52
	16:31	22 15:45 (WP KLUS-33)	17:21	5 08:42 (WP Hirsch-14)	18:11	20:04	20:54
6	08:31	15:24 (WP KLUS-33)	07:58		07:02	06:52	05:50
	16:32	22 15:46 (WP KLUS-33)	17:23		18:13	20:06	20:56
7	08:30	15:24 (WP KLUS-33)	07:56		07:00	06:50	05:48
	16:33	21 15:45 (WP KLUS-33)	17:24		18:15	20:08	20:57
8	08:30	15:25 (WP KLUS-33)	07:54		06:58	06:47	05:46
	16:34	21 15:46 (WP KLUS-33)	17:26		18:17	20:09	20:59
9	08:30	15:25 (WP KLUS-33)	07:52		06:55	06:45	05:45
	16:36	21 15:46 (WP KLUS-33)	17:28		18:18	20:11	21:01
10	08:29	15:26 (WP KLUS-33)	07:51		06:53	06:43	05:43
	16:37	21 15:47 (WP KLUS-33)	17:30		18:20	20:13	21:02
11	08:28	15:27 (WP KLUS-33)	07:49		06:51	06:41	05:41
	16:39	20 15:47 (WP KLUS-33)	17:32		18:22	20:14	21:04
12	08:28	15:27 (WP KLUS-33)	07:47		06:49	06:38	05:40
	16:40	20 15:47 (WP KLUS-33)	17:34		18:24	20:16	21:05
13	08:27	15:28 (WP KLUS-33)	07:45		06:46	06:36	05:38
	16:42	19 15:47 (WP KLUS-33)	17:35		18:25	20:18	21:07
14	08:26	15:28 (WP KLUS-33)	07:43		06:44	06:34	05:37
	16:43	19 15:47 (WP KLUS-33)	17:37		18:27	20:19	21:08
15	08:26	15:29 (WP KLUS-33)	07:41		06:42	06:32	05:35
	16:45	18 15:47 (WP KLUS-33)	17:39		18:29	20:21	21:10
16	08:25	15:30 (WP KLUS-33)	07:40		06:40	06:30	05:33
	16:46	17 15:47 (WP KLUS-33)	17:41		18:30	20:23	21:11
17	08:24	15:31 (WP KLUS-33)	07:38		06:37	06:28	05:32
	16:48	15 15:46 (WP KLUS-33)	17:43		18:32	20:24	21:13
18	08:23	15:33 (WP KLUS-33)	07:36		06:35	06:25	05:31
	16:49	13 15:46 (WP KLUS-33)	17:45		18:34	20:26	21:14
19	08:22	15:35 (WP KLUS-33)	07:34		06:33	06:23	05:29
	16:51	10 15:45 (WP KLUS-33)	17:46		18:36	20:28	21:16
20	08:21	15:38 (WP KLUS-33)	07:32		06:31	06:21	05:28
	16:53	5 15:43 (WP KLUS-33)	17:48		18:37	20:29	21:17
21	08:20		07:30		06:28	06:19	05:26
	16:54		17:50		18:39	20:31	21:19
22	08:19		07:28		06:26	06:17	05:25
	16:56		17:52		18:41	20:33	21:20
23	08:18		07:26		06:24	06:15	05:24
	16:58		17:54		18:42	20:34	21:22
24	08:17	08:44 (WP Hirsch-14)	07:23		06:21	06:13	05:23
	16:59	1 08:45 (WP Hirsch-14)	17:55		18:44	20:36	21:23
25	08:15	08:42 (WP Hirsch-14)	07:21		06:19	06:11	05:22
	17:01	3 08:45 (WP Hirsch-14)	17:57		18:46	20:38	21:24
26	08:14	08:41 (WP Hirsch-14)	07:19		06:17	06:09	05:20
	17:03	5 08:46 (WP Hirsch-14)	17:59		18:47	20:39	21:26
27	08:13	08:39 (WP Hirsch-14)	07:17		06:15	06:07	05:19
	17:05	7 08:46 (WP Hirsch-14)	18:01		18:49	20:41	21:27
28	08:11	08:38 (WP Hirsch-14)	07:15		06:12	06:05	05:18
	17:06	9 08:47 (WP Hirsch-14)	18:03		18:51	20:43	21:28
29	08:10	08:36 (WP Hirsch-14)			07:10	06:03	05:17
	17:08	11 08:47 (WP Hirsch-14)			19:52	20:44	21:29
30	08:09	08:35 (WP Hirsch-14)			07:08	06:01	05:16
	17:10	12 08:47 (WP Hirsch-14)			19:54	20:46	21:30
31	08:07	08:33 (WP Hirsch-14)			07:05		05:15
	17:12	14 08:47 (WP Hirsch-14)			19:56		21:32
Sonnenscheinstunden		261	278	367	415	484	497
astr.max.mögl.Beschattung		431	58				
Red.Sonnenscheinwahrsch.		0,19	0,32				
Reduktion Betriebsdauer		0,84	0,84				
Reduktion Windrichtung		0,68	0,59				
Gesamte Reduktion		0,11	0,16				
Met.wahrsch.Beschattung		47	9				

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

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



Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AL - Stallbusch 7, Haaren (WA)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	Juli	August	September	Oktober	November	Dezember	
1	05:12 21:47	05:48 21:15	06:37 20:14	07:25 19:05	07:18 17:00	08:08 16:20	15:09 (WP KLUS-33) 20 15:29 (WP KLUS-33)
2	05:12 21:46	05:49 21:14	06:38 20:12	07:26 19:03	07:19 16:58	08:09 16:20	15:09 (WP KLUS-33) 20 15:29 (WP KLUS-33)
3	05:13 21:46	05:51 21:12	06:40 20:10	07:28 19:01	07:21 16:56	08:11 16:19	15:09 (WP KLUS-33) 21 15:30 (WP KLUS-33)
4	05:14 21:45	05:52 21:10	06:41 20:07	07:30 18:59	07:23 16:55	08:12 16:19	15:09 (WP KLUS-33) 22 15:31 (WP KLUS-33)
5	05:15 21:45	05:54 21:09	06:43 20:05	07:31 18:56	07:25 16:53	08:13 16:18	15:10 (WP KLUS-33) 22 15:32 (WP KLUS-33)
6	05:15 21:45	05:55 21:07	06:45 20:03	07:33 18:54	07:27 16:51	08:15 16:18	08:06 (WP Hirsch-14) 22 15:32 (WP KLUS-33)
7	05:16 21:44	05:57 21:05	06:46 20:01	07:35 18:52	07:28 16:50	08:16 16:17	08:04 (WP Hirsch-14) 22 15:32 (WP KLUS-33)
8	05:17 21:43	05:58 21:03	06:48 19:58	07:36 18:50	07:30 16:48	08:17 16:17	08:02 (WP Hirsch-14) 22 15:32 (WP KLUS-33)
9	05:18 21:43	06:00 21:01	06:49 19:56	07:38 18:47	07:32 16:46	08:18 16:17	08:02 (WP Hirsch-14) 21 15:32 (WP KLUS-33)
10	05:19 21:42	06:01 21:00	06:51 19:54	07:40 18:45	07:34 16:45	08:19 16:17	08:03 (WP Hirsch-14) 21 15:33 (WP KLUS-33)
11	05:20 21:41	06:03 20:58	06:53 19:52	07:41 18:43	07:35 16:43	08:21 16:16	08:04 (WP Hirsch-14) 22 15:34 (WP KLUS-33)
12	05:21 21:40	06:05 20:56	06:54 19:49	07:43 18:41	07:37 16:42	08:22 16:16	08:06 (WP Hirsch-14) 21 15:34 (WP KLUS-33)
13	05:22 21:40	06:06 20:54	06:56 19:47	07:45 18:39	07:39 16:40	08:23 16:16	08:08 (WP Hirsch-14) 21 15:34 (WP KLUS-33)
14	05:23 21:39	06:08 20:52	06:57 19:45	07:46 18:36	07:41 16:39	08:24 16:16	08:10 (WP Hirsch-14) 21 15:35 (WP KLUS-33)
15	05:25 21:38	06:09 20:50	06:59 19:42	07:48 18:34	07:42 16:37	08:24 16:16	08:12 (WP Hirsch-14) 20 15:35 (WP KLUS-33)
16	05:26 21:37	06:11 20:48	07:01 19:40	07:50 18:32	07:44 16:36	08:25 16:16	08:14 (WP Hirsch-14) 21 15:36 (WP KLUS-33)
17	05:27 21:36	06:13 20:46	07:02 19:38	07:52 18:30	07:46 16:35	08:26 16:17	08:16 (WP Hirsch-14) 20 15:35 (WP KLUS-33)
18	05:28 21:35	06:14 20:44	07:04 19:35	07:53 18:28	07:47 16:33	08:27 16:17	08:18 (WP Hirsch-14) 20 15:36 (WP KLUS-33)
19	05:29 21:33	06:16 20:42	07:05 19:33	07:55 18:26	07:49 16:32	08:28 16:17	08:19 (WP Hirsch-14) 20 15:37 (WP KLUS-33)
20	05:31 21:32	06:17 20:40	07:07 19:31	07:57 18:24	07:51 16:31	08:28 16:17	15:16 (WP KLUS-33) 21 15:37 (WP KLUS-33)
21	05:32 21:31	06:19 20:38	07:09 19:28	07:58 18:22	07:52 16:30	08:29 16:18	15:17 (WP KLUS-33) 20 15:37 (WP KLUS-33)
22	05:33 21:30	06:21 20:36	07:10 19:26	08:00 18:20	07:54 16:29	15:14 (WP KLUS-33) 16:18	08:29 20 15:37 (WP KLUS-33)
23	05:35 21:29	06:22 20:34	07:12 19:24	08:02 18:17	07:56 16:27	15:12 (WP KLUS-33) 16:19	08:30 21 15:39 (WP KLUS-33)
24	05:36 21:27	06:24 20:32	07:13 19:22	08:04 18:15	07:57 16:26	15:10 (WP KLUS-33) 16:19	08:30 20 15:39 (WP KLUS-33)
25	05:37 21:26	06:25 20:29	07:15 19:19	07:05 17:13	07:59 16:25	15:10 (WP KLUS-33) 16:20	08:31 20 15:39 (WP KLUS-33)
26	05:39 21:24	06:27 20:27	07:17 19:17	07:07 17:12	08:01 16:24	15:09 (WP KLUS-33) 16:21	08:31 20 15:40 (WP KLUS-33)
27	05:40 21:23	06:29 20:25	07:18 19:15	07:09 17:10	08:02 16:24	15:08 (WP KLUS-33) 16:22	08:31 21 15:41 (WP KLUS-33)
28	05:42 21:22	06:30 20:23	07:20 19:12	07:11 17:08	08:04 16:23	15:09 (WP KLUS-33) 16:22	08:31 21 15:41 (WP KLUS-33)
29	05:43 21:20	06:32 20:21	07:21 19:10	07:12 17:06	08:05 16:22	15:09 (WP KLUS-33) 16:23	08:32 20 15:41 (WP KLUS-33)
30	05:45 21:19	06:33 20:19	07:23 19:08	07:14 17:04	08:07 16:21	15:08 (WP KLUS-33) 16:24	08:32 21 15:42 (WP KLUS-33)
31	05:46 21:17	06:35 20:16	07:25 17:02	07:16 17:02	08:09 16:25	15:08 (WP KLUS-33) 16:25	08:32 21 15:43 (WP KLUS-33)
Sonnenscheinstunden	500	453	381	332	268	246	
astr.max.mögl.Beschattung					255		645
Red.Sonnenscheinwahrsch.					0,23		0,17
Reduktion Betriebsdauer					0,84		0,84
Reduktion Windrichtung					0,65		0,70
Gesamte Reduktion					0,12		0,10
Met.wahrsch.Beschattung					32		65

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
  
D-33181 Bad Wünnenberg  
  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AM - Salmes Feld 18, Bad Wünnenberg-Haaren (WA)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

| Januar | Februar | März | April | Mai | Juni | Juli | August | September | Oktober | November | Dezember

1	08:32 16:26	08:06 17:13	07:13 18:04	07:03 19:57	05:59 20:48	05:15 21:33	05:12 21:47	05:48 21:15	06:36 20:14	07:25 19:05	07:18 17:00	08:08 16:20	
2	08:32 16:27	08:04 17:15	07:11 18:06	07:01 19:59	05:57 20:49	05:14 21:34	05:12 21:46	05:49 21:14	06:38 20:12	07:26 19:03	07:19 16:58	08:09 16:20	
3	08:32 16:28	08:02 17:17	07:09 18:08	06:59 20:01	05:55 20:51	05:13 21:35	05:13 21:46	05:51 21:12	06:40 20:10	07:28 19:01	07:21 16:56	08:11 16:19	
4	08:31 16:29	08:01 17:19	07:06 18:10	06:56 20:03	05:53 20:53	05:12 21:36	05:14 21:45	05:52 21:10	06:41 20:07	07:30 18:59	07:23 16:55	08:12 16:19	
5	08:31 16:31	07:59 17:21	07:04 18:11	06:54 20:04	05:52 20:54	05:12 21:37	05:15 21:45	05:54 21:09	06:43 20:05	07:31 18:56	07:25 16:53	08:13 16:18	
6	08:31 16:32	07:58 17:23	07:02 18:13	06:52 20:06	05:50 20:56	05:11 21:38	05:15 21:44	05:55 21:07	06:44 20:03	07:33 18:54	07:27 16:51	08:15 16:18	
7	08:30 16:33	07:56 17:24	07:00 18:15	06:50 20:08	05:48 20:57	05:10 21:39	05:16 21:44	05:57 21:05	06:46 20:01	07:35 18:52	07:28 16:50	08:16 16:17	
8	08:30 16:34	07:54 17:26	06:58 18:17	06:47 20:09	05:46 20:59	05:10 21:40	05:17 21:43	05:58 21:03	06:48 19:58	07:36 18:50	07:30 16:48	08:17 16:17	
9	08:30 16:36	07:52 17:28	06:55 18:18	06:45 20:11	05:45 21:01	05:09 21:40	05:18 21:43	06:00 21:01	06:49 19:56	07:38 18:47	07:32 16:46	08:18 16:17	
10	08:29 16:37	07:51 17:30	06:53 18:20	06:43 20:13	05:43 21:02	05:09 21:41	05:19 21:42	06:01 21:00	06:51 19:54	07:40 18:45	07:34 16:45	08:19 16:16	
11	08:28 16:39	07:49 17:32	06:51 18:22	06:41 20:14	05:41 21:04	05:09 21:42	05:20 21:41	06:03 20:58	06:52 19:51	07:41 18:43	07:35 16:43	08:20 16:16	
12	08:28 16:40	07:47 17:34	06:49 18:24	06:38 20:16	05:40 21:05	05:08 21:43	05:21 21:40	06:05 20:56	06:54 19:49	07:43 18:41	07:37 16:42	08:22 16:16	
13	08:27 16:41	07:45 17:35	06:46 18:25	06:36 20:18	05:38 21:07	05:08 21:43	05:22 21:39	06:06 20:54	06:56 19:47	07:45 18:39	07:39 16:40	08:23 16:16	
14	08:26 16:43	07:43 17:37	06:44 18:27	06:34 20:19	05:36 21:08	05:08 21:44	05:23 21:39	06:08 20:52	06:57 19:45	07:46 18:36	07:41 16:39	08:23 16:16	
15	08:26 16:44	07:41 17:39	06:42 18:29	06:32 20:21	05:35 21:10	05:08 21:44	05:25 21:38	06:09 20:50	06:59 19:42	07:48 18:34	07:42 16:37	08:24 16:16	
16	08:25 16:46	07:39 17:41	06:40 18:30	06:30 20:23	05:33 21:11	05:07 21:45	05:26 21:37	06:11 20:48	07:00 19:40	07:50 18:32	07:44 16:36	08:25 16:16	
17	08:24 16:48	07:38 17:43	06:37 18:32	06:28 20:24	05:32 21:13	05:07 21:45	05:27 21:36	06:13 20:46	07:02 19:38	07:51 18:30	07:46 16:35	08:26 16:17	
18	08:23 16:49	07:36 17:45	06:35 18:34	06:25 20:26	05:31 21:14	05:07 21:46	05:28 21:35	06:14 20:44	07:04 19:35	07:53 18:28	07:47 16:33	08:27 16:17	
19	08:22 16:51	07:34 17:46	06:33 18:36	06:23 20:28	05:29 21:16	05:07 21:46	05:29 21:33	06:16 20:42	07:05 19:33	07:55 18:26	07:49 16:32	08:27 16:17	
20	08:21 16:52	07:32 17:48	06:30 18:37	06:21 20:29	05:28 21:17	05:07 21:46	05:31 21:32	06:17 20:40	07:07 19:31	07:57 18:24	07:51 16:31	08:28 16:17	
21	08:20 16:54	07:30 17:50	06:28 18:39	06:19 20:31	05:26 21:19	05:08 21:47	05:32 21:31	06:19 20:38	07:08 19:28	07:58 18:22	07:52 16:30	08:29 16:18	
22	08:19 16:56	07:28 17:52	06:26 18:41	06:17 20:33	05:25 21:20	05:08 21:47	05:33 21:30	06:20 20:36	07:10 19:26	08:00 18:19	07:54 16:28	08:29 16:18	
23	08:18 16:58	07:25 17:54	06:24 18:42	06:15 20:34	05:24 21:21	05:08 21:47	05:35 21:28	06:22 20:34	07:12 19:24	08:02 18:17	07:56 16:27	08:30 16:19	
24	08:16 16:59	07:23 17:55	06:21 18:44	06:13 20:36	05:23 21:23	05:08 21:47	05:36 21:27	06:24 20:31	07:13 19:21	08:04 18:15	07:57 16:26	08:30 16:19	
25	08:15 17:01	07:21 17:57	06:19 18:46	06:11 20:38	05:21 21:24	05:09 21:47	05:37 21:26	06:25 20:29	07:15 19:19	07:05 17:13	07:59 16:25	08:31 16:20	
26	08:14 17:03	07:19 17:59	06:17 18:47	06:09 20:39	05:20 21:25	05:09 21:47	05:39 21:24	06:27 20:27	07:17 19:17	07:07 17:11	08:00 16:24	08:31 16:21	
27	08:13 17:04	07:17 18:01	06:14 18:49	06:07 20:41	05:19 21:27	05:09 21:47	05:40 21:23	06:28 20:25	07:18 19:15	07:09 17:09	08:02 16:23	08:31 16:21	
28	08:11 17:06	07:15 18:03	06:12 18:51	06:05 20:43	05:18 21:28	05:10 21:47	05:42 21:22	06:30 20:23	07:20 19:12	07:11 17:08	08:04 16:23	08:31 16:22	
29	08:10 17:08		07:10 19:52	06:03 20:44	05:17 21:29	05:10 21:47	05:43 21:20	06:32 20:21	07:21 19:10	07:12 17:06	08:05 16:22	08:32 16:23	
30	08:08 17:10		07:08 19:54	06:01 20:46	05:16 21:30	05:11 21:47	05:45 21:18	06:33 20:19	07:23 19:08	07:14 17:04	08:07 16:21	08:32 16:24	
31	08:07 17:12		07:05 19:56	05:15 21:32	05:15 21:32	05:15 21:17	05:46 20:16	06:35 20:16	07:16 17:02	07:16 17:02	08:08 16:25	08:32 16:25	
	Sonnenscheinstunden	260	278	367	415	484	497	500	453	381	332	268	246
	astr.max.mögl.Beschattung												
	Red.Sonnenscheinwahrsch.												
	Reduktion Betriebsdauer												
	Reduktion Windrichtung												
	Gesamte Reduktion												
	Met.wahrsch.Beschattung												

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

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

Projekt: Schattenwurf Bad Wünnenb.-Hirschweg	Beschreibung: Auftraggeber:  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	Lizenzierter Anwender: Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AN - Am Südhang 31, Bad Wünnenberg (WA-MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Januar	Februar	März	April	Mai	Juni		
1	08:32 16:27	08:06 17:14	07:13 18:04	07:03 19:58	05:59 20:48	05:15 21:33		06:08 (WP Hirsch-15)
2	08:32 16:28	08:04 17:15	07:11 18:06	07:01 19:59	05:57 20:49	05:14 21:34	14	06:09 (WP Hirsch-15)
3	08:31 16:29	08:02 17:17	07:09 18:08	07:09 20:01	06:59 20:51	05:13 21:35	12	06:21 (WP Hirsch-15)
4	08:31 16:30	08:01 17:19	07:06 18:10	06:56 20:03	06:54 20:53	05:13 21:36	10	06:12 (WP Hirsch-15)
5	08:31 16:31	07:59 17:21	07:04 18:12	06:54 20:04	05:52 20:04	05:12 21:37	8	06:20 (WP Hirsch-15)
6	08:31 16:32	07:58 17:23	07:02 18:13	06:52 20:06	05:50 20:56	05:11 21:38	5	06:14 (WP Hirsch-15)
7	08:30 16:33	07:56 17:25	07:00 18:15	06:50 20:08	05:48 20:57	05:11 21:39		06:19 (WP Hirsch-15)
8	08:30 16:35	07:54 17:26	06:58 18:17	06:47 20:09	05:47 20:59	05:10 21:40		
9	08:29 16:36	07:52 17:28	06:55 18:19	06:45 20:11	05:45 21:01	05:10 21:40		06:12 (WP Hirsch-15)
10	08:29 16:37	07:51 17:30	06:53 18:20	06:43 20:13	05:43 21:02	05:09 21:41	5	06:17 (WP Hirsch-15)
11	08:28 16:39	07:49 17:32	06:51 18:22	06:41 20:14	05:42 21:04	05:09 21:42	12	06:08 (WP Hirsch-15)
12	08:28 16:40	07:47 17:34	06:49 18:24	06:39 20:16	05:40 21:05	05:09 21:43	15	06:06 (WP Hirsch-15)
13	08:27 16:42	07:45 17:36	06:46 18:25	06:36 20:18	05:38 21:07	05:08 21:43	16	06:22 (WP Hirsch-15)
14	08:26 16:43	07:43 17:37	06:44 18:27	06:34 20:19	05:37 21:08	05:08 21:44	19	06:04 (WP Hirsch-15)
15	08:26 16:45	07:41 17:39	06:42 18:29	06:32 20:21	05:35 21:10	05:08 21:44	20	06:04 (WP Hirsch-15)
16	08:25 16:46	07:40 17:41	06:40 18:31	06:30 20:23	05:34 21:11	05:08 21:45	21	06:25 (WP Hirsch-15)
17	08:24 16:48	07:38 17:43	06:37 18:32	06:28 20:24	05:32 21:13	05:08 21:45	21	06:03 (WP Hirsch-15)
18	08:23 16:49	07:36 17:45	06:35 18:34	06:26 20:26	05:31 21:14	05:08 21:46	22	06:25 (WP Hirsch-15)
19	08:22 16:51	07:34 17:47	06:33 18:36	06:23 20:28	05:29 21:16	05:08 21:46	22	06:03 (WP Hirsch-15)
20	08:21 16:53	07:32 17:48	06:31 18:37	06:21 20:29	05:28 21:17	05:08 21:46	23	06:26 (WP Hirsch-15)
21	08:20 16:54	07:30 17:50	06:28 18:39	06:19 20:31	05:27 21:19	05:08 21:47	23	06:03 (WP Hirsch-15)
22	08:19 16:56	07:28 17:52	06:26 18:41	06:17 20:33	05:25 21:20	05:08 21:47	22	06:03 (WP Hirsch-15)
23	08:18 16:58	07:26 17:54	06:24 18:42	06:15 20:34	05:24 21:21	05:08 21:47	22	06:25 (WP Hirsch-15)
24	08:16 16:59	07:23 17:56	06:21 18:44	06:13 20:36	05:23 21:23	05:09 21:47	22	06:04 (WP Hirsch-15)
25	08:15 17:01	07:21 17:57	06:19 18:46	06:11 20:38	05:22 21:24	05:09 21:47	21	06:25 (WP Hirsch-15)
26	08:14 17:03	07:19 17:59	06:17 18:47	06:09 20:39	05:21 21:25	05:09 21:47	21	06:04 (WP Hirsch-15)
27	08:13 17:05	07:17 18:01	06:15 18:49	06:07 20:41	05:20 21:27	05:10 21:47	21	06:05 (WP Hirsch-15)
28	08:11 17:06	07:15 18:03	06:12 18:51	06:05 20:43	05:19 21:28	05:10 21:47	20	06:05 (WP Hirsch-15)
29	08:10 17:08		07:10 19:53	06:03 20:44	05:18 21:29	05:11 21:47	19	06:06 (WP Hirsch-15)
30	08:08 17:10		07:08 19:54	06:01 20:46	05:17 21:30	05:11 21:47	18	06:24 (WP Hirsch-15)
31	08:07 17:12		07:05 19:56		05:16 21:32	05:11 21:47	17	06:08 (WP Hirsch-15)
					15	06:23 (WP Hirsch-15)		
Sonnenscheinstunden	261	278	367	415	483	497		
astr.max.mögl.Beschattung				84			49	
Red.Sonnenscheinwahrsch.				0,36	0,43		0,34	
Reduktion Betriebsdauer				0,84	0,84		0,84	
Reduktion Windrichtung				0,63	0,72		0,72	
Gesamte Reduktion				0,19	0,26		0,20	
Met.wahrsch.Beschattung				16	113		10	

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

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

<b>Projekt:</b> Schattenwurf Bad Wünnenb.-Hirschweg	<b>Beschreibung:</b> Auftraggeber:  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	<b>Lizenzierter Anwender:</b> Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AN - Am Südhang 31, Bad Wünnenberg (WA-MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

| Juli | August | September | Oktober | November | Dezember

1	05:12		05:48		06:16 (WP Hirsch-15)	06:37	07:25	07:18	08:08			
	21:46		21:15	16	06:32 (WP Hirsch-15)	20:14	19:06	17:00	16:21			
2	05:13		05:49		06:18 (WP Hirsch-15)	06:38	07:26	07:19	08:09			
	21:46		21:14	14	06:32 (WP Hirsch-15)	20:12	19:03	16:58	16:20			
3	05:13		05:51		06:20 (WP Hirsch-15)	06:40	07:28	07:21	08:11			
	21:46		21:12	9	06:29 (WP Hirsch-15)	20:10	19:01	16:57	16:19			
4	05:14		05:52			06:41	07:30	07:23	08:12			
	21:45		21:10			20:07	18:59	16:55	16:19			
5	05:15		05:54			06:43	07:31	07:25	08:13			
	21:45		21:09			20:05	18:56	16:53	16:18			
6	05:16		05:55			06:45	07:33	07:27	08:15			
	21:44		21:07			20:03	18:54	16:51	16:18			
7	05:17	06:22 (WP Hirsch-15)	05:57			06:46	07:35	07:28	08:16			
	21:44	2	21:05			20:01	18:52	16:50	16:18			
8	05:18	06:20 (WP Hirsch-15)	05:59			06:48	07:36	07:30	08:17			
	21:43	7	21:03			19:58	18:50	16:48	16:17			
9	05:18	06:19 (WP Hirsch-15)	06:00			06:49	07:38	07:32	08:18			
	21:43	9	21:01			19:56	18:47	16:47	16:17			
10	05:19	06:17 (WP Hirsch-15)	06:02			06:51	07:40	07:34	08:19			
	21:42	11	21:00			19:54	18:45	16:45	16:17			
11	05:20	06:16 (WP Hirsch-15)	06:03			06:53	07:41	07:35	08:20			
	21:41	13	20:58			19:52	18:43	16:43	16:17			
12	05:22	06:16 (WP Hirsch-15)	06:05			06:54	07:43	07:37	08:21			
	21:40	14	20:56			19:49	18:41	16:42	16:17			
13	05:23	06:15 (WP Hirsch-15)	06:06			06:56	07:45	07:39	08:22			
	21:39	16	20:54			19:47	18:39	16:40	16:16			
14	05:24	06:16 (WP Hirsch-15)	06:08			06:57	07:46	07:41	08:23			
	21:39	17	20:52			19:45	18:37	16:39	16:16			
15	05:25	06:15 (WP Hirsch-15)	06:10			06:59	07:48	07:42	08:24			
	21:38	18	20:50			19:42	18:34	16:38	16:17			
16	05:26	06:15 (WP Hirsch-15)	06:11			07:01	07:50	07:44	08:25			
	21:37	19	20:48			19:40	18:32	16:36	16:17			
17	05:27	06:14 (WP Hirsch-15)	06:13			07:02	07:52	07:46	08:26			
	21:36	20	20:46			19:38	18:30	16:35	16:17			
18	05:28	06:14 (WP Hirsch-15)	06:14			07:04	07:53	07:47	08:27			
	21:34	21	20:44	7	19:57 (WP KLUS-12)	19:35	18:28	16:34	16:17			
19	05:30	06:13 (WP Hirsch-15)	06:16			07:05	07:55	07:49	08:27			
	21:33	22	20:42	10	19:59 (WP KLUS-12)	19:33	18:26	16:32	16:17			
20	05:31	06:13 (WP Hirsch-15)	06:18			07:07	07:57	07:51	08:28			
	21:32	22	20:40	12	19:59 (WP KLUS-12)	19:31	18:24	16:31	16:18			
21	05:32	06:14 (WP Hirsch-15)	06:19			07:09	07:58	07:52	08:29			
	21:31	22	20:38	12	19:59 (WP KLUS-12)	19:29	18:22	16:30	16:18			
22	05:34	06:13 (WP Hirsch-15)	06:21			07:10	08:00	07:54	08:29			
	21:30	23	20:36	12	19:58 (WP KLUS-12)	19:26	18:20	16:29	16:19			
23	05:35	06:13 (WP Hirsch-15)	06:22			07:12	08:02	07:56	08:30			
	21:28	23	20:34	11	19:58 (WP KLUS-12)	19:24	18:18	16:28	16:19			
24	05:36	06:13 (WP Hirsch-15)	06:24			07:13	08:04	07:57	08:30			
	21:27	23	20:32	10	19:57 (WP KLUS-12)	19:22	18:16	16:27	16:20			
25	05:38	06:14 (WP Hirsch-15)	06:25			07:15	07:05	07:59	08:31			
	21:26	22	20:29	8	19:56 (WP KLUS-12)	19:19	17:14	16:26	16:20			
26	05:39	06:13 (WP Hirsch-15)	06:27			07:17	07:07	08:00	08:31			
	21:24	23	20:27	1	19:52 (WP KLUS-12)	19:17	17:12	16:25	16:21			
27	05:41	06:13 (WP Hirsch-15)	06:29			07:18	07:09	08:02	08:31			
	21:23	22	20:25			19:15	17:10	16:24	16:22			
28	05:42	06:14 (WP Hirsch-15)	06:30			07:20	07:11	08:04	08:31			
	21:21	22	20:23			19:12	17:08	16:23	16:23			
29	05:43	06:14 (WP Hirsch-15)	06:32			07:22	07:12	08:05	08:32			
	21:20	21	20:21			19:10	17:06	16:22	16:23			
30	05:45	06:15 (WP Hirsch-15)	06:33			07:23	07:14	08:06	08:32			
	21:18	19	20:19			19:08	17:04	16:21	16:24			
31	05:46	06:16 (WP Hirsch-15)	06:35				07:16		08:32			
	21:17	18	20:16				17:02		16:25			
Sonnenscheinstunden	500		453		381	332	268	246				
astr.max.mögl.Beschattung	449		122									
Red.Sonnenscheinwahrsch.	0,39		0,40									
Reduktion Betriebsdauer	0,84		0,84									
Reduktion Windrichtung	0,72		0,66									
Gesamte Reduktion	0,23		0,22									
Met.wahrsch.Beschattung	105		27									

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

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

Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AO - Am Südhang 28, Bad Wünnenberg (WA)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:32 16:27	08:06 17:14	07:13 18:04	07:03 19:58	05:59 20:48	05:15 21:33	05:12 21:46	05:48 21:15	06:37 20:14	07:25 19:06	07:18 17:00	08:08 16:21
2	08:32 16:28	08:04 17:15	07:11 18:06	07:01 19:59	05:57 20:49	05:14 21:34	05:13 21:46	05:49 21:14	06:38 20:12	07:26 19:03	07:19 16:58	08:09 16:20
3	08:31 16:29	08:02 17:17	07:09 18:08	06:59 20:01	05:56 20:51	05:13 21:35	05:13 21:46	05:51 21:12	06:40 20:10	07:28 19:01	07:21 16:57	08:11 16:19
4	08:31 16:30	08:01 17:19	07:06 18:10	06:56 20:03	05:54 20:53	05:13 21:36	05:14 21:45	05:52 21:10	06:41 20:07	07:30 18:59	07:23 16:55	08:12 16:19
5	08:31 16:31	07:59 17:21	07:04 18:12	06:54 20:04	05:52 20:54	05:12 21:37	05:15 21:45	05:54 21:09	06:43 20:05	07:31 18:56	07:25 16:53	08:13 16:18
6	08:31 16:32	07:58 17:23	07:02 18:13	06:52 20:06	05:50 20:56	05:11 21:38	05:16 21:44	05:55 21:07	06:45 20:03	07:33 18:54	07:27 16:51	08:15 16:18
7	08:30 16:33	07:56 17:25	07:00 18:15	06:50 20:08	05:48 20:57	05:11 21:39	05:17 21:44	05:57 21:05	06:46 20:01	07:35 18:52	07:28 16:50	08:16 16:18
8	08:30 16:35	07:54 17:26	06:58 18:17	06:47 20:09	05:47 20:59	05:10 21:40	05:18 21:43	05:59 21:03	06:48 19:58	07:36 18:50	07:30 16:48	08:17 16:17
9	08:29 16:36	07:52 17:28	06:55 18:19	06:45 20:11	05:45 21:01	05:10 21:40	05:18 21:43	06:00 21:01	06:49 19:56	07:38 18:47	07:32 16:47	08:18 16:17
10	08:29 16:37	07:51 17:30	06:53 18:20	06:43 20:13	05:43 21:02	05:09 21:41	05:19 21:42	06:02 21:00	06:51 19:54	07:40 18:45	07:34 16:45	08:19 16:17
11	08:28 16:39	07:49 17:32	06:51 18:22	06:41 20:14	05:42 21:04	05:09 21:42	05:20 21:41	06:03 20:58	06:53 19:52	07:41 18:43	07:35 16:43	08:20 16:17
12	08:28 16:40	07:47 17:34	06:49 18:24	06:39 20:16	05:40 21:05	05:09 21:43	05:22 21:40	06:05 20:56	06:54 19:49	07:43 18:41	07:37 16:42	08:21 16:17
13	08:27 16:42	07:45 17:36	06:46 18:25	06:36 20:18	05:38 21:07	05:08 21:43	05:23 21:39	06:06 20:54	06:56 19:47	07:45 18:39	07:39 16:40	08:22 16:16
14	08:26 16:43	07:43 17:37	06:44 18:27	06:34 20:19	05:37 21:08	05:08 21:44	05:24 21:39	06:08 20:52	06:57 19:45	07:46 18:37	07:41 16:39	08:23 16:16
15	08:26 16:45	07:41 17:39	06:42 18:29	06:32 20:21	05:35 21:10	05:08 21:44	05:25 21:38	06:10 20:50	06:59 19:42	07:48 18:34	07:42 16:38	08:24 16:17
16	08:25 16:46	07:40 17:41	06:40 18:31	06:30 20:23	05:34 21:11	05:08 21:45	05:26 21:37	06:11 20:48	07:01 19:40	07:50 18:32	07:44 16:36	08:25 16:17
17	08:24 16:48	07:38 17:43	06:37 18:32	06:28 20:24	05:32 21:13	05:08 21:45	05:27 21:36	06:13 20:46	07:02 19:38	07:52 18:30	07:46 16:35	08:26 16:17
18	08:23 16:49	07:36 17:45	06:35 18:34	06:26 20:26	05:31 21:14	05:08 21:46	05:28 21:44	06:14 20:44	07:04 19:35	07:53 18:28	07:47 16:34	08:27 16:17
19	08:22 16:51	07:34 17:47	06:33 18:36	06:23 20:28	05:29 21:16	05:08 21:46	05:30 21:33	06:16 20:42	07:05 19:33	07:55 18:26	07:49 16:32	08:27 16:17
20	08:21 16:53	07:32 17:48	06:31 18:37	06:21 20:29	05:28 21:17	05:08 21:46	05:31 21:32	06:18 20:40	07:07 19:31	07:57 18:24	07:51 16:31	08:28 16:18
21	08:20 16:54	07:30 17:50	06:28 18:39	06:19 20:31	05:27 21:19	05:08 21:47	05:32 21:31	06:19 20:38	07:09 19:29	07:58 18:22	07:52 16:30	08:29 16:18
22	08:19 16:56	07:28 17:52	06:26 18:41	06:17 20:33	05:25 21:20	05:08 21:47	05:34 21:30	06:21 20:36	07:10 19:26	08:00 18:20	07:54 16:29	08:29 16:19
23	08:18 16:58	07:26 17:54	06:24 18:42	06:15 20:34	05:24 21:21	05:08 21:47	05:35 21:28	06:22 20:34	07:12 19:24	08:02 18:18	07:56 16:28	08:30 16:19
24	08:16 16:59	07:23 17:56	06:21 18:44	06:13 20:36	05:23 21:23	05:09 21:47	05:36 21:27	06:24 20:32	07:13 19:22	08:04 18:16	07:57 16:27	08:30 16:20
25	08:15 17:01	07:21 17:57	06:19 18:46	06:11 20:38	05:22 21:24	05:09 21:47	05:38 21:26	06:25 20:29	07:15 19:19	07:05 17:14	07:59 16:26	08:31 16:20
26	08:14 17:03	07:19 17:59	06:17 18:47	06:09 20:39	05:21 21:25	05:09 21:47	05:39 21:24	06:27 20:27	07:17 19:17	07:07 17:12	08:00 16:25	08:31 16:21
27	08:13 17:05	07:17 18:01	06:15 18:49	06:07 20:41	05:20 21:27	05:10 21:47	05:41 21:23	06:29 20:25	07:18 19:15	07:09 17:10	08:02 16:24	08:31 16:22
28	08:11 17:06	07:15 18:03	06:12 18:51	06:05 20:43	05:19 21:28	05:10 21:47	05:42 21:21	06:30 20:23	07:20 19:12	07:11 17:08	08:04 16:23	08:31 16:23
29	08:10 17:08		07:10 19:53	06:03 20:44	05:18 21:29	05:11 21:47	05:43 21:20	06:32 20:21	07:22 19:10	07:12 17:06	08:05 16:22	08:32 16:23
30	08:08 17:10		07:08 19:54	06:01 20:46	05:17 21:30	05:11 21:47	05:45 21:18	06:33 20:19	07:23 19:08	07:14 17:04	08:06 16:21	08:32 16:24
31	08:07 17:12		07:05 19:56	05:16 21:32	05:16 21:32	05:16 21:17	05:46 20:16	06:35 20:16	07:16 17:02	07:16 17:02	08:07 16:25	08:32 16:25
Sonnenscheinstunden	261	278	367	415	483	497	500	453	381	332	268	246
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

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

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

Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:

Auftraggeber:

WBG Energie 1 GmbH & Co. KG  
An der Grotte 17

D-33181 Bad Wünnenberg

Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:

Power of Nature - Windenergie

Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674

Fürtges / joerg.fuertges@powernature.de

Berechnet:

21.05.2024 09:58/3.6.366

### SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AP - Stallbusch 18, Haaren (WA-MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

Januar		Februar		März		April		Mai		Juni	
1	08:32	15:31 (WP KLUS-33)	08:06	08:31 (WP Hirsch-14)	07:13	07:03	05:59	05:15			
	16:26	18 15:49 (WP KLUS-33)	17:13	15 08:46 (WP Hirsch-14)	18:04	18:04	19:58	20:48	21:33		
2	08:32	15:30 (WP KLUS-33)	08:04	08:30 (WP Hirsch-14)	07:11	07:01	05:57	05:14			
	16:27	19 15:49 (WP KLUS-33)	17:15	16 08:46 (WP Hirsch-14)	18:06	18:06	19:59	20:49	21:34		
3	08:32	15:31 (WP KLUS-33)	08:02	08:31 (WP Hirsch-14)	07:09	06:59	05:55	05:13			
	16:28	19 15:50 (WP KLUS-33)	17:17	14 08:45 (WP Hirsch-14)	18:08	18:08	20:01	20:51	21:35		
4	08:31	15:32 (WP KLUS-33)	08:01	08:32 (WP Hirsch-14)	07:06	06:56	05:54	05:12			
	16:30	19 15:51 (WP KLUS-33)	17:19	12 08:44 (WP Hirsch-14)	18:10	18:10	20:03	20:53	21:36		
5	08:31	15:31 (WP KLUS-33)	07:59	08:34 (WP Hirsch-14)	07:04	06:54	05:52	05:12			
	16:31	20 15:51 (WP KLUS-33)	17:21	9 08:43 (WP Hirsch-14)	18:11	18:11	20:04	20:54	21:37		
6	08:31	15:32 (WP KLUS-33)	07:58		07:02	06:52	05:50	05:11			
	16:32	20 15:52 (WP KLUS-33)	17:23		18:13	18:13	20:06	20:56	21:38		
7	08:30	15:32 (WP KLUS-33)	07:56		07:00	06:50	05:48	05:10			
	16:33	20 15:52 (WP KLUS-33)	17:24		18:15	18:15	20:08	20:57	21:39		
8	08:30	15:33 (WP KLUS-33)	07:54		06:58	06:47	05:46	05:10			
	16:34	20 15:53 (WP KLUS-33)	17:26		18:17	18:17	20:09	20:59	21:40		
9	08:30	15:32 (WP KLUS-33)	07:52		06:55	06:45	05:45	05:09			
	16:36	22 15:54 (WP KLUS-33)	17:28		18:18	18:18	20:11	21:01	21:40		
10	08:29	15:32 (WP KLUS-33)	07:51		06:53	06:43	05:43	05:09			
	16:37	22 15:54 (WP KLUS-33)	17:30		18:20	18:20	20:13	21:02	21:41		
11	08:28	15:34 (WP KLUS-33)	07:49		06:51	06:41	05:41	05:09			
	16:39	21 15:55 (WP KLUS-33)	17:32		18:22	18:22	20:14	21:04	21:42		
12	08:28	15:34 (WP KLUS-33)	07:47		06:49	06:38	05:40	05:08			
	16:40	21 15:55 (WP KLUS-33)	17:34		18:24	18:24	20:16	21:05	21:43		
13	08:27	15:34 (WP KLUS-33)	07:45		06:46	06:36	05:38	05:08			
	16:42	21 15:55 (WP KLUS-33)	17:35		18:25	18:25	20:18	21:07	21:43		
14	08:26	15:34 (WP KLUS-33)	07:43		06:44	06:34	05:37	05:08			
	16:43	21 15:55 (WP KLUS-33)	17:37		18:27	18:27	20:19	21:08	21:44		
15	08:26	15:35 (WP KLUS-33)	07:41		06:42	06:32	05:35	05:08			
	16:45	21 15:56 (WP KLUS-33)	17:39		18:29	18:29	20:21	21:10	21:44		
16	08:25	15:35 (WP KLUS-33)	07:40		06:40	06:30	05:33	05:07			
	16:46	21 15:56 (WP KLUS-33)	17:41		18:30	18:30	20:23	21:11	21:45		
17	08:24	15:36 (WP KLUS-33)	07:38		06:37	06:28	05:32	05:07			
	16:48	20 15:56 (WP KLUS-33)	17:43		18:32	18:32	20:24	21:13	21:45		
18	08:23	15:37 (WP KLUS-33)	07:36		06:35	06:25	05:31	05:07			
	16:49	19 15:56 (WP KLUS-33)	17:45		18:34	18:34	20:26	21:14	21:46		
19	08:22	15:38 (WP KLUS-33)	07:34		06:33	06:23	05:29	05:07			
	16:51	18 15:56 (WP KLUS-33)	17:46		18:36	18:36	20:28	21:16	21:46		
20	08:21	15:39 (WP KLUS-33)	07:32		06:31	06:21	05:28	05:08			
	16:53	17 15:56 (WP KLUS-33)	17:48		18:37	18:37	20:29	21:17	21:47		
21	08:20	15:41 (WP KLUS-33)	07:30		06:28	06:19	05:26	05:08			
	16:54	14 15:55 (WP KLUS-33)	17:50		18:39	18:39	20:31	21:19	21:47		
22	08:19	15:41 (WP KLUS-33)	07:28		06:26	06:17	05:25	05:08			
	16:56	13 15:54 (WP KLUS-33)	17:52		18:41	18:41	20:33	21:20	21:47		
23	08:18	15:44 (WP KLUS-33)	07:26		06:24	06:15	05:24	05:08			
	16:58	9 15:53 (WP KLUS-33)	17:54		18:42	18:42	20:34	21:22	21:47		
24	08:17		07:23		06:21	06:13	05:23	05:08			
	16:59		17:55		18:44	18:44	20:36	21:23	21:47		
25	08:15	08:42 (WP Hirsch-14)	07:21		06:19	06:11	05:22	05:09			
	17:01	3 08:45 (WP Hirsch-14)	17:57		18:46	18:46	20:38	21:24	21:47		
26	08:14	08:41 (WP Hirsch-14)	07:19		06:17	06:09	05:20	05:09			
	17:03	5 08:46 (WP Hirsch-14)	17:59		18:47	18:47	20:39	21:25	21:47		
27	08:13	08:39 (WP Hirsch-14)	07:17		06:15	06:07	05:19	05:10			
	17:05	7 08:46 (WP Hirsch-14)	18:01		18:49	18:49	20:41	21:27	21:47		
28	08:11	08:38 (WP Hirsch-14)	07:15		06:12	06:05	05:18	05:10			
	17:06	9 08:47 (WP Hirsch-14)	18:03		18:51	18:51	20:43	21:28	21:47		
29	08:10	08:36 (WP Hirsch-14)			07:10	06:03	05:17	05:11			
	17:08	10 08:46 (WP Hirsch-14)			19:52	19:52	20:44	21:29	21:47		
30	08:09	08:35 (WP Hirsch-14)			07:08	06:01	05:16	05:11			
	17:10	12 08:47 (WP Hirsch-14)			19:54	19:54	20:46	21:30	21:47		
31	08:07	08:33 (WP Hirsch-14)			07:05		05:15				
	17:12	14 08:47 (WP Hirsch-14)			19:56	19:56	21:32				
Sonnenscheinstunden	261		278		367	415	484	497			
astr.max.mögl.Beschattung		495		66							
Red.Sonnenscheinwahrsch.		0,19		0,32							
Reduktion Betriebsdauer		0,84		0,84							
Reduktion Windrichtung		0,69		0,59							
Gesamte Reduktion		0,11		0,16							
Met.wahrsch.Beschattung		54		11							

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

Tag im Monat	Sonnenaufgang (SS:MM)	Zeitpunkt (SS:MM) Schattenanfang (WEA mit erstem Schatten)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)
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Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AP - Stallbusch 18, Haaren (WA-MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	Juli	August	September	Oktober	November	Dezember	
1	05:12	05:48	06:37	07:25	07:18	08:08	15:16 (WP KLUS-33)
	21:47	21:15	20:14	19:05	17:00	16:20	21 15:37 (WP KLUS-33)
2	05:12	05:49	06:38	07:26	07:19	08:09	15:16 (WP KLUS-33)
	21:46	21:14	20:12	19:03	16:58	16:20	21 15:37 (WP KLUS-33)
3	05:13	05:51	06:40	07:28	07:21	08:11	15:17 (WP KLUS-33)
	21:46	21:12	20:10	19:01	16:56	16:19	21 15:38 (WP KLUS-33)
4	05:14	05:52	06:41	07:30	07:23	08:12	15:17 (WP KLUS-33)
	21:45	21:10	20:07	18:59	16:55	16:19	20 15:37 (WP KLUS-33)
5	05:15	05:54	06:43	07:31	07:25	08:13	15:18 (WP KLUS-33)
	21:45	21:09	20:05	18:56	16:53	16:18	1 08:08 (WP Hirsch-14) 20 15:38 (WP KLUS-33)
6	05:15	05:55	06:45	07:33	07:27	08:15	15:18 (WP KLUS-33)
	21:45	21:07	20:03	18:54	16:51	16:18	9 08:13 (WP Hirsch-14) 20 15:38 (WP KLUS-33)
7	05:16	05:57	06:46	07:35	07:28	08:16	15:18 (WP KLUS-33)
	21:44	21:05	20:01	18:52	16:50	16:17	13 08:15 (WP Hirsch-14) 20 15:38 (WP KLUS-33)
8	05:17	05:58	06:48	07:36	07:30	08:17	15:19 (WP KLUS-33)
	21:43	21:03	19:58	18:50	16:48	16:17	15 08:16 (WP Hirsch-14) 19 15:38 (WP KLUS-33)
9	05:18	06:00	06:49	07:38	07:32	08:18	15:20 (WP KLUS-33)
	21:43	21:01	19:56	18:47	16:46	16:17	16 08:17 (WP Hirsch-14) 19 15:39 (WP KLUS-33)
10	05:19	06:01	06:51	07:40	07:34	08:19	15:21 (WP KLUS-33)
	21:42	21:00	19:54	18:45	16:45	16:17	15 08:18 (WP Hirsch-14) 18 15:39 (WP KLUS-33)
11	05:20	06:03	06:53	07:41	07:35	08:21	15:21 (WP KLUS-33)
	21:41	20:58	19:51	18:43	16:43	16:16	14 08:18 (WP Hirsch-14) 18 15:39 (WP KLUS-33)
12	05:21	06:05	06:54	07:43	07:37	08:22	15:22 (WP KLUS-33)
	21:40	20:56	19:49	18:41	16:42	16:16	12 08:18 (WP Hirsch-14) 17 15:39 (WP KLUS-33)
13	05:22	06:06	06:56	07:45	07:39	08:23	15:22 (WP KLUS-33)
	21:40	20:54	19:47	18:39	16:40	16:16	10 08:18 (WP Hirsch-14) 18 15:40 (WP KLUS-33)
14	05:23	06:08	06:57	07:46	07:41	08:24	15:23 (WP KLUS-33)
	21:39	20:52	19:45	18:36	16:39	16:16	9 08:19 (WP Hirsch-14) 17 15:40 (WP KLUS-33)
15	05:25	06:09	06:59	07:48	07:42	08:24	15:24 (WP KLUS-33)
	21:38	20:50	19:42	18:34	16:37	16:16	7 08:19 (WP Hirsch-14) 16 15:40 (WP KLUS-33)
16	05:26	06:11	07:01	07:50	07:44	08:25	15:25 (WP KLUS-33)
	21:37	20:48	19:40	18:32	16:36	16:16	5 08:19 (WP Hirsch-14) 16 15:41 (WP KLUS-33)
17	05:27	06:13	07:02	07:52	07:46	08:26	15:24 (WP KLUS-33)
	21:36	20:46	19:38	18:30	16:35	16:17	2 08:18 (WP Hirsch-14) 16 15:40 (WP KLUS-33)
18	05:28	06:14	07:04	07:53	07:47	08:27	15:25 (WP KLUS-33)
	21:35	20:44	19:35	18:28	16:33	16:17	16 15:41 (WP KLUS-33)
19	05:29	06:16	07:05	07:55	07:49	08:28	15:26 (WP KLUS-33)
	21:33	20:42	19:33	18:26	16:32	16:17	9 15:18 (WP KLUS-33) 16 15:42 (WP KLUS-33)
20	05:31	06:17	07:07	07:57	07:51	08:28	15:26 (WP KLUS-33)
	21:32	20:40	19:31	18:24	16:31	16:17	13 15:29 (WP KLUS-33) 15 15:41 (WP KLUS-33)
21	05:32	06:19	07:09	07:58	07:52	08:29	15:27 (WP KLUS-33)
	21:31	20:38	19:28	18:22	16:30	16:18	14 15:30 (WP KLUS-33) 15 15:42 (WP KLUS-33)
22	05:33	06:21	07:10	08:00	07:54	08:29	15:27 (WP KLUS-33)
	21:30	20:36	19:26	18:20	16:29	16:18	17 15:32 (WP KLUS-33) 15 15:42 (WP KLUS-33)
23	05:35	06:22	07:12	08:02	07:56	08:30	15:28 (WP KLUS-33)
	21:29	20:34	19:24	18:17	16:27	16:19	18 15:33 (WP KLUS-33) 15 15:43 (WP KLUS-33)
24	05:36	06:24	07:13	08:04	07:57	08:30	15:28 (WP KLUS-33)
	21:27	20:32	19:21	18:15	16:26	16:19	19 15:33 (WP KLUS-33) 15 15:43 (WP KLUS-33)
25	05:37	06:25	07:15	07:05	07:59	08:31	15:28 (WP KLUS-33)
	21:26	20:29	19:19	17:13	16:25	16:20	20 15:34 (WP KLUS-33) 16 15:44 (WP KLUS-33)
26	05:39	06:27	07:17	07:07	08:01	08:31	15:29 (WP KLUS-33)
	21:24	20:27	19:17	17:12	16:24	16:21	20 15:35 (WP KLUS-33) 16 15:45 (WP KLUS-33)
27	05:40	06:29	07:18	07:09	08:02	08:31	15:30 (WP KLUS-33)
	21:23	20:25	19:15	17:10	16:24	16:22	21 15:35 (WP KLUS-33) 16 15:46 (WP KLUS-33)
28	05:42	06:30	07:20	07:11	08:04	08:31	15:30 (WP KLUS-33)
	21:22	20:23	19:12	17:08	16:23	16:22	22 15:36 (WP KLUS-33) 16 15:46 (WP KLUS-33)
29	05:43	06:32	07:21	07:12	08:05	08:32	15:30 (WP KLUS-33)
	21:20	20:21	19:10	17:06	16:22	16:23	21 15:36 (WP KLUS-33) 17 15:47 (WP KLUS-33)
30	05:45	06:33	07:23	07:14	08:07	08:32	15:30 (WP KLUS-33)
	21:19	20:19	19:08	17:04	16:21	16:24	21 15:36 (WP KLUS-33) 17 15:47 (WP KLUS-33)
31	05:46	06:35	07:24	07:16	08:08	08:32	15:31 (WP KLUS-33)
	21:17	20:16	19:02	17:02	16:20	16:25	17 15:48 (WP KLUS-33)
Sonnenscheinstunden	500	453	381	332	268	246	
astr.max.mögl.Beschattung					343		539
Red.Sonnenscheinwahrsch.					0,23		0,17
Reduktion Betriebsdauer					0,84		0,84
Reduktion Windrichtung					0,66		0,70
Gesamte Reduktion					0,13		0,10
Met.wahrsch.Beschattung					43		54

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

### SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AQ - Stallbusch 14, Haaren (WA-MI)

#### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

| Januar | Februar | März | April | Mai | Juni

1	08:32   16:26	32	09:26 (WP Hirsch-18) 15:47 (WP KLUS-33)	08:06   17:13	10	08:31 (WP Hirsch-14) 08:41 (WP Hirsch-14)	07:13   18:04	07:03   19:58	05:59   20:48	05:15   21:33
2	08:32   16:27	30	09:27 (WP Hirsch-18) 15:47 (WP KLUS-33)	08:04   17:15	12	08:30 (WP Hirsch-14) 08:42 (WP Hirsch-14)	07:11   18:06	07:01   19:59	05:57   20:49	05:14   21:34
3	08:32   16:28	28	09:29 (WP Hirsch-18) 15:48 (WP KLUS-33)	08:02   17:17	13	08:28 (WP Hirsch-14) 08:41 (WP Hirsch-14)	07:09   18:08	06:59   20:01	05:55   20:51	05:13   21:35
4	08:31   16:30	24	09:32 (WP Hirsch-18) 15:49 (WP KLUS-33)	08:01   17:19	15	08:26 (WP Hirsch-14) 08:41 (WP Hirsch-14)	07:06   18:10	06:56   20:03	05:54   20:53	05:12   21:36
5	08:31   16:31	21	15:28 (WP KLUS-33) 15:49 (WP KLUS-33)	07:59   17:21	16	08:25 (WP Hirsch-14) 08:41 (WP Hirsch-14)	07:04   18:11	06:54   20:04	05:52   20:54	05:12   21:37
6	08:31   16:32	21	15:29 (WP KLUS-33) 15:50 (WP KLUS-33)	07:58   17:23	14	08:26 (WP Hirsch-14) 08:40 (WP Hirsch-14)	07:02   18:13	06:52   20:06	05:50   20:56	05:11   21:38
7	08:30   16:33	22	15:28 (WP KLUS-33) 15:50 (WP KLUS-33)	07:56   17:24	11	08:27 (WP Hirsch-14) 08:38 (WP Hirsch-14)	07:00   18:15	06:50   20:08	05:48   20:57	05:10   21:39
8	08:30   16:35	22	15:29 (WP KLUS-33) 15:51 (WP KLUS-33)	07:54   17:26	7	08:29 (WP Hirsch-14) 08:36 (WP Hirsch-14)	06:58   18:17	06:47   20:09	05:46   20:59	05:10   21:40
9	08:30   16:36	22	15:29 (WP KLUS-33) 15:51 (WP KLUS-33)	07:52   17:28		06:55   18:18	06:45   20:11	05:45   21:01	05:09   21:40	
10	08:29   16:37	22	15:29 (WP KLUS-33) 15:51 (WP KLUS-33)	07:51   17:30		06:53   18:20	06:43   20:13	05:43   21:02	05:09   21:41	
11	08:28   16:39	23	15:30 (WP KLUS-33) 15:53 (WP KLUS-33)	07:49   17:32		06:51   18:22	06:41   20:14	05:41   21:04	05:09   21:42	
12	08:28   16:40	22	15:31 (WP KLUS-33) 15:53 (WP KLUS-33)	07:47   17:34		06:49   18:24	06:38   20:16	05:40   21:05	05:08   21:43	
13	08:27   16:42	22	15:31 (WP KLUS-33) 15:53 (WP KLUS-33)	07:45   17:35		06:46   18:25	06:36   20:18	05:38   21:07	05:08   21:43	
14	08:26   16:43	22	15:31 (WP KLUS-33) 15:53 (WP KLUS-33)	07:43   17:37		06:44   18:27	06:34   20:19	05:37   21:08	05:08   21:44	
15	08:26   16:45	21	15:32 (WP KLUS-33) 15:53 (WP KLUS-33)	07:41   17:39		06:42   18:29	06:32   20:21	05:35   21:10	05:08   21:44	
16	08:25   16:46	21	15:32 (WP KLUS-33) 15:53 (WP KLUS-33)	07:40   17:41		06:40   18:30	06:30   20:23	05:33   21:11	05:07   21:45	
17	08:24   16:48	20	15:33 (WP KLUS-33) 15:53 (WP KLUS-33)	07:38   17:43		06:37   18:32	06:28   20:24	05:32   21:13	05:07   21:45	
18	08:23   16:49	19	15:34 (WP KLUS-33) 15:53 (WP KLUS-33)	07:36   17:45		06:35   18:34	06:25   20:26	05:31   21:14	05:07   21:46	
19	08:22   16:51	18	15:35 (WP KLUS-33) 15:53 (WP KLUS-33)	07:34   17:46		06:33   18:36	06:23   20:28	05:29   21:16	05:07   21:46	
20	08:21   16:53	17	15:36 (WP KLUS-33) 15:53 (WP KLUS-33)	07:32   17:48		06:31   18:37	06:21   20:29	05:28   21:17	05:08   21:47	
21	08:20   16:54	15	15:38 (WP KLUS-33) 15:53 (WP KLUS-33)	07:30   17:50		06:28   18:39	06:19   20:31	05:26   21:19	05:08   21:47	
22	08:19   16:56	13	15:38 (WP KLUS-33) 15:51 (WP KLUS-33)	07:28   17:52		06:26   18:41	06:17   20:33	05:25   21:20	05:08   21:47	
23	08:18   16:58	9	15:41 (WP KLUS-33) 15:50 (WP KLUS-33)	07:26   17:54		06:24   18:42	06:15   20:34	05:24   21:22	05:08   21:47	
24	08:17   16:59	4	15:44 (WP KLUS-33) 15:48 (WP KLUS-33)	07:23   17:55		06:21   18:44	06:13   20:36	05:23   21:23	05:08   21:47	
25	08:15   17:01			07:21   17:57		06:19   18:46	06:11   20:38	05:22   21:24	05:09   21:47	
26	08:14   17:03			07:19   17:59		06:17   18:47	06:09   20:39	05:20   21:26	05:09   21:47	
27	08:13   17:05			07:17   18:01		06:15   18:49	06:07   20:41	05:19   21:27	05:10   21:47	
28	08:11   17:06	1	08:38 (WP Hirsch-14) 08:39 (WP Hirsch-14)	07:15   18:03		06:12   18:51	06:05   20:43	05:18   21:28	05:10   21:47	
29	08:10   17:08	4	08:36 (WP Hirsch-14) 08:40 (WP Hirsch-14)	07:14   18:04		06:10   19:52	06:03   20:44	05:17   21:29	05:11   21:47	
30	08:09   17:10	6	08:35 (WP Hirsch-14) 08:41 (WP Hirsch-14)	07:13   18:05		06:08   19:54	06:01   20:46	05:16   21:30	05:11   21:47	
31	08:07   17:12	8	08:33 (WP Hirsch-14) 08:41 (WP Hirsch-14)	07:12   18:06		06:06   19:56	05:59   21:32	05:15   21:32	05:11   21:47	
Sonnenscheinstunden		261		278		367	415	484	497	
astr.max.mögl.Beschattung			509		98					
Red.Sonnenscheinwahrsch.			0,19		0,32					
Reduktion Betriebsdauer			0,84		0,84					
Reduktion Windrichtung			0,69		0,60					
Gesamte Reduktion			0,11		0,16					
Met.wahrsch.Beschattung			55		16					

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

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



Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ AQ - Stallbusch 14, Haaren (WA-MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	Juli	August	September	Oktober	November	Dezember	
1	05:12	05:48	06:37	07:25	07:18	08:08	15:12 (WP KLUS-33)
	21:47	21:15	20:14	19:05	17:00	16:20	23 15:35 (WP KLUS-33)
2	05:12	05:49	06:38	07:26	07:19	08:09	15:12 (WP KLUS-33)
	21:46	21:14	20:12	19:03	16:58	16:20	22 15:34 (WP KLUS-33)
3	05:13	05:51	06:40	07:28	07:21	08:11	15:13 (WP KLUS-33)
	21:46	21:12	20:10	19:01	16:56	16:19	22 15:35 (WP KLUS-33)
4	05:14	05:52	06:41	07:30	07:23	08:12	15:13 (WP KLUS-33)
	21:45	21:10	20:07	18:59	16:55	16:19	22 15:35 (WP KLUS-33)
5	05:15	05:54	06:43	07:31	07:25	08:13	15:14 (WP KLUS-33)
	21:45	21:09	20:05	18:56	16:53	16:18	22 15:36 (WP KLUS-33)
6	05:15	05:55	06:45	07:33	07:27	08:15	15:15 (WP KLUS-33)
	21:45	21:07	20:03	18:54	16:51	16:18	21 15:36 (WP KLUS-33)
7	05:16	05:57	06:46	07:35	07:28	08:16	15:15 (WP KLUS-33)
	21:44	21:05	20:01	18:52	16:50	16:17	21 15:36 (WP KLUS-33)
8	05:17	05:58	06:48	07:36	07:30	08:17	09:19 (WP Hirsch-18)
	21:43	21:03	19:58	18:50	16:48	16:17	24 15:36 (WP KLUS-33)
9	05:18	06:00	06:49	07:38	07:32	08:18	09:18 (WP Hirsch-18)
	21:43	21:01	19:56	18:47	16:46	16:17	27 15:37 (WP KLUS-33)
10	05:19	06:01	06:51	07:40	07:34	08:19	09:17 (WP Hirsch-18)
	21:42	21:00	19:54	18:45	16:45	16:17	30 15:37 (WP KLUS-33)
11	05:20	06:03	06:53	07:41	07:35	08:21	09:17 (WP Hirsch-18)
	21:41	20:58	19:52	18:43	16:43	16:16	30 15:37 (WP KLUS-33)
12	05:21	06:05	06:54	07:43	07:37	08:22	09:16 (WP Hirsch-18)
	21:40	20:56	19:49	18:41	16:42	16:16	32 15:37 (WP KLUS-33)
13	05:22	06:06	06:56	07:45	07:39	08:23	09:16 (WP Hirsch-18)
	21:40	20:54	19:47	18:39	16:40	16:16	33 15:38 (WP KLUS-33)
14	05:23	06:08	06:57	07:46	07:41	08:24	09:16 (WP Hirsch-18)
	21:39	20:52	19:45	18:36	16:39	16:16	34 15:38 (WP KLUS-33)
15	05:25	06:09	06:59	07:48	07:42	08:24	09:16 (WP Hirsch-18)
	21:38	20:50	19:42	18:34	16:37	16:16	34 15:38 (WP KLUS-33)
16	05:26	06:11	07:01	07:50	07:44	08:25	09:17 (WP Hirsch-18)
	21:37	20:48	19:40	18:32	16:36	16:16	34 15:39 (WP KLUS-33)
17	05:27	06:13	07:02	07:52	07:46	08:26	09:16 (WP Hirsch-18)
	21:36	20:46	19:38	18:30	16:35	16:17	34 15:38 (WP KLUS-33)
18	05:28	06:14	07:04	07:53	07:47	08:27	09:17 (WP Hirsch-18)
	21:35	20:44	19:35	18:28	16:33	16:17	34 15:39 (WP KLUS-33)
19	05:29	06:16	07:05	07:55	07:49	08:28	09:17 (WP Hirsch-18)
	21:33	20:42	19:33	18:26	16:32	16:17	36 15:40 (WP KLUS-33)
20	05:31	06:17	07:07	07:57	07:51	08:28	09:17 (WP Hirsch-18)
	21:32	20:40	19:31	18:24	16:31	16:17	35 15:39 (WP KLUS-33)
21	05:32	06:19	07:09	07:58	07:52	08:29	09:18 (WP Hirsch-18)
	21:31	20:38	19:28	18:22	16:30	16:18	35 15:40 (WP KLUS-33)
22	05:33	06:21	07:10	08:00	07:54	08:29	09:18 (WP Hirsch-18)
	21:30	20:36	19:26	18:20	16:29	16:18	35 15:40 (WP KLUS-33)
23	05:35	06:22	07:12	08:02	07:56	08:30	09:19 (WP Hirsch-18)
	21:29	20:34	19:24	18:17	16:27	16:19	35 15:41 (WP KLUS-33)
24	05:36	06:24	07:13	08:04	07:57	08:30	09:19 (WP Hirsch-18)
	21:27	20:32	19:22	18:15	16:26	16:19	36 15:42 (WP KLUS-33)
25	05:37	06:25	07:15	07:05	07:59	08:31	09:20 (WP Hirsch-18)
	21:26	20:29	19:19	17:13	16:25	16:20	34 15:42 (WP KLUS-33)
26	05:39	06:27	07:17	07:07	08:01	08:31	09:21 (WP Hirsch-18)
	21:24	20:27	19:17	17:12	16:24	16:21	34 15:43 (WP KLUS-33)
27	05:40	06:29	07:18	07:09	08:02	08:31	09:22 (WP Hirsch-18)
	21:23	20:25	19:15	17:10	16:24	16:22	34 15:44 (WP KLUS-33)
28	05:42	06:30	07:20	07:11	08:04	08:31	09:22 (WP Hirsch-18)
	21:22	20:23	19:12	17:08	16:23	16:22	34 15:44 (WP KLUS-33)
29	05:43	06:32	07:21	07:12	08:05	08:32	09:23 (WP Hirsch-18)
	21:20	20:21	19:10	17:06	16:22	16:23	34 15:45 (WP KLUS-33)
30	05:45	06:33	07:23	07:14	08:07	08:32	09:24 (WP Hirsch-18)
	21:19	20:19	19:08	17:04	16:21	16:24	32 15:45 (WP KLUS-33)
31	05:46	06:35	07:24	07:16	08:08	08:32	09:25 (WP Hirsch-18)
	21:17	20:16	19:07	17:02	16:20	16:25	32 15:46 (WP KLUS-33)
Sonnenscheinstunden	500	453	381	332	268	246	
astr.max.mögl.Beschattung					340		945
Red.Sonnenscheinwahrsch.					0,23		0,17
Reduktion Betriebsdauer					0,84		0,84
Reduktion Windrichtung					0,66		0,65
Gesamte Reduktion					0,13		0,09
Met.wahrsch.Beschattung					43		87

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt: <b>Schattenwurf Bad Wünnenb.-Hirschweg</b>	Beschreibung: <b>Auftraggeber:</b>  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	Lizenzierter Anwender: <b>Power of Nature - Windenergie</b> Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ C - Windmühlenweg 2, Haaren (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPPSPRINGE]  
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor  
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember		
1	08:32		07:13	07:03	05:59	05:15	05:12	05:48	06:37	07:25	07:18	08:08		
2	08:32	18 15:33 (WP KLUS-31)	17:13	18:04	19:57	20:48	21:33	21:47	21:15	20:14	19:05	17:00	16:20	
3	16:27	13 15:32 (WP KLUS-31)	17:15	18:06	19:59	20:49	21:34	21:46	21:14	20:12	19:03	16:58	16:20	
4	08:32	7 15:31 (WP KLUS-31)	17:17	18:08	20:01	20:51	21:35	21:46	21:12	20:10	19:01	16:56	16:19	
5	08:31		08:01	07:06	06:56	05:53	05:12	05:14	05:52	06:41	07:30	07:23	08:12	
6	16:30		17:19	18:10	20:03	20:53	21:36	21:45	21:10	20:07	18:59	16:55	16:19	
7	08:31		07:59	07:04	06:54	05:52	05:12	05:15	05:54	06:43	07:31	07:25	08:13	
8	16:31		17:21	18:11	20:04	20:54	21:37	21:45	21:09	20:05	18:56	16:53	16:18	
9	08:31		07:58	07:02	06:52	05:50	05:11	05:15	05:55	06:45	07:33	07:27	08:15	
10	16:32		17:23	18:13	20:06	20:56	21:38	21:44	21:07	20:03	18:54	16:51	16:18	
11	08:30		07:56	07:00	06:50	05:48	05:10	05:16	05:57	06:46	07:35	07:28	08:16	
12	16:33		17:24	18:15	20:08	20:57	21:39	21:44	21:05	20:01	18:52	16:50	16:17	
13	08:30		07:54	06:58	06:47	05:46	05:10	05:17	05:58	06:48	07:36	07:30	08:17	
14	16:34		17:26	18:17	20:09	20:59	21:40	21:43	21:03	19:58	18:50	16:48	16:17	
15	08:30		07:52	06:55	06:45	05:45	05:09	05:18	06:00	06:49	07:38	07:32	08:18	
16	16:36		17:28	18:18	20:11	21:01	21:40	21:43	21:01	19:56	18:47	16:46	16:17	
17	08:29		07:51	06:53	06:43	05:43	05:09	05:19	06:01	06:51	07:40	07:34	08:19	
18	16:37		17:30	18:20	20:13	21:02	21:41	21:42	21:00	19:54	18:45	16:45	16:16	
19	08:28		07:49	06:51	06:41	05:41	05:09	05:20	06:03	06:52	07:41	07:35	08:21	
20	16:39		17:32	18:22	20:14	21:04	21:42	21:41	20:58	19:51	18:43	16:43	16:16	
21	08:28		07:47	06:49	06:38	05:40	05:08	05:21	06:05	06:54	07:43	07:37	08:22	
22	16:40		17:34	18:24	20:16	21:05	21:43	21:40	20:56	19:49	18:41	16:42	16:16	
23	08:27		07:45	06:46	06:36	05:38	05:08	05:22	06:06	06:56	07:45	07:39	08:23	
24	16:41		17:35	18:25	20:18	21:07	21:43	21:40	20:54	19:47	18:39	16:40	16:16	
25	08:26		07:43	06:44	06:34	05:36	05:08	05:23	06:08	06:57	07:46	07:41	08:22	
26	16:43		17:37	18:27	20:19	21:08	21:44	21:39	20:52	19:45	18:36	16:39	16:16	
27	08:26		07:41	06:42	06:32	05:35	05:08	05:25	06:09	06:59	07:48	07:42	08:24	
28	16:44		17:39	18:29	20:21	21:10	21:44	21:38	20:50	19:42	18:34	16:37	16:16	
29	08:25		07:39	06:40	06:30	05:33	05:07	05:26	06:11	07:00	07:50	07:44	08:25	
30	16:46		17:41	18:30	20:23	21:11	21:45	21:37	20:48	19:40	18:32	16:36	16:16	
31	08:24		07:38	06:37	06:28	05:32	05:07	05:27	06:13	07:02	07:51	07:46	08:26	
32	16:48		17:43	18:32	20:24	21:13	21:45	21:36	20:46	19:38	18:30	16:35	16:17	
33	08:23		07:36	06:35	06:25	05:31	05:07	05:28	06:14	07:04	07:53	07:47	08:27	
34	16:49		17:45	18:34	20:26	21:14	21:46	21:35	20:44	19:35	18:28	16:33	16:17	
35	08:22		07:34	06:33	06:23	05:29	05:07	05:29	06:16	07:05	07:55	07:49	08:27	
36	16:51		17:46	18:36	20:28	21:16	21:46	21:33	20:42	19:33	18:26	16:32	16:17	
37	08:21		07:32	06:30	06:21	05:28	05:07	05:31	06:17	07:07	07:57	07:51	08:28	
38	16:52		17:48	18:37	20:29	21:17	21:47	21:32	20:40	19:31	18:24	16:31	16:17	
39	08:20		07:30	06:28	06:19	05:26	05:08	05:32	06:19	07:08	07:58	07:52	08:29	
40	16:54		17:50	18:39	20:31	21:19	21:47	21:31	20:38	19:28	18:22	16:30	16:18	
41	08:19		07:28	06:26	06:17	05:25	05:08	05:33	06:20	07:10	08:00	07:54	08:29	
42	16:56		17:52	18:41	20:33	21:20	21:47	21:30	20:36	19:26	18:19	16:28	16:18	
43	08:18		07:26	06:24	06:15	05:24	05:08	05:35	06:22	07:12	08:02	07:56	08:30	
44	16:58		17:54	18:42	20:34	21:21	21:47	21:29	20:34	19:24	18:17	16:27	16:19	
45	08:16		07:23	06:21	06:13	05:23	05:08	05:36	06:24	07:13	08:04	07:57	08:30	
46	16:59		17:55	18:44	20:36	21:23	21:47	21:27	20:32	19:21	18:15	16:26	16:19	
47	08:15		07:21	06:19	06:11	05:22	05:09	05:37	06:25	07:15	07:05	07:59	08:31	
48	17:01		17:57	18:46	20:38	21:24	21:47	21:26	20:29	19:19	17:13	16:25	16:20	
49	08:14		07:19	06:17	06:09	05:20	05:09	05:39	06:27	07:17	07:07	08:00	08:31	
50	17:03		17:59	18:47	20:39	21:25	21:47	21:24	20:27	19:17	17:11	16:24	16:21	
51	08:13		07:17	06:14	06:07	05:19	05:09	05:40	06:29	07:18	07:09	08:02	08:31	
52	17:04		18:01	18:49	20:41	21:27	21:47	21:23	20:25	19:15	17:10	16:24	16:21	
53	08:11		07:15	06:12	06:05	05:18	05:10	05:42	06:30	07:20	07:11	08:04	08:31	
54	17:06		18:03	18:51	20:43	21:28	21:47	21:22	20:23	19:12	17:08	16:23	16:22	
55	08:10		07:10	06:03	05:17	05:10	05:43	06:32	07:21	07:12	08:05	08:32	09:09	
56	17:08		19:52	20:44	21:29	21:47	21:20	20:21	19:10	17:06	16:22	16:23	16:23	
57	08:08		07:08	06:01	05:16	05:11	05:45	06:33	07:23	07:14	08:07	08:32	09:30	
58	17:10		19:54	20:46	21:30	21:47	21:18	20:19	19:08	17:04	16:21	16:24	16:24	
59	08:07		07:05	06:05	05:15	05:15	05:46	06:35	07:25	07:16	08:02	08:32	09:31	
60	17:12		19:56	21:32	21:32	21:32	21:17	20:16	17:02	16:02	16:25	16:25	16:25	
61	Sonnenscheinstunden	260	278	367	415	484	497	500	453	381	332	268	246	536
62	astr. max. mögl. Beschattung													0,17
63	Red. Sonnenscheinwahrsch.													0,84
64	Reduktion Betriebsdauer													0,62
65	Reduktion Windrichtung													0,10
66	Gesamte Reduktion													0,62
67	Met. wahrsch. Beschattung													0,09
68														47

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

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

<b>Projekt:</b> Schattenwurf Bad Wünnenb.-Hirschweg	<b>Beschreibung:</b> <b>Auftraggeber:</b>  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	<b>Lizenzierter Anwender:</b> Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
--	---	---

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ D - Windmühlenweg 16, Haaren (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

### Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Januar	Februar	März	April	Mai	Juni		
1	08:32	15:39 (WP KLUS-31)	08:06	07:13	07:03	05:59	05:15	
	16:26	13	15:52 (WP KLUS-31)	17:13	18:04	19:57	20:48	21:33
2	08:32	15:38 (WP KLUS-31)	08:04	07:11	07:01	05:57	05:14	
	16:27	15	15:53 (WP KLUS-31)	17:15	18:06	19:59	20:49	21:34
3	08:32	15:39 (WP KLUS-31)	08:02	07:09	06:59	05:55	05:13	
	16:28	14	15:53 (WP KLUS-31)	17:17	18:08	20:01	20:51	21:35
4	08:31	15:40 (WP KLUS-31)	08:01	07:06	06:56	05:53	05:12	
	16:29	14	15:54 (WP KLUS-31)	17:19	18:10	20:03	20:53	21:36
5	08:31	15:40 (WP KLUS-31)	07:59	07:04	06:54	05:52	05:12	
	16:31	14	15:54 (WP KLUS-31)	17:21	18:11	20:04	20:54	21:37
6	08:31	15:41 (WP KLUS-31)	07:58	07:02	06:52	05:50	05:11	
	16:32	14	15:55 (WP KLUS-31)	17:23	18:13	20:06	20:56	21:38
7	08:30	15:41 (WP KLUS-31)	07:56	07:00	06:50	05:48	05:10	
	16:33	13	15:54 (WP KLUS-31)	17:24	18:15	20:08	20:57	21:39
8	08:30	15:42 (WP KLUS-31)	07:54	06:58	06:47	05:46	05:10	
	16:34	13	15:55 (WP KLUS-31)	17:26	18:17	20:09	20:59	21:40
9	08:30	15:42 (WP KLUS-31)	07:52	06:55	06:45	05:45	05:09	
	16:36	13	15:55 (WP KLUS-31)	17:28	18:18	20:11	21:01	21:40
10	08:29	15:43 (WP KLUS-31)	07:51	06:53	06:43	05:43	05:09	
	16:37	12	15:55 (WP KLUS-31)	17:30	18:20	20:13	21:02	21:41
11	08:28	15:45 (WP KLUS-31)	07:49	06:51	06:41	05:41	05:09	
	16:39	10	15:55 (WP KLUS-31)	17:32	18:22	20:14	21:04	21:42
12	08:28	15:45 (WP KLUS-31)	07:47	06:49	06:38	05:40	05:08	
	16:40	10	15:55 (WP KLUS-31)	17:34	18:24	20:16	21:05	21:43
13	08:27	15:47 (WP KLUS-31)	07:45	06:46	06:36	05:38	05:08	
	16:41	7	15:54 (WP KLUS-31)	17:35	18:25	20:18	21:07	21:43
14	08:26	15:49 (WP KLUS-31)	07:43	06:44	06:34	05:36	05:08	
	16:43	4	15:53 (WP KLUS-31)	17:37	18:27	20:19	21:08	21:44
15	08:26		07:41	06:42	06:32	05:35	05:08	
	16:44		17:39	18:29	20:21	21:10	21:44	
16	08:25		07:39	06:40	06:30	05:33	05:07	
	16:46		17:41	18:30	20:23	21:11	21:45	
17	08:24		07:38	06:37	06:28	05:32	05:07	
	16:48		17:43	18:32	20:24	21:13	21:45	
18	08:23		07:36	06:35	06:25	05:31	05:07	
	16:49		17:45	18:34	20:26	21:14	21:46	
19	08:22		07:34	06:33	06:23	05:29	05:07	
	16:51		17:46	18:36	20:28	21:16	21:46	
20	08:21		07:32	06:30	06:21	05:28	05:07	
	16:52		17:48	18:37	20:29	21:17	21:46	
21	08:20		07:30	06:28	06:19	05:26	05:08	
	16:54		17:50	18:39	20:31	21:19	21:47	
22	08:19		07:28	06:26	06:17	05:25	05:08	
	16:56		17:52	18:41	20:33	21:20	21:47	
23	08:18		07:25	06:24	06:15	05:24	05:08	
	16:58		17:54	18:42	20:34	21:21	21:47	
24	08:16		07:23	06:21	06:13	05:23	05:08	
	16:59		17:55	18:44	20:36	21:23	21:47	
25	08:15		07:21	06:19	06:11	05:21	05:09	
	17:01		17:57	18:46	20:38	21:24	21:47	
26	08:14		07:19	06:17	06:09	05:20	05:09	
	17:03		17:59	18:47	20:39	21:25	21:47	
27	08:13		07:17	06:14	06:07	05:19	05:09	
	17:04		18:01	18:49	20:41	21:27	21:47	
28	08:11		07:15	06:12	06:05	05:18	05:10	
	17:06		18:03	18:51	20:43	21:28	21:47	
29	08:10			07:10	06:03	05:17	05:10	
	17:08			19:52	20:44	21:29	21:47	
30	08:08			07:08	06:01	05:16	05:11	
	17:10			19:54	20:46	21:30	21:47	
31	08:07			07:05		05:15		
	17:12			19:56		21:32		
Sonnenscheinstunden	260	278	367	415	484	497		
astr.max.mögl.Beschattung	166							
Red.Sonnenscheinwahrsch.	0,19							
Reduktion Betriebsdauer	0,84							
Reduktion Windrichtung	0,70							
Gesamte Reduktion	0,11							
Met.wahrsch.Beschattung	18							

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

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

Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ D - Windmühlenweg 16, Haaren (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	Juli	August	September	Oktober	November	Dezember	
1	05:12	05:48	06:37	07:25	07:18	08:08	15:27 (WP KLUS-31)
	21:47	21:15	20:14	19:05	17:00	16:20	10 15:37 (WP KLUS-31)
2	05:12	05:49	06:38	07:26	07:19	08:09	15:26 (WP KLUS-31)
	21:46	21:14	20:12	19:03	16:58	16:20	12 15:38 (WP KLUS-31)
3	05:13	05:51	06:40	07:28	07:21	08:11	15:27 (WP KLUS-31)
	21:46	21:12	20:10	19:01	16:56	16:19	12 15:39 (WP KLUS-31)
4	05:14	05:52	06:41	07:30	07:23	08:12	15:26 (WP KLUS-31)
	21:45	21:10	20:07	18:59	16:55	16:19	13 15:39 (WP KLUS-31)
5	05:15	05:54	06:43	07:31	07:25	08:13	15:26 (WP KLUS-31)
	21:45	21:09	20:05	18:56	16:53	16:18	13 15:39 (WP KLUS-31)
6	05:15	05:55	06:44	07:33	07:27	08:15	15:27 (WP KLUS-31)
	21:44	21:07	20:03	18:54	16:51	16:18	14 15:41 (WP KLUS-31)
7	05:16	05:57	06:46	07:35	07:28	08:16	15:27 (WP KLUS-31)
	21:44	21:05	20:01	18:52	16:50	16:17	14 15:41 (WP KLUS-31)
8	05:17	05:58	06:48	07:36	07:30	08:17	15:27 (WP KLUS-31)
	21:43	21:03	19:58	18:50	16:48	16:17	14 15:41 (WP KLUS-31)
9	05:18	06:00	06:49	07:38	07:32	08:18	15:28 (WP KLUS-31)
	21:43	21:01	19:56	18:47	16:46	16:17	14 15:42 (WP KLUS-31)
10	05:19	06:01	06:51	07:40	07:34	08:19	15:28 (WP KLUS-31)
	21:42	21:00	19:54	18:45	16:45	16:16	15 15:43 (WP KLUS-31)
11	05:20	06:03	06:52	07:41	07:35	08:20	15:29 (WP KLUS-31)
	21:41	20:58	19:51	18:43	16:43	16:16	13 15:42 (WP KLUS-31)
12	05:21	06:05	06:54	07:43	07:37	08:22	15:29 (WP KLUS-31)
	21:40	20:56	19:49	18:41	16:42	16:16	13 15:42 (WP KLUS-31)
13	05:22	06:06	06:56	07:45	07:39	08:23	15:30 (WP KLUS-31)
	21:39	20:54	19:47	18:39	16:40	16:16	12 15:42 (WP KLUS-31)
14	05:23	06:08	06:57	07:46	07:41	08:23	15:30 (WP KLUS-31)
	21:39	20:52	19:45	18:36	16:39	16:16	12 15:42 (WP KLUS-31)
15	05:25	06:09	06:59	07:48	07:42	08:24	15:31 (WP KLUS-31)
	21:38	20:50	19:42	18:34	16:37	16:16	11 15:42 (WP KLUS-31)
16	05:26	06:11	07:00	07:50	07:44	08:25	15:32 (WP KLUS-31)
	21:37	20:48	19:40	18:32	16:36	16:16	10 15:42 (WP KLUS-31)
17	05:27	06:13	07:02	07:51	07:46	08:26	15:31 (WP KLUS-31)
	21:36	20:46	19:38	18:30	16:35	16:17	11 15:42 (WP KLUS-31)
18	05:28	06:14	07:04	07:53	07:47	08:27	15:32 (WP KLUS-31)
	21:35	20:44	19:35	18:28	16:33	16:17	10 15:42 (WP KLUS-31)
19	05:29	06:16	07:05	07:55	07:49	08:27	15:33 (WP KLUS-31)
	21:33	20:42	19:33	18:26	16:32	16:17	10 15:43 (WP KLUS-31)
20	05:31	06:17	07:07	07:57	07:51	08:28	15:33 (WP KLUS-31)
	21:32	20:40	19:31	18:24	16:31	16:17	9 15:42 (WP KLUS-31)
21	05:32	06:19	07:08	07:58	07:52	08:29	15:34 (WP KLUS-31)
	21:31	20:38	19:28	18:22	16:30	16:18	9 15:43 (WP KLUS-31)
22	05:33	06:20	07:10	08:00	07:54	08:29	15:34 (WP KLUS-31)
	21:30	20:36	19:26	18:19	16:28	16:18	9 15:43 (WP KLUS-31)
23	05:35	06:22	07:12	08:02	07:56	08:30	15:35 (WP KLUS-31)
	21:28	20:34	19:24	18:17	16:27	16:19	9 15:44 (WP KLUS-31)
24	05:36	06:24	07:13	08:04	07:57	08:30	15:35 (WP KLUS-31)
	21:27	20:31	19:21	18:15	16:26	16:19	10 15:45 (WP KLUS-31)
25	05:37	06:25	07:15	07:05	07:59	08:31	15:35 (WP KLUS-31)
	21:26	20:29	19:19	17:13	16:25	16:20	10 15:45 (WP KLUS-31)
26	05:39	06:27	07:17	07:07	08:00	08:31	15:36 (WP KLUS-31)
	21:24	20:27	19:17	17:11	16:24	16:21	10 15:46 (WP KLUS-31)
27	05:40	06:28	07:18	07:09	08:02	08:31	15:36 (WP KLUS-31)
	21:23	20:25	19:15	17:10	16:23	16:21	11 15:47 (WP KLUS-31)
28	05:42	06:30	07:20	07:11	08:04	08:31	15:37 (WP KLUS-31)
	21:22	20:23	19:12	17:08	16:23	4 15:29 (WP KLUS-31)	08:31 15:33 (WP KLUS-31) 16:22 11 15:48 (WP KLUS-31)
29	05:43	06:32	07:21	07:12	08:05	7 15:28 (WP KLUS-31)	08:32 15:37 (WP KLUS-31)
	21:20	20:21	19:10	17:06	16:22	7 15:35 (WP KLUS-31)	16:23 12 15:49 (WP KLUS-31)
30	05:45	06:33	07:23	07:14	08:07	9 15:27 (WP KLUS-31)	08:32 15:38 (WP KLUS-31)
	21:18	20:19	19:08	17:04	16:21	9 15:36 (WP KLUS-31)	16:24 12 15:50 (WP KLUS-31)
31	05:46	06:35	07:24	07:16	08:08	08:32	15:38 (WP KLUS-31)
	21:17	20:16	19:07	17:02	16:20	13 15:51 (WP KLUS-31)	16:25
Sonnenscheinstunden	500	453	381	332	268	246	358
astr.max.mögl.Beschattung					20		0,17
Red.Sonnenscheinwahrsch.					0,23		0,84
Reduktion Betriebsdauer					0,84		0,70
Reduktion Windrichtung					0,70		0,10
Gesamte Reduktion					0,13		36
Met.wahrsch.Beschattung					3		

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt: Schattenwurf Bad Wünnenb.-Hirschweg  
 Beschreibung: Auftraggeber: WBG Energie 1 GmbH & Co. KG  
 An der Grotte 17  
 D-33181 Bad Wünnenberg  
 Bundesland des Projekts: Nordrhein-Westfalen  
 Lizenzierter Anwender: Power of Nature - Windenergie  
 Aulendorf 40  
 DE-48727 Billerbeck  
 02543 9304674  
 Fürtges / joerg.fuertges@powernature.de  
 Berechnet: 21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ E - Windmühlenweg 20, Haaren (MI)

Annahmen für Schattenwurfberechnung  
 Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]  
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
 1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

### Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
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1	08:32 16:26	08:06 17:13	07:13 18:04	07:03 19:57	05:59 20:48	05:15 21:33	05:12 21:47	05:48 21:15	06:36 20:14	07:25 19:05	07:18 17:00	08:08 16:20
2	08:32 16:27	08:04 17:15	07:11 18:06	07:01 19:59	05:57 20:49	05:14 21:34	05:12 21:46	05:49 21:14	06:38 20:12	07:26 19:03	07:19 16:58	08:09 16:20
3	08:32 16:28	08:02 17:17	07:09 18:08	06:59 20:01	05:55 20:51	05:13 21:35	05:13 21:46	05:51 21:12	06:40 20:10	07:28 19:01	07:21 16:56	08:11 16:19
4	08:31 16:29	08:01 17:19	07:06 18:10	06:56 20:03	05:53 20:53	05:12 21:36	05:14 21:45	05:52 21:10	06:41 20:07	07:30 18:59	07:23 16:55	08:12 16:19
5	08:31 16:31	07:59 17:21	07:04 18:11	06:54 20:04	05:52 20:54	05:12 21:37	05:15 21:45	05:54 21:09	06:43 20:05	07:31 18:56	07:25 16:53	08:13 16:18
6	08:31 16:32	07:58 17:23	07:02 18:13	06:52 20:06	05:50 20:56	05:11 21:38	05:15 21:44	05:55 21:07	06:44 20:03	07:33 18:54	07:27 16:51	08:15 16:18
7	08:30 16:33	07:56 17:24	07:00 18:15	06:50 20:08	05:48 20:57	05:10 21:39	05:16 21:44	05:57 21:05	06:46 20:01	07:35 18:52	07:28 16:50	08:16 16:17
8	08:30 16:34	07:54 17:26	06:58 18:17	06:47 20:09	05:46 20:59	05:10 21:40	05:17 21:43	05:58 21:03	06:48 19:58	07:36 18:50	07:30 16:48	08:17 16:17
9	08:30 16:36	07:52 17:28	06:55 18:18	06:45 20:11	05:45 21:01	05:09 21:40	05:18 21:43	06:00 21:01	06:49 19:56	07:38 18:47	07:32 16:46	08:18 16:17
10	08:29 16:37	07:51 17:30	06:53 18:20	06:43 20:13	05:43 21:02	05:09 21:41	05:19 21:42	06:01 21:00	06:51 19:54	07:40 18:45	07:34 16:45	08:19 16:16
11	08:28 16:39	07:49 17:32	06:51 18:22	06:41 20:14	05:41 21:04	05:09 21:42	05:20 21:41	06:03 20:58	06:52 19:51	07:41 18:43	07:35 16:43	08:20 16:16
12	08:28 16:40	07:47 17:34	06:49 18:24	06:38 20:16	05:40 21:05	05:08 21:43	05:21 21:40	06:05 20:56	06:54 19:49	07:43 18:41	07:37 16:42	08:22 16:16
13	08:27 16:41	07:45 17:35	06:46 18:25	06:36 20:18	05:38 21:07	05:08 21:43	05:22 21:39	06:06 20:54	06:56 19:47	07:45 18:39	07:39 16:40	08:23 16:16
14	08:26 16:43	07:43 17:37	06:44 18:27	06:34 20:19	05:36 21:08	05:08 21:44	05:23 21:39	06:08 20:52	06:57 19:45	07:46 18:36	07:41 16:39	08:23 16:16
15	08:26 16:44	07:41 17:39	06:42 18:29	06:32 20:21	05:35 21:10	05:08 21:44	05:25 21:38	06:09 20:50	06:59 19:42	07:48 18:34	07:42 16:37	08:24 16:16
16	08:25 16:46	07:39 17:41	06:40 18:30	06:30 20:23	05:33 21:11	05:07 21:45	05:26 21:37	06:11 20:48	07:00 19:40	07:50 18:32	07:44 16:36	08:25 16:16
17	08:24 16:48	07:38 17:43	06:37 18:32	06:28 20:24	05:32 21:13	05:07 21:45	05:27 21:36	06:13 20:46	07:02 19:38	07:51 18:30	07:46 16:35	08:26 16:17
18	08:23 16:49	07:36 17:45	06:35 18:34	06:25 20:26	05:30 21:14	05:07 21:46	05:28 21:35	06:14 20:44	07:04 19:35	07:53 18:28	07:47 16:33	08:27 16:17
19	08:22 16:51	07:34 17:46	06:33 18:36	06:23 20:28	05:29 21:16	05:07 21:46	05:29 21:33	06:16 20:42	07:05 19:33	07:55 18:26	07:49 16:32	08:27 16:17
20	08:21 16:52	07:32 17:48	06:30 18:37	06:21 20:29	05:28 21:17	05:07 21:46	05:31 21:32	06:17 20:40	07:07 19:31	07:57 18:24	07:51 16:31	08:28 16:17
21	08:20 16:54	07:30 17:50	06:28 18:39	06:19 20:31	05:26 21:19	05:08 21:47	05:32 21:31	06:19 20:38	07:08 19:28	07:58 18:22	07:52 16:30	08:29 16:18
22	08:19 16:56	07:28 17:52	06:26 18:41	06:17 20:33	05:25 21:20	05:08 21:47	05:33 21:30	06:20 20:36	07:10 19:26	08:00 18:19	07:54 16:28	08:29 16:18
23	08:18 16:58	07:25 17:54	06:24 18:42	06:15 20:34	05:24 21:21	05:08 21:47	05:35 21:28	06:22 20:34	07:12 19:24	08:02 18:17	07:56 16:27	08:30 16:19
24	08:16 16:59	07:23 17:55	06:21 18:44	06:13 20:36	05:23 21:23	05:08 21:47	05:36 21:27	06:24 20:31	07:13 19:21	08:04 18:15	07:57 16:26	08:30 16:19
25	08:15 17:01	07:21 17:57	06:19 18:46	06:11 20:38	05:21 21:24	05:09 21:47	05:37 21:26	06:25 20:29	07:15 19:19	07:05 17:13	07:59 16:25	08:31 16:20
26	08:14 17:03	07:19 17:59	06:17 18:47	06:09 20:39	05:20 21:25	05:09 21:47	05:39 21:24	06:27 20:27	07:17 19:17	07:07 17:11	08:00 16:24	08:31 16:21
27	08:13 17:04	07:17 18:01	06:14 18:49	06:07 20:41	05:19 21:27	05:09 21:47	05:40 21:23	06:28 20:25	07:18 19:15	07:09 17:09	08:02 16:23	08:31 16:21
28	08:11 17:06	07:15 18:03	06:12 18:51	06:05 20:43	05:18 21:28	05:10 21:47	05:42 21:22	06:30 20:23	07:20 19:12	07:11 17:08	08:04 16:23	08:31 16:22
29	08:10 17:08		07:10 19:52	06:03 20:44	05:17 21:29	05:10 21:47	05:43 21:20	06:32 20:21	07:21 19:10	07:12 17:06	08:05 16:22	08:32 16:23
30	08:08 17:10		07:08 19:54	06:01 20:46	05:16 21:30	05:11 21:47	05:45 21:18	06:33 20:18	07:23 19:08	07:14 17:04	08:07 16:21	08:32 16:24
31	08:07 17:12		07:05 19:56	05:15 21:32	05:15 21:32	05:15 21:17	05:46 21:17	06:35 20:16	07:16 17:02	07:16 17:02	08:08 16:25	08:32 16:25
Sonnenscheinstunden	260	278	367	415	484	497	500	453	381	332	268	246
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

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

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

Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:

Auftraggeber: WBG Energie 1 GmbH & Co. KG
An der Grotte 17
D-33181 Bad Wünnenberg
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:

Power of Nature - Windenergie
Aulendorf 40
DE-48727 Billerbeck
02543 9304674
Fürtges / joerg.fuertges@powernature.de
Berechnet: 21.05.2024 09:58/3.6.366

SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ F - Windmühlenweg 24, Haaren (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Table with 12 columns (Jan to Dez) and 1 row of values: 1,58, 3,21, 3,35, 5,03, 6,68, 5,58, 6,26, 5,85, 4,04, 3,08, 2,01, 1,34

Betriebsdauer je Sektor

Table with 13 columns (N, NNO, ONO, O, OSO, SSO, S, SSW, WSW, W, WNW, NNW, Summe) and 1 row of values: 261, 393, 465, 559, 645, 572, 869, 1.140, 1.059, 606, 326, 7.370

Main table with columns for months (Januar to Dezember) and rows for each hour from 08:32 to 17:12. Includes summary rows for 'Sonnenscheinstunden', 'astr. max. mögl. Beschattung', 'Red. Sonnenscheinwahrsch.', 'Reduktion Betriebsdauer', 'Reduktion Windrichtung', 'Gesamte Reduktion', and 'Met. wahrsch. Beschattung'.

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

Table with 3 columns: Tag im Monat, Sonnenaufgang (SS:MM) / Sonnenuntergang (SS:MM), and Zeitpunkt (SS:MM) Schattenanfang / Zeitpunkt (SS:MM) Schattende (WEA mit erstem/letztem Schatten)

<b>Projekt:</b> Schattenwurf Bad Wünnenb.-Hirschweg	<b>Beschreibung:</b> Auftraggeber: WBG Energie 1 GmbH & Co. KG An der Grotte 17 D-33181 Bad Wünnenberg Bundesland des Projekts: Nordrhein-Westfalen	<b>Lizenzierter Anwender:</b> Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ G - Grüner Weg 1, Haaren (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

### Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

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

Sonnenscheinstunden	261		278		367	415	484	497
astr.max.mögl.Beschattung		539		3				
Red.Sonnenscheinwahrsch.		0,19		0,32				
Reduktion Betriebsdauer		0,84		0,84				
Reduktion Windrichtung		0,67		0,58				
Gesamte Reduktion		0,11		0,16				
Met.wahrsch.Beschattung		57		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 (WEA mit erstem Schatten)
	Sonnenuntergang (SS:MM)	Minuten mit Schatten
		Zeitpunkt (SS:MM) Schattende (WEA mit letztem Schatten)



## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ G - Grüner Weg 1, Haaren (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPPSRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Juli	August	September	Oktober	November	Dezember						
1	05:12 21:47	05:48 21:15	06:37 20:14	07:25 19:05	07:18 17:00							
2	05:12 21:46	05:49 21:14	06:38 20:12	07:26 19:03	07:19 16:58	20	08:09 15:19 (WP KLUS-33)					
3	05:13 21:46	05:51 21:12	06:40 20:10	07:28 19:01	07:21 16:56	20	08:11 15:20 (WP KLUS-33)					
4	05:14 21:45	05:52 21:10	06:41 20:07	07:30 18:59	07:23 16:55	20	08:12 15:20 (WP KLUS-33)					
5	05:15 21:45	05:54 21:09	06:43 20:05	07:31 18:56	07:25 16:53	19	08:13 15:21 (WP KLUS-33)					
6	05:15 21:45	05:55 21:07	06:45 20:03	07:33 18:54	07:27 16:51	19	08:15 15:21 (WP KLUS-33)					
7	05:16 21:44	05:57 21:05	06:46 20:01	07:35 18:52	07:28 16:50	19	08:16 15:21 (WP KLUS-33)					
8	05:17 21:43	05:58 21:03	06:48 19:58	07:36 18:50	07:30 16:48	19	08:17 15:22 (WP KLUS-33)					
9	05:18 21:43	06:00 21:01	06:49 19:56	07:38 18:47	07:32 16:46	18	08:18 15:23 (WP KLUS-33)					
10	05:19 21:42	06:01 21:00	06:51 19:54	07:40 18:45	07:34 16:45	18	08:19 15:24 (WP KLUS-33)					
11	05:20 21:41	06:03 20:58	06:53 19:51	07:41 18:43	07:35 16:43	17	08:21 (WP Hirsch-14) 08:23 (WP Hirsch-14)					
12	05:21 21:40	06:05 20:56	06:54 19:49	07:43 18:41	07:37 16:42	17	08:22 (WP Hirsch-14) 08:25 (WP Hirsch-14)					
13	05:22 21:40	06:06 20:54	06:56 19:47	07:45 18:39	07:39 16:40	16	08:25 (WP Hirsch-14) 08:27 (WP Hirsch-14)					
14	05:23 21:39	06:08 20:52	06:57 19:45	07:46 18:36	07:41 16:39	16	08:28 (WP Hirsch-14) 08:11 (WP Hirsch-14)					
15	05:25 21:38	06:09 20:50	06:59 19:42	07:48 18:34	07:42 16:37	16	08:28 (WP Hirsch-14) 08:14 (WP Hirsch-14)					
16	05:26 21:37	06:11 20:48	07:01 19:40	07:50 18:32	07:44 16:36	15	08:25 (WP Hirsch-14) 08:29 (WP Hirsch-14)					
17	05:27 21:36	06:13 20:46	07:02 19:38	07:52 18:30	07:46 16:35	14	08:26 (WP Hirsch-14) 08:30 (WP Hirsch-14)					
18	05:28 21:35	06:14 20:44	07:04 19:35	07:53 18:28	07:47 16:33	13	08:27 (WP Hirsch-14) 08:30 (WP Hirsch-14)					
19	05:29 21:33	06:16 20:42	07:05 19:33	07:55 18:26	07:49 16:32	13	08:28 (WP Hirsch-14) 15:26 (WP KLUS-33)					
20	05:31 21:32	06:17 20:40	07:07 19:31	07:57 18:24	07:51 16:31	13	08:28 (WP Hirsch-14) 15:30 (WP KLUS-33)					
21	05:32 21:31	06:19 20:38	07:09 19:28	07:58 18:22	07:52 16:30	13	08:29 (WP Hirsch-14) 15:32 (WP KLUS-33)					
22	05:33 21:30	06:21 20:36	07:10 19:26	08:00 18:20	07:54 16:29	13	08:29 (WP Hirsch-14) 15:33 (WP KLUS-33)					
23	05:35 21:29	06:22 20:34	07:12 19:24	08:02 18:17	07:56 16:27	13	08:30 (WP Hirsch-14) 15:34 (WP KLUS-33)					
24	05:36 21:27	06:24 20:32	07:13 19:21	08:04 18:15	07:57 16:26	14	08:30 (WP Hirsch-14) 15:35 (WP KLUS-33)					
25	05:37 21:26	06:25 20:29	07:15 19:19	08:05 18:13	07:59 16:25	14	15:18 (WP KLUS-33) 15:36 (WP KLUS-33)					
26	05:39 21:24	06:27 20:27	07:17 19:17	08:07 18:11	08:01 16:24	13	15:18 (WP KLUS-33) 15:37 (WP KLUS-33)					
27	05:40 21:23	06:29 20:25	07:18 19:15	08:09 18:10	08:02 16:24	14	15:17 (WP KLUS-33) 15:37 (WP KLUS-33)					
28	05:42 21:22	06:30 20:23	07:20 19:12	08:11 18:08	08:04 16:23	15	15:18 (WP KLUS-33) 15:37 (WP KLUS-33)					
29	05:43 21:20	06:32 20:21	07:21 19:10	08:12 18:06	08:05 16:22	16	15:18 (WP KLUS-33) 15:38 (WP KLUS-33)					
30	05:45 21:19	06:33 20:19	07:23 19:08	08:14 18:04	08:07 16:21	16	15:18 (WP KLUS-33) 15:38 (WP KLUS-33)					
31	05:46 21:17	06:35 20:16		08:16 18:02	07:16 17:02	16	08:32 16:25 15:50 (WP KLUS-33)					
Sonnenscheinstunden							500	453	381	332	268	246
astr.max.mögl.Beschattung											340	494
Red.Sonnenscheinwahrsch.											0,23	0,17
Reduktion Betriebsdauer											0,84	0,84
Reduktion Windrichtung											0,65	0,70
Gesamte Reduktion											0,12	0,10
Met.wahrsch.Beschattung											42	49

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

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

Projekt: <b>Schattenwurf Bad Wünnenb.-Hirschweg</b>	Beschreibung: Auftraggeber:  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	Lizenzierter Anwender: Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de <small>Berechnet:</small> 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ H - Kermelsgrund 1, Haaren (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

Januar		Februar		März		April		Mai		Juni	
1	08:32	09:32 (WP Hirsch-04(N))	08:06	08:31 (WP Hirsch-11)	07:13	17:09 (WP KLUS-21)	07:03	05:59	05:15		
	16:26	15:14 (WP KLUS-24)	17:14	14:41 (WP KLUS-33)	18:04	17:25 (WP KLUS-21)	19:58	20:48	21:33		
2	08:32	09:32 (WP Hirsch-04(N))	08:04	08:30 (WP Hirsch-11)	07:11	17:10 (WP KLUS-21)	07:01	05:57	05:14		
	16:27	15:14 (WP KLUS-24)	17:15	14:42 (WP KLUS-33)	18:06	17:25 (WP KLUS-21)	19:59	20:49	21:34		
3	08:32	09:34 (WP Hirsch-04(N))	08:02	08:28 (WP Hirsch-11)	07:09	17:10 (WP KLUS-21)	06:59	05:55	05:13		
	16:28	15:15 (WP KLUS-24)	17:17	14:41 (WP KLUS-33)	18:08	17:24 (WP KLUS-21)	20:01	20:51	21:35		
4	08:31	09:35 (WP Hirsch-04(N))	08:01	08:26 (WP Hirsch-11)	07:06	17:11 (WP KLUS-21)	06:56	05:54	05:12		
	16:30	15:16 (WP KLUS-24)	17:19	14:40 (WP KLUS-33)	18:10	17:24 (WP KLUS-21)	20:03	20:53	21:36		
5	08:31	09:36 (WP Hirsch-04(N))	07:59	08:25 (WP Hirsch-11)	07:04	17:11 (WP KLUS-21)	06:54	05:52	05:12		
	16:31	15:16 (WP KLUS-24)	17:21	14:40 (WP KLUS-33)	18:11	17:21 (WP KLUS-21)	20:04	20:54	21:37		
6	08:31	09:38 (WP Hirsch-04(N))	07:58	08:24 (WP Hirsch-11)	07:02	17:13 (WP KLUS-21)	06:52	05:50	05:11		
	16:32	15:18 (WP KLUS-24)	17:23	14:40 (WP KLUS-33)	18:13	17:19 (WP KLUS-21)	20:06	20:56	21:38		
7	08:30	09:39 (WP Hirsch-04(N))	07:56	08:23 (WP Hirsch-11)	07:00		06:50	05:48	05:10		
	16:33	15:18 (WP KLUS-24)	17:24	14:39 (WP KLUS-33)	18:15		20:08	20:57	21:39		
8	08:30	13:46 (WP KLUS-33)	07:54	08:23 (WP Hirsch-11)	06:58		06:47	05:46	05:10		
	16:35	15:19 (WP KLUS-24)	17:26	16:29 (WP KLUS-19)	18:17		20:09	20:59	21:40		
9	08:30	13:46 (WP KLUS-33)	07:52	08:23 (WP Hirsch-11)	06:55		06:45	05:45	05:09		
	16:36	15:19 (WP KLUS-24)	17:28	16:32 (WP KLUS-19)	18:18		20:11	21:01	21:40		
10	08:29	13:46 (WP KLUS-33)	07:51	08:23 (WP Hirsch-11)	06:53		06:43	05:43	05:09		
	16:37	15:21 (WP KLUS-24)	17:30	16:34 (WP KLUS-19)	18:20		20:13	21:02	21:41		
11	08:28	13:46 (WP KLUS-33)	07:49	08:24 (WP Hirsch-11)	06:51		06:41	05:41	05:09		
	16:39	15:21 (WP KLUS-24)	17:32	16:36 (WP KLUS-19)	18:22		20:14	21:04	21:42		
12	08:28	13:46 (WP KLUS-33)	07:47	08:12 (WP Hirsch-18)	06:49		06:38	05:40	05:08		
	16:40	15:21 (WP KLUS-24)	17:34	16:37 (WP KLUS-19)	18:24		20:16	21:05	21:43		
13	08:27	13:46 (WP KLUS-33)	07:45	08:10 (WP Hirsch-18)	06:46		06:36	05:38	05:08		
	16:42	15:22 (WP KLUS-24)	17:35	16:37 (WP KLUS-19)	18:25		20:18	21:07	21:43		
14	08:26	13:46 (WP KLUS-33)	07:43	08:08 (WP Hirsch-18)	06:44		06:34	05:37	05:08		
	16:43	15:22 (WP KLUS-24)	17:37	16:38 (WP KLUS-19)	18:27		20:19	21:08	21:44		
15	08:26	13:46 (WP KLUS-33)	07:41	08:06 (WP Hirsch-18)	06:42		06:32	05:35	05:08		
	16:45	15:22 (WP KLUS-24)	17:39	16:38 (WP KLUS-19)	18:29		20:21	21:10	21:44		
16	08:25	13:46 (WP KLUS-33)	07:40	08:04 (WP Hirsch-18)	06:40		06:30	05:34	05:08		
	16:46	15:23 (WP KLUS-24)	17:41	16:38 (WP KLUS-19)	18:31		20:23	21:11	21:45		
17	08:24	13:46 (WP KLUS-33)	07:38	08:02 (WP Hirsch-18)	06:37		06:28	05:32	05:07		
	16:48	15:23 (WP KLUS-24)	17:43	16:38 (WP KLUS-19)	18:32		20:24	21:13	21:45		
18	08:23	13:47 (WP KLUS-33)	07:36	08:00 (WP Hirsch-18)	06:35		06:25	05:31	05:07		
	16:49	15:23 (WP KLUS-24)	17:45	16:38 (WP KLUS-19)	18:34		20:26	21:14	21:46		
19	08:22	13:47 (WP KLUS-33)	07:34	07:58 (WP Hirsch-18)	06:33		06:23	05:29	05:07		
	16:51	15:24 (WP KLUS-24)	17:46	16:37 (WP KLUS-19)	18:36		20:28	21:16	21:46		
20	08:21	13:47 (WP KLUS-33)	07:32	07:57 (WP Hirsch-18)	06:31		06:21	05:28	05:08		
	16:53	15:24 (WP KLUS-24)	17:48	16:36 (WP KLUS-19)	18:37		20:29	21:17	21:47		
21	08:20	13:48 (WP KLUS-33)	07:30	07:57 (WP Hirsch-18)	06:28		06:19	05:27	05:08		
	16:54	15:24 (WP KLUS-24)	17:50	16:34 (WP KLUS-19)	18:39		20:31	21:19	21:47		
22	08:19	13:47 (WP KLUS-33)	07:28	07:58 (WP Hirsch-18)	06:26		06:17	05:25	05:08		
	16:56	15:23 (WP KLUS-24)	17:52	16:32 (WP KLUS-19)	18:41		20:33	21:20	21:47		
23	08:18	13:48 (WP KLUS-33)	07:26	08:00 (WP Hirsch-18)	06:24		06:15	05:24	05:08		
	16:58	15:23 (WP KLUS-24)	17:54	16:29 (WP KLUS-19)	18:42		20:34	21:22	21:47		
24	08:17	13:48 (WP KLUS-33)	07:23	08:03 (WP Hirsch-18)	06:21		06:13	05:23	05:08		
	16:59	15:22 (WP KLUS-24)	17:55	08:09 (WP Hirsch-18)	18:44		20:36	21:23	21:47		
25	08:15	13:48 (WP KLUS-33)	07:21	17:14 (WP KLUS-21)	06:19		06:11	05:22	05:09		
	17:01	15:21 (WP KLUS-24)	17:57	17:21 (WP KLUS-21)	18:46		20:38	21:24	21:47		
26	08:14	13:49 (WP KLUS-33)	07:19	17:12 (WP KLUS-21)	06:17		06:09	05:20	05:09		
	17:03	15:20 (WP KLUS-24)	17:59	17:23 (WP KLUS-21)	18:47		20:39	21:26	21:47		
27	08:13	13:48 (WP KLUS-33)	07:17	17:11 (WP KLUS-21)	06:15		06:07	05:19	05:10		
	17:05	15:15 (WP KLUS-24)	18:01	17:25 (WP KLUS-21)	18:49		20:41	21:27	21:47		
28	08:11	08:38 (WP Hirsch-11)	07:15	17:10 (WP KLUS-21)	06:12		06:05	05:18	05:10		
	17:06	14:42 (WP KLUS-33)	18:03	17:24 (WP KLUS-21)	18:51		20:43	21:28	21:47		
29	08:10	08:36 (WP Hirsch-11)			07:10		06:03	05:17	05:11		
	17:08	14:42 (WP KLUS-33)			19:53		20:44	21:29	21:47		
30	08:09	08:35 (WP Hirsch-11)			07:08		06:01	05:16	05:11		
	17:10	14:42 (WP KLUS-33)			19:54		20:46	21:30	21:47		
31	08:07	08:33 (WP Hirsch-11)			07:05			05:15			
	17:12	14:42 (WP KLUS-33)			19:56			21:32			
Sonnenscheinstunden		261	278	367		415		484	497		
astr.max.mögl.Beschattung		2239	1489	74							
Red.Sonnenscheinwahrsch.		0,19	0,32	0,28							
Reduktion Betriebsdauer		0,84	0,84	0,84							
Reduktion Windrichtung		0,67	0,65	0,71							
Gesamte Reduktion		0,11	0,18	0,17							
Met.wahrsch.Beschattung		235	262	12							

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

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

Schattenwurf Bad Wünnenb.-Hirschweg

## Beschreibung:

Auftraggeber:

WBG Energie 1 GmbH & Co. KG  
An der Grotte 17

D-33181 Bad Wünnenberg

Bundesland des Projekts: Nordrhein-Westfalen

## Lizenzierter Anwender:

Power of Nature - Windenergie

Aulendorf 40

DE-48727 Billerbeck

02543 9304674

Fürtges / joerg.fuertges@powernature.de

Berechnet:

21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung &amp; 1 x Neuanlage) Schattenrezeptor: RZ H - Kermelsgrund 1, Haaren (Ml)

## Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

## Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	July	August	September	Oktober	November	Dezember		
1	05:12 21:47	05:48 21:15	06:37 20:14	07:25 19:05	07:18 17:00	07:52 (WP Hirsch-11) 16:20	08:08 15:03 (WP KLUS-24)	
2	05:12 21:46	05:49 21:14	06:38 20:12	07:26 19:03	07:20 16:58	07:52 (WP Hirsch-11) 16:01 (WP KLUS-19)	08:09 16:20 15:03 (WP KLUS-24)	
3	05:13 21:46	05:51 21:12	06:40 20:10	07:28 19:01	07:21 16:57	07:53 (WP Hirsch-11) 15:57 (WP KLUS-19)	08:11 16:19 15:03 (WP KLUS-24)	
4	05:14 21:46	05:52 21:10	06:41 20:07	07:30 18:59	07:23 16:55	07:53 (WP Hirsch-11) 14:08 (WP KLUS-33)	08:12 16:19 15:03 (WP KLUS-24)	
5	05:15 21:45	05:54 21:09	06:43 20:05	07:31 18:56	07:25 16:53	07:53 (WP Hirsch-11) 14:09 (WP KLUS-33)	08:13 16:18 09:25 (WP Hirsch-04(N))	
6	05:16 21:45	05:55 21:07	06:45 20:03	07:33 18:54	07:27 16:51	07:55 (WP Hirsch-11) 14:10 (WP KLUS-33)	08:15 16:18 09:24 (WP Hirsch-04(N))	
7	05:16 21:44	05:57 21:05	06:46 20:01	07:35 18:52	07:28 16:50	07:57 (WP Hirsch-11) 14:11 (WP KLUS-33)	08:16 16:17 09:23 (WP Hirsch-04(N))	
8	05:17 21:43	05:58 21:03	06:48 19:58	07:36 18:50	07:30 17:48 (WP KLUS-21)	07:59 (WP Hirsch-11) 14:12 (WP KLUS-33)	08:17 16:17 09:22 (WP Hirsch-04(N))	
9	05:18 21:43	06:00 21:02	06:49 19:56	07:38 18:47	8 17:56 (WP KLUS-21) 17:45 (WP KLUS-21)	16:48 17:32	72 14:13 (WP KLUS-33) 16:17 08:18	83 15:03 (WP KLUS-24) 09:23 (WP Hirsch-04(N))
10	05:19 21:42	06:02 21:00	06:51 19:54	07:40 18:45	12 17:57 (WP KLUS-21) 17:44 (WP KLUS-21)	16:46 17:34	71 14:13 (WP KLUS-33) 16:17 08:03 (WP Hirsch-11)	85 15:04 (WP KLUS-24) 09:22 (WP Hirsch-04(N))
11	05:20 21:41	06:03 20:58	06:53 19:52	07:41 18:43	14 17:58 (WP KLUS-21) 17:59 (WP KLUS-21)	16:45 16:43	68 14:13 (WP KLUS-33) 16:16 08:04 (WP Hirsch-11)	89 15:04 (WP KLUS-24) 09:22 (WP Hirsch-04(N))
12	05:21 21:40	06:05 20:56	06:54 19:49	07:43 18:41	15 17:59 (WP KLUS-21) 17:43 (WP KLUS-21)	16:43 16:42	67 14:13 (WP KLUS-33) 16:16 08:06 (WP Hirsch-11)	89 15:04 (WP KLUS-24) 09:22 (WP Hirsch-04(N))
13	05:22 21:40	06:06 20:54	06:56 19:47	07:45 18:39	15 17:43 (WP KLUS-21) 17:58 (WP KLUS-21)	16:39 16:40	61 14:14 (WP KLUS-33) 16:16 08:10 (WP Hirsch-11)	90 15:04 (WP KLUS-24) 09:23 (WP Hirsch-04(N))
14	05:24 21:39	06:08 20:52	06:57 19:45	07:46 18:36	14 17:43 (WP KLUS-21) 17:57 (WP KLUS-21)	16:41 16:39	61 14:14 (WP KLUS-33) 16:16 13:21 (WP KLUS-33)	90 15:04 (WP KLUS-24) 09:23 (WP Hirsch-04(N))
15	05:25 21:38	06:09 20:50	06:59 19:42	07:48 18:34	14 17:44 (WP KLUS-21) 17:56 (WP KLUS-21)	16:42 16:37	61 14:14 (WP KLUS-33) 16:16 13:21 (WP KLUS-33)	91 15:05 (WP KLUS-24) 09:23 (WP Hirsch-04(N))
16	05:26 21:37	06:11 20:48	07:01 19:40	07:50 18:32	10 17:45 (WP KLUS-21) 17:55 (WP KLUS-21)	16:44 16:36	63 13:22 (WP KLUS-33) 16:16 14:53 (WP KLUS-24)	91 15:05 (WP KLUS-24) 09:23 (WP Hirsch-04(N))
17	05:27 21:36	06:13 20:46	07:02 19:38	07:52 18:30	17 17:47 (WP KLUS-21) 17:51 (WP KLUS-21)	16:46 16:35	67 13:22 (WP KLUS-33) 16:17 14:55 (WP KLUS-24)	89 15:06 (WP KLUS-24) 09:23 (WP Hirsch-04(N))
18	05:28 21:35	06:14 20:44	07:04 19:35	07:53 18:28	9 08:33 (WP Hirsch-18) 08:42 (WP Hirsch-18)	16:47 16:33	70 14:56 (WP KLUS-24) 16:17 13:22 (WP KLUS-33)	90 15:06 (WP KLUS-24) 09:24 (WP Hirsch-04(N))
19	05:30 21:33	06:16 20:42	07:05 19:33	07:55 18:26	22 17:02 (WP KLUS-19) 08:29 (WP Hirsch-18)	16:32 16:51	71 14:57 (WP KLUS-24) 16:17 13:22 (WP KLUS-33)	90 15:06 (WP KLUS-24) 09:24 (WP Hirsch-04(N))
20	05:31 21:32	06:17 20:40	07:07 19:31	07:57 18:24	29 17:04 (WP KLUS-19) 17:04 (WP KLUS-24)	16:31 16:31	73 14:58 (WP KLUS-24) 16:18 13:23 (WP KLUS-33)	89 15:06 (WP KLUS-24) 09:25 (WP Hirsch-04(N))
21	05:32 21:31	06:19 20:38	07:09 19:28	07:58 18:22	35 08:28 (WP Hirsch-18) 17:06 (WP KLUS-19)	16:30 16:30	74 14:59 (WP KLUS-24) 16:18 13:23 (WP KLUS-33)	90 15:06 (WP KLUS-24) 09:25 (WP Hirsch-04(N))
22	05:33 21:30	06:21 20:36	07:10 19:26	08:00 18:20	49 08:26 (WP Hirsch-18) 17:06 (WP KLUS-19)	16:29 16:29	75 15:00 (WP KLUS-24) 16:18 13:24 (WP KLUS-33)	90 15:06 (WP KLUS-24) 09:26 (WP Hirsch-04(N))
23	05:35 21:29	06:22 20:34	07:12 19:24	08:02 18:18	56 08:28 (WP Hirsch-18) 17:07 (WP KLUS-19)	16:27 16:27	75 15:01 (WP KLUS-24) 16:19 13:24 (WP KLUS-33)	89 15:07 (WP KLUS-24) 09:26 (WP Hirsch-04(N))
24	05:36 21:27	06:24 20:32	07:13 19:22	08:04 18:16	59 08:30 (WP Hirsch-18) 17:07 (WP KLUS-19)	16:26 16:26	74 15:00 (WP KLUS-24) 16:20 13:24 (WP KLUS-33)	90 15:08 (WP KLUS-24) 09:26 (WP Hirsch-04(N))
25	05:38 21:26	06:25 20:29	07:15 19:19	07:05 17:14	60 07:32 (WP Hirsch-18) 16:08 (WP KLUS-19)	16:25 16:25	75 13:24 (WP KLUS-33) 16:20 15:01 (WP KLUS-24)	90 15:08 (WP KLUS-24) 09:28 (WP Hirsch-04(N))
26	05:39 21:24	06:27 20:27	07:17 19:17	07:07 17:12	60 07:34 (WP Hirsch-18) 16:08 (WP KLUS-19)	16:25 16:25	74 13:25 (WP KLUS-33) 16:21 15:02 (WP KLUS-24)	90 15:09 (WP KLUS-24) 09:28 (WP Hirsch-04(N))
27	05:40 21:23	06:29 20:25	07:18 19:15	07:09 17:10	60 07:36 (WP Hirsch-18) 16:08 (WP KLUS-19)	16:24 16:24	74 13:25 (WP KLUS-33) 16:22 15:01 (WP KLUS-24)	90 15:10 (WP KLUS-24) 09:28 (WP Hirsch-04(N))
28	05:42 21:22	06:30 20:23	07:20 19:12	07:11 17:08	63 17:38 (WP Hirsch-18) 16:07 (WP KLUS-19)	16:23 16:23	73 13:26 (WP KLUS-33) 16:22 15:02 (WP KLUS-24)	91 15:10 (WP KLUS-24) 09:29 (WP Hirsch-04(N))
29	05:43 21:20	06:32 20:21	07:22 19:10	07:12 17:06	74 07:40 (WP Hirsch-18) 16:07 (WP KLUS-19)	16:22 16:22	73 13:27 (WP KLUS-33) 16:23 15:03 (WP KLUS-24)	90 15:11 (WP KLUS-24) 09:30 (WP Hirsch-04(N))
30	05:45 21:19	06:33 20:19	07:23 19:08	07:14 17:04	75 07:41 (WP Hirsch-18) 16:05 (WP KLUS-19)	16:21 16:21	72 13:27 (WP KLUS-33) 16:24 15:02 (WP KLUS-24)	90 15:12 (WP KLUS-24) 09:31 (WP Hirsch-04(N))
31	05:46 21:17	06:35 20:16	07:25 19:07	07:16 17:02	78 07:52 (WP Hirsch-11) 16:04 (WP KLUS-19)	16:20 16:20	90 08:32 16:25 15:13 (WP KLUS-24)	
Sonnenscheinstunden	500	453	381	332	268	246	2650	
astr. max.mögl. Beschattung				848	2126		0,17	
Red. Sonnenscheinwahrsch.				0,29	0,23		0,17	
Reduktion Betriebsdauer				0,84	0,84		0,84	
Reduktion Windrichtung				0,66	0,66		0,64	
Gesamte Reduktion				0,16	0,13		0,09	
Met. wahrsch. Beschattung				135	266		241	

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

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

Projekt: Schattenwurf Bad Wünnenb.-Hirschweg	Beschreibung: Auftraggeber: WBG Energie 1 GmbH & Co. KG An der Grotte 17 D-33181 Bad Wünnenberg Bundesland des Projekts: Nordrhein-Westfalen	Lizenziertes Anwender: Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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### SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ I - Bürener Str. 45, Haaren (MI)

#### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

Januar			Februar			März			April			Mai			Juni		
1	08:32	09:03 (WP Hirsch-11)	08:06														
	16:26	43 15:34 (WP KLUS-19)	17:14	25	08:37 (WP Hirsch-18)	07:13	07:03	05:59	05:15								
2	08:32	09:02 (WP Hirsch-11)	08:04		08:40 (WP Hirsch-18)	07:11	07:01	05:57	05:14								
	16:27	43 15:33 (WP KLUS-19)	17:15	21	16:39 (WP KLUS-21)	18:06	19:59	20:49	21:34								
3	08:32	09:02 (WP Hirsch-11)	08:02		16:26 (WP KLUS-21)	07:09	06:59	05:55	05:13								
	16:28	44 15:34 (WP KLUS-19)	17:17	12	16:38 (WP KLUS-21)	18:08	20:01	20:51	21:35								
4	08:31	09:02 (WP Hirsch-11)	08:01		16:26 (WP KLUS-21)	07:06	06:56	05:54	05:12								
	16:30	46 15:35 (WP KLUS-19)	17:19	12	16:38 (WP KLUS-21)	18:10	20:03	20:53	21:36								
5	08:31	09:01 (WP Hirsch-11)	07:59		16:28 (WP KLUS-21)	07:04	06:54	05:52	05:12								
	16:31	46 15:35 (WP KLUS-19)	17:21	10	16:38 (WP KLUS-21)	18:11	20:04	20:54	21:37								
6	08:31	09:02 (WP Hirsch-11)	07:58		16:29 (WP KLUS-21)	07:02	06:52	05:50	05:11								
	16:32	45 15:35 (WP KLUS-19)	17:23	7	16:36 (WP KLUS-21)	18:13	20:06	20:56	21:38								
7	08:30	09:02 (WP Hirsch-11)	07:56			07:00	06:50	05:48	05:10								
	16:33	45 15:35 (WP KLUS-19)	17:24			18:15	20:08	20:57	21:39								
8	08:30	09:03 (WP Hirsch-11)	07:54			06:58	06:47	05:46	05:10								
	16:35	45 15:36 (WP KLUS-19)	17:26			18:17	20:09	20:59	21:40								
9	08:30	09:03 (WP Hirsch-11)	07:52			06:55	06:45	05:45	05:09								
	16:36	44 15:36 (WP KLUS-19)	17:28			18:18	20:11	21:01	21:40								
10	08:29	09:05 (WP Hirsch-11)	07:51			06:53	06:43	05:43	05:09								
	16:37	43 15:37 (WP KLUS-19)	17:30			18:20	20:13	21:02	21:41								
11	08:29	09:05 (WP Hirsch-11)	07:49			06:51	06:41	05:41	05:09								
	16:39	42 15:37 (WP KLUS-19)	17:32			18:22	20:14	21:04	21:42								
12	08:28	09:05 (WP Hirsch-11)	07:47			06:49	06:38	05:40	05:08								
	16:40	41 15:36 (WP KLUS-19)	17:34			18:24	20:16	21:05	21:43								
13	08:27	09:06 (WP Hirsch-11)	07:45			06:46	06:36	05:38	05:08								
	16:42	39 15:36 (WP KLUS-19)	17:35			18:25	20:18	21:07	21:43								
14	08:26	09:07 (WP Hirsch-11)	07:43			06:44	06:34	05:37	05:08								
	16:43	37 15:36 (WP KLUS-19)	17:37			18:27	20:19	21:08	21:44								
15	08:26	09:07 (WP Hirsch-11)	07:41			06:42	06:32	05:35	05:08								
	16:45	34 15:35 (WP KLUS-19)	17:39			18:29	20:21	21:10	21:45								
16	08:25	09:08 (WP Hirsch-11)	07:40			06:40	06:30	05:34	05:08								
	16:46	30 15:34 (WP KLUS-19)	17:41			18:31	20:23	21:12	21:45								
17	08:24	09:09 (WP Hirsch-11)	07:38			06:37	06:28	05:32	05:07								
	16:48	22 09:31 (WP Hirsch-11)	17:43			18:32	20:24	21:13	21:45								
18	08:23	09:10 (WP Hirsch-11)	07:36			06:35	06:25	05:31	05:07								
	16:49	21 09:31 (WP Hirsch-11)	17:45			18:34	20:26	21:14	21:46								
19	08:22	09:12 (WP Hirsch-11)	07:34			06:33	06:23	05:29	05:07								
	16:51	18 09:30 (WP Hirsch-11)	17:46			18:36	20:28	21:16	21:46								
20	08:21	08:49 (WP Hirsch-18)	07:32			06:31	06:21	05:28	05:08								
	16:53	18 09:30 (WP Hirsch-11)	17:48			18:37	20:29	21:17	21:47								
21	08:20	08:48 (WP Hirsch-18)	07:30			06:28	06:19	05:27	05:08								
	16:54	16 09:29 (WP Hirsch-11)	17:50			18:39	20:31	21:19	21:47								
22	08:19	08:46 (WP Hirsch-18)	07:28			06:26	06:17	05:25	05:08								
	16:56	14 09:26 (WP Hirsch-11)	17:52			18:41	20:33	21:20	21:47								
23	08:18	08:45 (WP Hirsch-18)	07:26			06:24	06:15	05:24	05:08								
	16:58	6 08:51 (WP Hirsch-18)	17:54			18:42	20:34	21:22	21:47								
24	08:17	08:44 (WP Hirsch-18)	07:24			06:21	06:13	05:23	05:08								
	16:59	8 08:52 (WP Hirsch-18)	17:55			18:44	20:36	21:23	21:47								
25	08:15	08:42 (WP Hirsch-18)	07:21			06:19	06:11	05:22	05:09								
	17:01	10 08:52 (WP Hirsch-18)	17:57			18:46	20:38	21:24	21:47								
26	08:14	08:41 (WP Hirsch-18)	07:19			06:17	06:09	05:20	05:09								
	17:03	11 08:52 (WP Hirsch-18)	17:59			18:47	20:39	21:26	21:47								
27	08:13	08:39 (WP Hirsch-18)	07:17			06:15	06:07	05:19	05:10								
	17:05	16 16:32 (WP KLUS-21)	18:01			18:49	20:41	21:27	21:47								
28	08:11	08:38 (WP Hirsch-18)	07:15			06:12	06:05	05:18	05:10								
	17:06	22 16:35 (WP KLUS-21)	18:03			18:51	20:43	21:28	21:47								
29	08:10	08:36 (WP Hirsch-18)				07:10	06:03	05:17	05:11								
	17:08	25 16:36 (WP KLUS-21)				19:53	20:44	21:29	21:47								
30	08:09	08:35 (WP Hirsch-18)				07:08	06:01	05:16	05:11								
	17:10	28 16:38 (WP KLUS-21)				19:54	20:46	21:30	21:47								
31	08:07	08:36 (WP Hirsch-18)				07:05		05:15									
	17:12	27 16:38 (WP KLUS-21)				19:56		21:32									
Sonnenscheinstunden	261		278			367	415	484	497								
astr.max.mögl.Beschattung		929		87													
Red.Sonnenscheinwahrsch.		0,19		0,32													
Reduktion Betriebsdauer		0,84		0,84													
Reduktion Windrichtung		0,60		0,69													
Gesamte Reduktion		0,10		0,19													
Met.wahrsch.Beschattung		88		16													

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

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

Projekt: Schattenwurf Bad Wünnenb.-Hirschweg	Beschreibung: Auftraggeber:  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	Lizenzierter Anwender: Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ I - Bürener Str. 45, Haaren (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	July	August	September	Oktober	November	Dezember	
1	05:12 21:47	05:48 21:15	06:37 20:14	07:25 19:05	07:18 17:00	08:08 16:20	42 08:47 (WP Hirsch-11) 15:19 (WP KLUS-19)
2	05:12 21:46	05:49 21:14	06:38 20:12	07:26 19:03	07:20 16:58	08:09 16:20	43 08:47 (WP Hirsch-11) 15:19 (WP KLUS-19)
3	05:13 21:46	05:51 21:12	06:40 20:10	07:28 19:01	07:21 16:57	08:11 16:19	43 08:48 (WP Hirsch-11) 15:20 (WP KLUS-19)
4	05:14 21:46	05:52 21:10	06:41 20:07	07:30 18:59	07:23 16:55	16:01 (WP KLUS-21) 16:03 (WP KLUS-21)	44 08:47 (WP Hirsch-11) 15:20 (WP KLUS-19)
5	05:15 21:45	05:54 21:09	06:43 20:05	07:31 18:56	07:25 16:53	15:58 (WP KLUS-21) 16:06 (WP KLUS-21)	45 08:48 (WP Hirsch-11) 15:21 (WP KLUS-19)
6	05:16 21:45	05:55 21:07	06:45 20:03	07:33 18:54	07:27 16:51	15:57 (WP KLUS-21) 16:08 (WP KLUS-21)	46 08:48 (WP Hirsch-11) 15:22 (WP KLUS-19)
7	05:16 21:44	05:57 21:05	06:46 20:01	07:35 18:52	07:28 16:50	15:57 (WP KLUS-21) 16:09 (WP KLUS-21)	46 08:48 (WP Hirsch-11) 15:22 (WP KLUS-19)
8	05:17 21:43	05:58 21:03	06:48 19:58	07:36 18:50	07:30 16:48	15:56 (WP KLUS-21) 16:09 (WP KLUS-21)	45 08:49 (WP Hirsch-11) 15:22 (WP KLUS-19)
9	05:18 21:43	06:00 21:02	06:49 19:56	07:38 18:47	07:32 16:46	08:11 (WP Hirsch-18) 16:10 (WP KLUS-21)	44 08:51 (WP Hirsch-11) 15:23 (WP KLUS-19)
10	05:19 21:42	06:02 21:00	06:51 19:54	07:40 18:45	07:34 16:45	08:09 (WP Hirsch-18) 16:10 (WP KLUS-21)	43 08:52 (WP Hirsch-11) 15:23 (WP KLUS-19)
11	05:20 21:41	06:03 20:58	06:53 19:52	07:41 18:43	07:35 16:43	08:07 (WP Hirsch-18) 16:09 (WP KLUS-21)	43 08:53 (WP Hirsch-11) 15:24 (WP KLUS-19)
12	05:21 21:40	06:05 20:56	06:54 19:49	07:43 18:41	07:37 16:42	08:06 (WP Hirsch-18) 16:08 (WP KLUS-21)	42 08:54 (WP Hirsch-11) 15:24 (WP KLUS-19)
13	05:22 21:40	06:06 20:54	06:56 19:47	07:45 18:39	07:39 16:40	08:08 (WP Hirsch-18) 16:08 (WP KLUS-21)	41 08:55 (WP Hirsch-11) 15:24 (WP KLUS-19)
14	05:23 21:39	06:08 20:52	06:57 19:45	07:46 18:36	07:41 16:39	08:10 (WP Hirsch-18) 16:07 (WP KLUS-21)	41 08:56 (WP Hirsch-11) 15:25 (WP KLUS-19)
15	05:25 21:38	06:09 20:50	06:59 19:42	07:48 18:34	07:42 16:37	08:12 (WP Hirsch-18) 16:05 (WP KLUS-21)	40 08:57 (WP Hirsch-11) 15:25 (WP KLUS-19)
16	05:26 21:37	06:11 20:48	07:01 19:40	07:50 18:32	07:44 16:36	08:14 (WP Hirsch-18) 16:04 (WP Hirsch-18)	40 08:58 (WP Hirsch-11) 15:26 (WP KLUS-19)
17	05:27 21:36	06:13 20:46	07:02 19:38	07:52 18:30	07:46 16:35	08:16 (WP Hirsch-18) 16:03 (WP Hirsch-18)	38 08:58 (WP Hirsch-11) 15:27 (WP KLUS-19)
18	05:28 21:35	06:14 20:44	07:04 19:35	07:53 18:28	07:48 16:33	08:18 (WP Hirsch-18) 16:02 (WP Hirsch-18)	38 08:59 (WP Hirsch-11) 15:28 (WP KLUS-19)
19	05:29 21:33	06:16 20:42	07:05 19:33	07:55 18:26	07:49 16:32	08:19 (WP Hirsch-18) 16:01 (WP Hirsch-18)	38 09:00 (WP Hirsch-11) 15:29 (WP KLUS-19)
20	05:31 21:32	06:17 20:40	07:07 19:31	07:57 18:24	07:51 16:31	08:21 (WP Hirsch-18) 16:00 (WP Hirsch-11)	39 09:00 (WP Hirsch-11) 15:30 (WP KLUS-19)
21	05:32 21:31	06:19 20:38	07:09 19:28	07:58 18:22	07:53 16:30	08:23 (WP Hirsch-18) 15:59 (WP Hirsch-11)	39 09:01 (WP Hirsch-11) 15:31 (WP KLUS-19)
22	05:33 21:30	06:21 20:36	07:10 19:26	08:00 18:20	07:54 16:29	08:25 (WP Hirsch-18) 15:58 (WP Hirsch-11)	39 09:01 (WP Hirsch-11) 15:32 (WP KLUS-19)
23	05:35 21:29	06:22 20:34	07:12 19:24	08:02 18:18	07:56 16:27	08:49 (WP Hirsch-11) 15:57 (WP Hirsch-11)	39 09:02 (WP Hirsch-11) 15:33 (WP KLUS-19)
24	05:36 21:27	06:24 20:32	07:13 19:22	08:04 18:16	07:57 16:26	08:47 (WP Hirsch-11) 15:56 (WP Hirsch-11)	39 09:02 (WP Hirsch-11) 15:34 (WP KLUS-19)
25	05:38 21:26	06:25 20:29	07:15 19:19	07:05 17:14	07:59 16:25	08:47 (WP Hirsch-11) 15:55 (WP Hirsch-11)	38 09:02 (WP Hirsch-11) 15:35 (WP KLUS-19)
26	05:39 21:24	06:27 20:27	07:17 19:17	07:07 17:12	08:01 16:24	08:47 (WP Hirsch-11) 15:54 (WP Hirsch-11)	38 09:03 (WP Hirsch-11) 15:36 (WP KLUS-19)
27	05:40 21:23	06:29 20:25	07:18 19:15	07:09 17:10	08:02 16:23	08:46 (WP Hirsch-11) 15:53 (WP Hirsch-11)	40 09:03 (WP Hirsch-11) 15:37 (WP KLUS-19)
28	05:42 21:22	06:30 20:23	07:20 19:12	07:11 17:08	08:04 16:22	08:47 (WP Hirsch-11) 15:52 (WP Hirsch-11)	40 09:03 (WP Hirsch-11) 15:38 (WP KLUS-19)
29	05:43 21:20	06:32 20:21	07:22 19:10	07:12 17:06	08:05 16:21	08:47 (WP Hirsch-11) 15:51 (WP Hirsch-11)	40 09:03 (WP Hirsch-11) 15:39 (WP KLUS-19)
30	05:45 21:19	06:33 20:19	07:23 19:08	07:14 17:04	08:07 16:20	08:47 (WP Hirsch-11) 15:50 (WP Hirsch-11)	41 09:03 (WP Hirsch-11) 15:40 (WP KLUS-19)
31	05:46 21:17	06:35 20:16	07:25 17:02	07:16 17:00	08:08 16:19	08:47 (WP Hirsch-11) 15:49 (WP Hirsch-11)	42 09:03 (WP Hirsch-11) 15:41 (WP KLUS-19)
Sonnenscheinstunden	500	453	381	332	268	246	
astr.max.mögl.Beschattung					533		1276
Red.Sonnenscheinwahrsch.					0,23		0,17
Reduktion Betriebsdauer					0,84		0,84
Reduktion Windrichtung					0,61		0,61
Gesamte Reduktion					0,12		0,09
Met.wahrsch.Beschattung					62		111

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

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

Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:

Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17

Lizenzierter Anwender:

Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

Bundesland des Projekts: Nordrhein-Westfalen

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ J - Bürener Str. 51, Haaren (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

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

Sonnenscheinstunden	261			278			367	415	484	497
astr.max.mögl.Beschattung	430			153			125	145	170	195
Red.Sonnenscheinwahrsch.	0,19			0,32			0,50	0,60	0,75	0,90
Reduktion Betriebsdauer	0,84			0,84			0,84	0,84	0,84	0,84
Reduktion Windrichtung	0,64			0,64			0,64	0,64	0,64	0,64
Gesamte Reduktion	0,10			0,17			0,25	0,30	0,38	0,45
Met.wahrsch.Beschattung	44			26			21	25	30	36

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

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

Projekt:

Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:

Auftraggeber:

WBG Energie 1 GmbH & Co. KG  
An der Grotte 17

D-33181 Bad Wünnenberg

Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:

Power of Nature - Windenergie

Aulendorf 40

DE-48727 Billerbeck

02543 9304674

Fürtges / joerg.fuertges@powernature.de

Berechnet:

21.05.2024 09:58/3.6.366

### SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ J - Bürener Str. 51, Haaren (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Juli	August	September	Oktober	November	Dezember
1	05:12	05:48	06:37	07:25	07:18	08:08
	21:47	21:15	20:14	19:05	17:00	16:20
2	05:12	05:49	06:38	07:26	07:20	08:09
	21:46	21:14	20:12	19:03	16:58	16:20
3	05:13	05:51	06:40	07:28	07:21	08:11
	21:46	21:12	20:10	19:01	16:57	16:19
4	05:14	05:52	06:41	07:30	07:23	08:12
	21:46	21:10	20:07	18:59	16:55	5 08:22 (WP Hirsch-11) 16:19
5	05:15	05:54	06:43	07:31	07:25	08:14 (WP Hirsch-11) 08:14
	21:45	21:09	20:05	18:56	16:53	12 08:26 (WP Hirsch-11) 16:18
6	05:16	05:55	06:45	07:33	07:27	08:12 (WP Hirsch-11) 08:15
	21:45	21:07	20:03	18:54	16:51	16 08:28 (WP Hirsch-11) 16:18
7	05:16	05:57	06:46	07:35	07:28	08:11 (WP Hirsch-11) 08:16
	21:44	21:05	20:01	18:52	16:50	23 15:43 (WP KLUS-21) 16:17 7 14:22 (WP KLUS-19)
8	05:17	05:58	06:48	07:36	07:30	08:10 (WP Hirsch-11) 08:17
	21:43	21:03	19:58	18:50	16:48	30 15:46 (WP KLUS-21) 16:17 9 14:30 (WP KLUS-19)
9	05:18	06:00	06:49	07:38	07:32	08:09 (WP Hirsch-11) 08:18
	21:43	21:02	19:56	18:47	16:46	34 15:47 (WP KLUS-21) 16:17 11 14:32 (WP KLUS-19)
10	05:19	06:02	06:51	07:40	07:34	08:09 (WP Hirsch-11) 08:20
	21:42	21:00	19:54	18:45	16:45	37 15:48 (WP KLUS-21) 16:17 12 14:33 (WP KLUS-19)
11	05:20	06:03	06:53	07:41	07:35	08:08 (WP Hirsch-11) 08:21
	21:41	20:58	19:52	18:43	16:43	39 15:48 (WP KLUS-21) 16:16 14 14:34 (WP KLUS-19)
12	05:21	06:05	06:54	07:43	07:37	08:08 (WP Hirsch-11) 08:22
	21:40	20:56	19:49	18:41	16:42	41 15:49 (WP KLUS-21) 16:16 15 14:35 (WP KLUS-19)
13	05:22	06:06	06:56	07:45	07:39	08:08 (WP Hirsch-11) 08:23
	21:40	20:54	19:47	18:39	16:40	41 15:49 (WP KLUS-21) 16:16 15 14:35 (WP KLUS-19)
14	05:24	06:08	06:57	07:46	07:41	08:10 (WP Hirsch-11) 08:24
	21:39	20:52	19:45	18:36	16:39	39 15:49 (WP KLUS-21) 16:16 15 14:36 (WP KLUS-19)
15	05:25	06:09	06:59	07:48	07:42	08:12 (WP Hirsch-11) 08:24
	21:38	20:50	19:42	18:34	16:37	38 15:50 (WP KLUS-21) 16:16 16 14:37 (WP KLUS-19)
16	05:26	06:11	07:01	07:50	07:44	08:14 (WP Hirsch-11) 08:25
	21:37	20:48	19:40	18:32	16:36	35 15:50 (WP KLUS-21) 16:16 17 14:38 (WP KLUS-19)
17	05:27	06:13	07:02	07:52	07:46	08:16 (WP Hirsch-11) 08:26
	21:36	20:46	19:38	18:30	16:35	33 15:50 (WP KLUS-21) 16:17 17 14:38 (WP KLUS-19)
18	05:28	06:14	07:04	07:53	07:48	08:18 (WP Hirsch-11) 08:27
	21:35	20:44	19:35	18:28	16:33	29 15:49 (WP KLUS-21) 16:17 17 14:39 (WP KLUS-19)
19	05:30	06:16	07:05	07:55	07:49	08:19 (WP Hirsch-11) 08:28
	21:33	20:42	19:33	18:26	16:32	26 15:48 (WP KLUS-21) 16:17 17 14:39 (WP KLUS-19)
20	05:31	06:17	07:07	07:57	07:51	08:21 (WP Hirsch-11) 08:28
	21:32	20:40	19:31	18:24	16:31	22 15:48 (WP KLUS-21) 16:18 17 14:39 (WP KLUS-19)
21	05:32	06:19	07:09	07:58	07:53	08:23 (WP Hirsch-11) 08:29
	21:31	20:38	19:28	18:22	16:30	17 15:47 (WP KLUS-21) 16:18 17 14:40 (WP KLUS-19)
22	05:33	06:21	07:10	08:00	07:54	08:25 (WP Hirsch-11) 08:29
	21:30	20:36	19:26	18:20	16:29	9 15:44 (WP KLUS-21) 16:18 17 14:40 (WP KLUS-19)
23	05:35	06:22	07:12	08:02	07:56	08:27 (WP Hirsch-11) 08:30
	21:29	20:34	19:24	18:18	16:27	4 08:31 (WP Hirsch-11) 16:19 17 14:41 (WP KLUS-19)
24	05:36	06:24	07:13	08:04	07:57	08:28 (WP Hirsch-11) 08:30
	21:27	20:32	19:22	18:16	16:26	2 08:30 (WP Hirsch-11) 16:20 17 14:41 (WP KLUS-19)
25	05:38	06:25	07:15	07:05	07:59	08:31
	21:26	20:29	19:19	17:14	16:25	17 14:24 (WP KLUS-19)
26	05:39	06:27	07:17	07:07	08:01	08:31
	21:24	20:27	19:17	17:12	16:25	17 14:41 (WP KLUS-19)
27	05:40	06:29	07:18	07:09	08:02	08:31
	21:23	20:25	19:15	17:10	16:24	17 14:43 (WP KLUS-19)
28	05:42	06:30	07:20	07:11	08:04	08:31
	21:22	20:23	19:12	17:08	16:23	16 14:43 (WP KLUS-19)
29	05:43	06:32	07:22	07:12	08:05	08:32
	21:20	20:21	19:10	17:06	16:22	16 14:43 (WP KLUS-19)
30	05:45	06:33	07:23	07:14	08:07	08:32
	21:19	20:19	19:08	17:04	16:21	15 14:43 (WP KLUS-19)
31	05:46	06:35	07:25	07:16	08:08	08:32
	21:17	20:16	19:06	17:02	16:20	15 14:44 (WP KLUS-19)
Sonnenscheinstunden	500	453	381	332	268	246
astr.max.mögl.Beschattung					532	380
Red.Sonnenscheinwahrsch.					0,23	0,17
Reduktion Betriebsdauer					0,84	0,84
Reduktion Windrichtung					0,63	0,68
Gesamte Reduktion					0,12	0,10
Met.wahrsch.Beschattung					64	37

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt: Schattenwurf Bad Wünnenb.-Hirschweg	Beschreibung: Auftraggeber: WBG Energie 1 GmbH & Co. KG An der Grotte 17 D-33181 Bad Wünnenberg Bundesland des Projekts: Nordrhein-Westfalen	Lizenziertes Anwender: Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ K - Im Sintfeld 1, Bad Wünnenberg (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

### Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

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

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

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

Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:

Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg

Lizenzierter Anwender:

Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtgtes / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

Bundesland des Projekts: Nordrhein-Westfalen

### SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ K - Im Sintfeld 1, Bad Wünnenberg (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	July	August	September	Oktober	November	Dezember
1	05:12   21:46	05:48   21:15	06:24 (WP Hirsch-15)   06:37	19:35 (WP KLUS-12)	07:25   07:18	08:08
2	05:13   21:46	05:49   21:14	06:24 (WP Hirsch-15)   06:38	19:36 (WP KLUS-12)	07:26   07:19	08:09
3	05:13   21:46	05:51   21:12	06:24 (WP Hirsch-15)   06:40	19:41 (WP KLUS-12)	07:28   07:21	08:11
4	05:14   21:45	05:52   21:10	06:24 (WP Hirsch-15)   06:41		07:30   07:23	08:12
5	05:15   21:45	05:54   21:09	06:24 (WP Hirsch-15)   06:43		07:31   07:25	08:13
6	05:16   21:44	05:55   21:07	06:24 (WP Hirsch-15)   06:45		07:33   07:27	08:15
7	05:17   21:44	05:57   21:05	06:25 (WP Hirsch-15)   06:46		07:35   07:28	08:16
8	05:18   21:43	05:59   21:03	06:26 (WP Hirsch-15)   06:48		07:36   07:30	08:17
9	05:18   21:43	06:00   21:01	06:28 (WP Hirsch-15)   06:49		07:38   07:32	08:18
10	05:19   21:42	06:02   21:00	06:29 (WP Hirsch-15)   06:51		07:40   07:34	08:19
11	05:20   21:41	06:03   20:58	06:31 (WP Hirsch-15)   06:53		07:41   07:35	08:20
12	05:22   21:40	06:05   20:56	06:32 (WP Hirsch-15)   06:54		07:43   07:37	08:21
13	05:23   21:39	06:06   20:54	06:37 (WP Hirsch-15)   06:56		07:45   07:39	08:22
14	05:24   21:39	06:08   20:52		19:47	07:46   07:41	08:23
15	05:25   21:38	06:10   20:50		19:45	07:47   07:42	08:24
16	05:26   21:37	06:11   20:48		19:42	07:48   07:44	08:25
17	05:27   21:36	06:13   20:46		19:40	07:50   07:46	08:26
18	05:28   21:34	06:14   20:44		19:38	07:52   07:48	08:27
19	05:30   21:33	06:16   20:42		19:35	07:53   07:49	08:28
20	05:31   21:32	06:18   20:40		19:33	07:55   07:51	08:29
21	05:32   21:31	06:19   20:38		19:31	07:57   07:53	08:30
22	05:34   21:30	06:21   20:36		19:29	07:58   07:54	08:31
23	05:35   21:28	06:22   20:34		19:27	08:00   07:56	08:32
24	05:36   21:27	06:29 (WP Hirsch-15)   20:32		19:24	08:02   07:58	08:33
25	05:38   21:26	06:40 (WP Hirsch-15)   20:29		19:22	08:04   07:59	08:34
26	05:39   21:24	06:28 (WP Hirsch-15)   20:27	19:40 (WP KLUS-12)	19:15	08:06   08:00	08:35
27	05:41   21:23	06:43 (WP Hirsch-15)   20:25	19:36 (WP KLUS-12)	19:17	08:08   08:02	08:36
28	05:42   21:21	06:27 (WP Hirsch-15)   20:23	19:45 (WP KLUS-12)	19:19	08:10   08:04	08:37
29	05:43   21:20	06:43 (WP Hirsch-15)   20:21	19:36 (WP KLUS-12)	19:17	08:12   08:06	08:38
30	05:45   21:18	06:26 (WP Hirsch-15)   20:19	19:46 (WP KLUS-12)	19:19	08:14   08:08	08:39
31	05:46   21:17	06:45 (WP Hirsch-15)   20:16	19:33 (WP KLUS-12)	19:18	08:16   08:10	08:40
	Sonnenscheinstunden   500	453	381	332	268	246
	astr.max.mögl.Beschattung   150	284	14			
	Red.Sonnenscheinwahrsch.   0,39	0,40	0,32			
	Reduktion Betriebsdauer   0,84	0,84	0,84			
	Reduktion Windrichtung   0,71	0,70	0,65			
	Gesamte Reduktion   0,23	0,23	0,17			
	Met.wahrsch.Beschattung   35	67	2			

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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<b>Projekt:</b> Schattenwurf Bad Wünnenb.-Hirschweg	<b>Beschreibung:</b> Auftraggeber:  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	<b>Lizenzierter Anwender:</b> Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ L - Im Sintfeld 2, Bad Wünnenberg (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Januar	Februar	März	April	Mai	Juni		
1	08:32 16:26	08:05 17:14	07:13 18:04	07:03 19:58	05:59 20:48	05:15 21:33		
2	08:32 16:28	08:04 17:15	07:11 18:06	07:01 19:59	05:57 20:49	05:14 21:34	25	05:47 (WP Hirsch-15)
3	08:31 16:29	08:02 17:17	07:09 18:08	06:59 20:01	05:55 20:51	05:13 21:35	25	05:47 (WP Hirsch-15)
4	08:31 16:30	08:01 17:19	07:06 18:10	06:56 20:03	05:54 20:53	05:12 21:36	27	05:46 (WP Hirsch-15)
5	08:31 16:31	07:59 17:21	07:04 18:12	06:54 20:04	05:52 20:54	05:12 21:37	28	05:47 (WP Hirsch-15)
6	08:31 16:32	07:58 17:23	07:02 18:13	06:52 20:06	05:50 20:56	05:11 21:38	29	05:46 (WP Hirsch-15)
7	08:30 16:33	07:56 17:25	07:00 18:15	06:50 20:08	05:48 20:57	05:11 21:39	32	05:40 (WP Hirsch-13)
8	08:30 16:35	07:54 17:26	06:58 18:17	06:47 20:09	05:47 20:59	05:10 21:39	33	05:39 (WP Hirsch-13)
9	08:29 16:36	07:52 17:28	06:55 18:18	06:45 20:11	05:45 21:01	05:10 21:40	35	05:39 (WP Hirsch-13)
10	08:29 16:37	07:51 17:30	06:53 18:20	06:43 20:13	05:43 21:02	05:09 21:41	36	05:38 (WP Hirsch-13)
11	08:28 16:39	07:49 17:32	06:51 18:22	06:41 20:14	05:41 21:04	05:09 21:42	37	05:38 (WP Hirsch-13)
12	08:28 16:40	07:47 17:34	06:49 18:24	06:39 20:16	05:40 21:05	05:08 21:43	39	05:38 (WP Hirsch-13)
13	08:27 16:42	07:45 17:36	06:46 18:25	06:36 20:18	05:38 21:07	05:08 21:43	39	05:38 (WP Hirsch-13)
14	08:26 16:43	07:43 17:37	06:44 18:27	06:34 20:19	05:37 21:08	05:08 21:44	40	05:38 (WP Hirsch-13)
15	08:26 16:45	07:41 17:39	06:42 18:29	06:32 20:21	05:35 21:10	05:08 21:44	40	05:38 (WP Hirsch-13)
16	08:25 16:46	07:39 17:41	06:40 18:31	06:30 20:23	05:34 21:11	05:08 21:45	41	05:37 (WP Hirsch-13)
17	08:24 16:48	07:38 17:43	06:37 18:32	06:28 20:24	05:32 21:13	05:08 21:45	41	05:37 (WP Hirsch-13)
18	08:23 16:49	07:36 17:45	06:35 18:34	06:26 20:26	05:31 21:14	05:08 21:46	42	05:38 (WP Hirsch-13)
19	08:22 16:51	07:34 17:47	06:33 18:36	06:23 20:28	05:29 21:16	05:08 21:46	42	05:38 (WP Hirsch-13)
20	08:21 16:53	07:32 17:48	06:31 18:37	06:21 20:29	05:28 21:17	05:08 21:46	42	05:38 (WP Hirsch-13)
21	08:20 16:54	07:30 17:50	06:28 18:39	06:19 20:31	05:27 21:19	05:08 21:47	42	05:38 (WP Hirsch-13)
22	08:19 16:56	07:28 17:52	06:26 18:41	06:17 20:33	05:25 21:20	05:08 21:47	42	05:38 (WP Hirsch-13)
23	08:18 16:58	07:26 17:54	06:24 18:42	06:15 20:34	05:24 21:21	05:08 21:47	42	05:38 (WP Hirsch-13)
24	08:16 16:59	07:23 17:56	06:21 18:44	06:13 20:36	05:23 21:23	05:09 21:47	42	05:39 (WP Hirsch-13)
25	08:15 17:01	07:21 17:57	06:19 18:46	06:11 20:38	05:22 21:24	05:09 21:47	42	05:39 (WP Hirsch-13)
26	08:14 17:03	07:19 17:59	06:17 18:47	06:09 20:39	05:21 21:25	05:09 21:47	41	05:40 (WP Hirsch-13)
27	08:13 17:05	07:17 18:01	06:15 18:49	06:07 20:41	05:20 21:27	05:10 21:47	41	05:40 (WP Hirsch-13)
28	08:11 17:06	07:15 18:03	06:12 18:51	06:05 20:43	05:18 21:28	05:10 21:47	41	05:41 (WP Hirsch-13)
29	08:10 17:08		07:10 19:53	06:03 20:44	05:18 21:29	05:11 21:47	40	05:41 (WP Hirsch-13)
30	08:08 17:10		07:08 19:54	06:01 20:46	05:17 21:30	05:11 21:47	39	05:42 (WP Hirsch-13)
31	08:07 17:12		07:05 19:56	05:16 21:31	05:16 21:31	05:11 21:47	39	05:42 (WP Hirsch-13)
Sonnenscheinstunden	261	278	367	415	483	497		
astr.max.mögl.Beschattung					112			1113
Red.Sonnenscheinwahrsch.					0,43			0,34
Reduktion Betriebsdauer					0,84			0,84
Reduktion Windrichtung					0,72			0,72
Gesamte Reduktion					0,26			0,20
Met.wahrsch.Beschattung					29			227

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

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

Projekt: <b>Schattenwurf Bad Wünnenb.-Hirschweg</b>	Beschreibung: <b>Auftraggeber:</b>  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	Lizenzierter Anwender: <b>Power of Nature - Windenergie</b> Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de <small>Berechnet:</small> 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ L - Im Sintfeld 2, Bad Wünnenberg (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

#### Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

| Juli | August | September | Oktober | November | Dezember

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

Sonnenscheinstunden	500					
astr.max.mögl.Beschattung		467				
Red.Sonnenscheinwahrsch.		0,39				
Reduktion Betriebsdauer		0,84				
Reduktion Windrichtung		0,72				
Gesamte Reduktion		0,24				
Met.wahrsch.Beschattung		110				

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

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

Projekt: <b>Schattenwurf Bad Wünnenb.-Hirschweg</b>	Beschreibung: Auftraggeber: WBG Energie 1 GmbH & Co. KG An der Grotte 17 D-33181 Bad Wünnenberg Bundesland des Projekts: Nordrhein-Westfalen	Lizenzierter Anwender: Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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### SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ M - Im Sintfeld 3, Bad Wünnenberg (MI)

#### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

#### Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Januar	Februar	März	April		Mai		Juni
1	08:32 16:26	08:06 17:14	07:13 18:04	07:03 19:58		05:59 20:48	06:23 (WP Hirsch-13)	05:15 21:33
2	08:32 16:28	08:04 17:15	07:11 18:06	07:01 19:59		05:57 20:49	06:22 (WP Hirsch-13)	05:14 21:34
3	08:31 16:29	08:02 17:17	07:09 18:08	06:59 20:01		05:56 20:51	06:20 (WP Hirsch-13)	05:13 21:35
4	08:31 16:30	08:01 17:19	07:06 18:10	06:56 20:03		05:54 20:53	06:18 (WP Hirsch-13)	05:12 21:36
5	08:31 16:31	07:59 17:21	07:04 18:12	06:54 20:04		05:52 20:54	06:16 (WP Hirsch-13)	05:12 21:37
6	08:31 16:32	07:58 17:23	07:02 18:13	06:52 20:06		05:50 20:56	06:15 (WP Hirsch-13)	05:11 21:38
7	08:30 16:33	07:56 17:25	07:00 18:15	06:50 20:08		05:48 20:57	06:13 (WP Hirsch-13)	05:11 21:39
8	08:30 16:35	07:54 17:26	06:58 18:17	06:47 20:09		05:47 20:59	06:11 (WP Hirsch-13)	05:10 21:40
9	08:29 16:36	07:52 17:28	06:55 18:18	06:45 20:11		05:45 21:01	06:12 (WP Hirsch-13)	05:10 21:40
10	08:29 16:37	07:51 17:30	06:53 18:20	06:43 20:13		05:43 21:02	06:12 (WP Hirsch-13)	05:09 21:41
11	08:28 16:39	07:49 17:32	06:51 18:22	06:41 20:14	6	07:05 (WP Hirsch-15)	06:13 (WP Hirsch-13)	05:09 21:42
12	08:28 16:40	07:47 17:34	06:49 18:24	06:39 20:16		07:11 (WP Hirsch-15)	06:31 (WP Hirsch-13)	05:08 21:43
13	08:27 16:42	07:45 17:36	06:46 18:25	06:36 20:18	14	07:01 (WP Hirsch-15)	06:30 (WP Hirsch-13)	05:08 21:44
14	08:26 16:43	07:43 17:37	06:44 18:27	06:34 20:19		07:15 (WP Hirsch-15)	06:29 (WP Hirsch-13)	05:08 21:44
15	08:26 16:45	07:41 17:39	06:42 18:29	06:32 20:21	21	06:59 (WP Hirsch-15)	06:27 (WP Hirsch-13)	05:08 21:44
16	08:25 16:46	07:40 17:41	06:40 18:31	06:30 20:23	24	07:17 (WP Hirsch-15)	06:18 (WP Hirsch-13)	05:08 21:44
17	08:24 16:48	07:38 17:43	06:37 18:32	06:28 20:24	26	07:20 (WP Hirsch-15)	06:25 (WP Hirsch-13)	05:08 21:45
18	08:23 16:49	07:36 17:45	06:35 18:34	06:26 20:26	27	07:20 (WP Hirsch-15)	06:16 (WP Hirsch-13)	05:08 21:46
19	08:22 16:51	07:34 17:47	06:33 18:36	06:23 20:28	28	07:21 (WP Hirsch-15)	06:18 (WP Hirsch-13)	05:08 21:46
20	08:21 16:53	07:32 17:48	06:31 18:37	06:21 20:29	29	07:18 (WP Hirsch-15)	06:18 (WP Hirsch-13)	05:08 21:46
21	08:20 16:54	07:30 17:50	06:28 18:39	06:19 20:31	29	07:20 (WP Hirsch-15)	06:18 (WP Hirsch-13)	05:08 21:47
22	08:19 16:56	07:28 17:52	06:26 18:41	06:17 20:33	33	06:50 (WP Hirsch-15)	06:18 (WP Hirsch-13)	05:08 21:47
23	08:18 16:58	07:26 17:54	06:24 18:42	06:15 20:34	38	06:50 (WP Hirsch-15)	06:18 (WP Hirsch-13)	05:08 21:47
24	08:16 16:59	07:23 17:56	06:21 18:44	06:13 20:36	40	06:50 (WP Hirsch-15)	06:18 (WP Hirsch-13)	05:09 21:47
25	08:15 17:01	07:21 17:57	06:19 18:46	06:11 20:38	40	06:50 (WP KLUS-13)	06:18 (WP Hirsch-13)	05:09 21:47
26	08:14 17:03	07:19 17:59	06:17 18:47	06:09 20:39	41	06:50 (WP KLUS-13)	06:18 (WP Hirsch-13)	05:09 21:47
27	08:13 17:05	07:17 18:01	06:15 18:49	06:07 20:41	39	06:50 (WP KLUS-13)	06:18 (WP Hirsch-13)	05:10 21:47
28	08:11 17:06	07:15 18:03	06:12 18:51	06:05 20:43	39	06:50 (WP KLUS-13)	06:18 (WP Hirsch-13)	05:10 21:47
29	08:10 17:08		07:10 19:53	06:03 20:44	34	06:27 (WP Hirsch-13)	06:25 (WP Hirsch-13)	05:11 21:47
30	08:08 17:10		07:08 19:54	06:01 20:46	33	06:25 (WP Hirsch-13)		05:11 21:47
31	08:07 17:12		07:05 19:56		32	06:25 (WP Hirsch-13)		05:16 21:47
	Sonnenscheinstunden	261	278	367	415	483		497
	astr.max.mögl.Beschattung				591	249		298
	Red.Sonnenscheinwahrsch.				0,36	0,43		0,34
	Reduktion Betriebsdauer				0,84	0,84		0,84
	Reduktion Windrichtung				0,68	0,71		0,60
	Gesamte Reduktion				0,21	0,25		0,17
	Met.wahrsch.Beschattung				123	63		50

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

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

Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:

Auftraggeber:

WBG Energie 1 GmbH & Co. KG  
An der Grotte 17

D-33181 Bad Wünnenberg

Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:

Power of Nature - Windenergie

Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674

Fürtges / joerg.fuertges@powernature.de  
Berechnet:

21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ M - Im Sintfeld 3, Bad Wünnenberg (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

		Juli		August		September		Oktober		November		Dezember	
1	05:12	20:58 (WP KLUS-10)	05:48	06:23 (WP Hirsch-13)	06:37	07:04 (WP Hirsch-15)	07:25	07:18	08:08				
	21:46	12 21:10 (WP KLUS-10)	21:15	17 06:40 (WP Hirsch-13)	20:14	5 07:09 (WP Hirsch-15)	19:05	17:00	16:21				
2	05:13	20:59 (WP KLUS-10)	05:49	06:23 (WP Hirsch-13)	06:38		07:26	07:19	08:09				
	21:46	11 21:10 (WP KLUS-10)	21:14	19 06:42 (WP Hirsch-13)	20:12		19:03	16:58	16:20				
3	05:13	21:00 (WP KLUS-10)	05:51	06:22 (WP Hirsch-13)	06:40		07:28	07:21	08:11				
	21:46	10 21:10 (WP KLUS-10)	21:12	20 06:42 (WP Hirsch-13)	20:10		19:01	16:57	16:19				
4	05:14	21:00 (WP KLUS-10)	05:52	06:22 (WP Hirsch-13)	06:41		07:30	07:23	08:12				
	21:45	10 21:10 (WP KLUS-10)	21:10	21 06:43 (WP Hirsch-13)	20:07		18:59	16:55	16:19				
5	05:15	21:00 (WP KLUS-10)	05:54	06:22 (WP Hirsch-13)	06:43		07:31	07:25	08:13				
	21:45	10 21:10 (WP KLUS-10)	21:09	20 06:42 (WP Hirsch-13)	20:05		18:56	16:53	16:18				
6	05:16	21:01 (WP KLUS-10)	05:55	06:23 (WP Hirsch-13)	06:45		07:33	07:27	08:15				
	21:44	9 21:10 (WP KLUS-10)	21:07	19 06:42 (WP Hirsch-13)	20:03		18:54	16:51	16:18				
7	05:17	21:02 (WP KLUS-10)	05:57	06:25 (WP Hirsch-13)	06:46		07:35	07:28	08:16				
	21:44	7 21:09 (WP KLUS-10)	21:05	17 06:42 (WP Hirsch-13)	20:01		18:52	16:50	16:18				
8	05:17	21:03 (WP KLUS-10)	05:59	06:26 (WP Hirsch-13)	06:48		07:36	07:30	08:17				
	21:43	6 21:09 (WP KLUS-10)	21:03	16 06:42 (WP Hirsch-13)	19:58		18:50	16:48	16:17				
9	05:18	21:05 (WP KLUS-10)	06:00	06:28 (WP Hirsch-13)	06:49		07:38	07:32	08:18				
	21:43	2 21:07 (WP KLUS-10)	21:01	14 06:42 (WP Hirsch-13)	19:56		18:47	16:46	16:17				
10	05:19		06:02	06:29 (WP Hirsch-13)	06:51		07:40	07:34	08:19				
	21:42		21:00	12 06:41 (WP Hirsch-13)	19:54		18:45	16:45	16:17				
11	05:20		06:03	06:31 (WP Hirsch-13)	06:53		07:41	07:35	08:20				
	21:41		20:58	18 07:16 (WP Hirsch-15)	19:52		18:43	16:43	16:17				
12	05:21		06:05	06:32 (WP Hirsch-13)	06:54		07:43	07:37	08:21				
	21:40		20:56	27 20:07 (WP KLUS-13)	19:49		18:41	16:42	16:16				
13	05:23		06:06	06:34 (WP Hirsch-13)	06:56		07:45	07:39	08:22				
	21:39		20:54	33 20:09 (WP KLUS-13)	19:47		18:39	16:40	16:16				
14	05:24		06:08	06:35 (WP Hirsch-13)	06:57		07:46	07:41	08:23				
	21:39		20:52	35 20:09 (WP KLUS-13)	19:45		18:37	16:39	16:16				
15	05:25		06:10	07:00 (WP Hirsch-15)	06:59		07:48	07:42	08:24				
	21:38		20:50	36 20:10 (WP KLUS-13)	19:42		18:34	16:37	16:16				
16	05:26		06:11	06:59 (WP Hirsch-15)	07:01		07:50	07:44	08:25				
	21:37		20:48	39 20:10 (WP KLUS-13)	19:40		18:32	16:36	16:17				
17	05:27		06:13	06:58 (WP Hirsch-15)	07:02		07:52	07:46	08:26				
	21:36		20:46	41 20:10 (WP KLUS-13)	19:38		18:30	16:35	16:17				
18	05:28		06:14	06:57 (WP Hirsch-15)	07:04		07:53	07:47	08:27				
	21:34		20:44	40 20:09 (WP KLUS-13)	19:35		18:28	16:33	16:17				
19	05:30		06:16	06:57 (WP Hirsch-15)	07:05		07:55	07:49	08:27				
	21:33		20:42	41 20:09 (WP KLUS-13)	19:33		18:26	16:32	16:17				
20	05:31		06:17	06:56 (WP Hirsch-15)	07:07		07:57	07:51	08:28				
	21:32		20:40	40 20:07 (WP KLUS-13)	19:31		18:24	16:31	16:18				
21	05:32		06:19	06:56 (WP Hirsch-15)	07:09		07:58	07:52	08:29				
	21:31		20:38	37 20:06 (WP KLUS-13)	19:28		18:22	16:30	16:18				
22	05:34		06:21	06:55 (WP Hirsch-15)	07:10		08:00	07:54	08:29				
	21:30		20:36	29 07:24 (WP Hirsch-15)	19:26		18:20	16:29	16:19				
23	05:35		06:22	06:55 (WP Hirsch-15)	07:12		08:02	07:56	08:30				
	21:28		20:34	30 07:25 (WP Hirsch-15)	19:24		18:18	16:28	16:19				
24	05:36		06:24	06:55 (WP Hirsch-15)	07:13		08:04	07:57	08:30				
	21:27		20:32	29 07:24 (WP Hirsch-15)	19:22		18:16	16:27	16:20				
25	05:38		06:25	06:55 (WP Hirsch-15)	07:15		07:05	07:59	08:31				
	21:26		20:29	29 07:24 (WP Hirsch-15)	19:19		17:14	16:26	16:20				
26	05:39		06:27	06:55 (WP Hirsch-15)	07:17		07:07	08:00	08:31				
	21:24		20:27	27 07:22 (WP Hirsch-15)	19:17		17:12	16:25	16:21				
27	05:40		06:29	06:56 (WP Hirsch-15)	07:18		07:09	08:02	08:31				
	21:23		20:25	26 07:22 (WP Hirsch-15)	19:15		17:10	16:24	16:22				
28	05:42	06:31 (WP Hirsch-13)	06:30	06:56 (WP Hirsch-15)	07:20		07:11	08:04	08:31				
	21:21	3 06:34 (WP Hirsch-13)	20:23	24 07:20 (WP Hirsch-15)	19:12		17:08	16:23	16:23				
29	05:43	06:27 (WP Hirsch-13)	06:32	06:58 (WP Hirsch-15)	07:22		07:12	08:05	08:32				
	21:20	10 06:37 (WP Hirsch-13)	20:21	21 07:19 (WP Hirsch-15)	19:10		17:06	16:22	16:23				
30	05:45	06:25 (WP Hirsch-13)	06:33	06:59 (WP Hirsch-15)	07:23		07:14	08:06	08:32				
	21:18	13 06:38 (WP Hirsch-13)	20:19	17 07:16 (WP Hirsch-15)	19:08		17:04	16:21	16:24				
31	05:46	06:25 (WP Hirsch-13)	06:35	07:01 (WP Hirsch-15)			07:16	08:08	08:32				
	21:17	15 06:40 (WP Hirsch-13)	20:16	13 07:14 (WP Hirsch-15)			17:02	16:25	16:25				
	Sonnenscheinstunden	500	453		381		332	268	246				
	astr.max.mögl.Beschattung	118	807		5								
	Red.Sonnenscheinwahrsch.	0,39	0,40		0,32								
	Reduktion Betriebsdauer	0,84	0,84		0,84								
	Reduktion Windrichtung	0,64	0,69		0,70								
	Gesamte Reduktion	0,21	0,23		0,19								
	Met.wahrsch.Beschattung	24	187		1								

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

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

Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtgtes / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ N - Im Sintfeld 5, Bad Wünnenberg (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Januar	Februar	März	April	Mai	Juni					
1	08:32 16:26	08:06 17:14	07:13 18:04	07:03 19:58	07:44 (WP Hirsch-15) 19:27 (WP KLUS-13)	05:59 20:48	19:42 (WP KLUS-14) 21:33				
2	08:32 16:28	08:04 17:15	07:11 18:06	07:01 19:59	07:44 (WP Hirsch-15) 19:27 (WP KLUS-13)	05:57 20:49	19:42 (WP KLUS-14) 21:34				
3	08:31 16:29	08:02 17:17	07:09 18:08	06:59 20:01	07:45 (WP Hirsch-15) 19:27 (WP KLUS-13)	05:55 20:51	19:40 (WP KLUS-14) 21:35				
4	08:31 16:30	08:01 17:19	07:06 18:10	06:56 20:03	07:46 (WP Hirsch-15) 19:26 (WP KLUS-13)	05:54 20:53	19:39 (WP KLUS-14) 21:36				
5	08:31 16:31	07:59 17:21	07:04 18:12	06:54 20:04	07:47 (WP Hirsch-15) 19:26 (WP KLUS-13)	05:52 20:54	19:38 (WP KLUS-14) 21:37				
6	08:31 16:32	07:58 17:23	07:02 18:13	06:52 20:06	07:49 (WP Hirsch-15) 19:23 (WP KLUS-13)	05:50 20:56	19:39 (WP KLUS-14) 21:38				
7	08:30 16:33	07:56 17:25	07:00 18:15	06:50 20:08	07:52 (WP Hirsch-15) 19:20 (WP KLUS-13)	05:48 20:57	19:38 (WP KLUS-14) 21:39				
8	08:30 16:35	07:54 17:26	06:58 18:17	06:47 20:09	05:47 20:59	19:38 (WP KLUS-14) 20:23 (WP KLUS-10)	05:10 21:40				
9	08:30 16:36	07:52 17:28	06:55 18:18	06:45 20:11	05:45 21:01	19:38 (WP KLUS-14) 20:23 (WP KLUS-10)	05:10 21:40				
10	08:29 16:37	07:51 17:30	06:53 18:20	06:43 20:13	05:43 21:02	19:38 (WP KLUS-14) 20:22 (WP KLUS-10)	05:09 21:41				
11	08:28 16:39	07:49 17:32	06:51 18:22	06:41 20:14	05:41 21:04	19:39 (WP KLUS-14) 20:23 (WP KLUS-10)	05:09 21:42				
12	08:28 16:40	07:47 17:34	06:49 18:24	06:39 20:16	05:40 21:05	19:38 (WP KLUS-14) 20:21 (WP KLUS-10)	05:08 21:43				
13	08:27 16:42	07:45 17:36	06:46 18:25	06:36 20:18	07:01 (WP Hirsch-13) 07:05 (WP Hirsch-13)	05:38 21:07	19:39 (WP KLUS-14) 20:21 (WP KLUS-10)	05:08 21:43			
14	08:26 16:43	07:43 17:37	06:44 18:27	06:34 20:19	06:57 (WP Hirsch-13) 07:08 (WP Hirsch-13)	05:37 21:08	19:39 (WP KLUS-14) 20:19 (WP KLUS-10)	05:08 21:44			
15	08:26 16:45	07:41 17:39	06:42 18:29	06:32 20:21	06:55 (WP Hirsch-13) 07:08 (WP Hirsch-13)	05:35 21:10	19:41 (WP KLUS-14) 19:58 (WP KLUS-14)	05:08 21:44			
16	08:25 16:46	07:40 17:41	06:40 18:31	06:30 20:23	06:53 (WP Hirsch-13) 07:09 (WP Hirsch-13)	05:34 21:11	19:42 (WP KLUS-14) 19:57 (WP KLUS-14)	05:08 21:45			
17	08:24 16:48	07:38 17:43	06:37 18:32	06:28 20:24	06:51 (WP Hirsch-13) 07:09 (WP Hirsch-13)	05:32 21:13	19:43 (WP KLUS-14) 19:56 (WP KLUS-14)	05:08 21:45			
18	08:23 16:49	07:36 17:45	06:35 18:34	06:26 20:26	06:49 (WP Hirsch-13) 07:09 (WP Hirsch-13)	05:31 21:14	19:44 (WP KLUS-14) 19:54 (WP KLUS-14)	05:08 21:46			
19	08:22 16:51	07:34 17:47	06:33 18:36	06:23 20:28	06:46 (WP Hirsch-13) 07:08 (WP Hirsch-13)	05:29 21:16	19:47 (WP KLUS-14) 19:52 (WP KLUS-14)	05:08 21:46			
20	08:21 16:53	07:32 17:48	06:31 18:37	06:21 20:29	06:45 (WP Hirsch-13) 07:07 (WP Hirsch-13)	05:28 21:17	05:08 21:47	05:08 21:47			
21	08:20 16:54	07:30 17:50	06:28 18:39	06:19 20:31	06:52 (WP Hirsch-15) 07:12 (WP Hirsch-15)	05:27 20:31	05:08 21:47	05:08 21:47			
22	08:19 16:56	07:28 17:52	06:26 18:41	06:17 20:33	06:49 (WP Hirsch-15) 07:13 (WP Hirsch-15)	05:25 20:33	05:08 21:47	05:08 21:47			
23	08:18 16:58	07:26 17:54	06:24 18:42	06:15 20:34	06:48 (WP Hirsch-15) 07:14 (WP Hirsch-15)	05:24 21:21	05:08 21:47	05:08 21:47			
24	08:16 16:59	07:23 17:56	06:21 18:44	06:13 20:36	06:47 (WP Hirsch-15) 07:15 (WP Hirsch-15)	05:23 21:23	05:09 21:47	05:09 21:47			
25	08:15 17:01	07:21 17:57	06:19 18:46	06:11 20:38	06:46 (WP Hirsch-15) 07:15 (WP Hirsch-15)	05:22 20:38	05:09 21:47	05:09 21:47			
26	08:14 17:03	07:19 17:59	06:17 18:47	06:09 20:39	06:45 (WP Hirsch-15) 07:15 (WP Hirsch-15)	05:21 20:39	05:09 21:47	05:09 21:47			
27	08:13 17:05	07:17 18:01	06:15 18:49	06:07 20:41	06:45 (WP Hirsch-15) 07:15 (WP Hirsch-15)	05:20 20:41	05:10 21:47	05:10 21:47			
28	08:11 17:06	07:15 18:03	06:12 18:51	06:05 20:43	06:44 (WP Hirsch-15) 07:15 (WP Hirsch-15)	05:18 20:43	05:10 21:47	05:10 21:47			
29	08:10 17:08	07:10 19:53	06:10 19:53	06:03 20:44	07:43 (WP Hirsch-15) 08:14 (WP Hirsch-15)	05:17 21:29	05:11 21:47	05:11 21:47			
30	08:08 17:10	07:08 19:54	06:08 19:54	06:01 20:46	07:43 (WP Hirsch-15) 19:25 (WP KLUS-13)	05:17 21:30	05:11 21:47	05:11 21:47			
31	08:07 17:12	07:05 19:56	06:05 19:56	05:59 20:46	07:44 (WP Hirsch-15) 19:26 (WP KLUS-13)	05:16 21:32	05:11 21:47	05:11 21:47			
Sonnenscheinstunden	261	278	367	415	483	497					
astr.max.mögl.Beschattung			352	470	467						
Red.Sonnenscheinwahrsch.			0,28	0,36	0,43						
Reduktion Betriebsdauer			0,84	0,84	0,84						
Reduktion Windrichtung			0,67	0,68	0,62						
Gesamte Reduktion			0,16	0,21	0,22						
Met.wahrsch.Beschattung			56	98	105						

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

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

Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:

Auftraggeber:
WBG Energie 1 GmbH & Co. KG
An der Grotte 17
D-33181 Bad Wünnenberg
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:

Power of Nature - Windenergie
Aulendorf 40
DE-48727 Billerbeck
02543 9304674
Fürtges / joerg.fuertges@powernature.de
Berechnet:
21.05.2024 09:58/3.6.366

SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ N - Im Sintfeld 5, Bad Wünnenberg (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Table with 12 columns (Jan to Dez) and 2 rows of solar radiation data.

Betriebsdauer je Sektor

Table with 13 columns (N, NNO, ONO, O, OSO, SSO, S, SSW, WSW, W, WNW, NNW, Summe) and 2 rows of sector duration data.

Main table showing shadow cast data for each day from July to December, including start/end times and sector abbreviations.

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

Summary table with 4 columns: Tag im Monat, Sonnenaufgang (SS:MM), Sonnenuntergang (SS:MM), Minuten mit Schatten, Zeitpunkt (SS:MM) Schattenanfang, Zeitpunkt (SS:MM) Schattende, (WEA mit erstem Schatten), (WEA mit letztem Schatten).

Projekt: Schattenwurf Bad Wünnenb.-Hirschweg  
 Beschreibung: Auftraggeber: WBG Energie 1 GmbH & Co. KG  
 An der Grotte 17  
 D-33181 Bad Wünnenberg  
 Bundesland des Projekts: Nordrhein-Westfalen  
 Lizenzierter Anwender: Power of Nature - Windenergie  
 Aulendorf 40  
 DE-48727 Billerbeck  
 02543 9304674  
 Fürtges / joerg.fuertges@powernature.de  
 Berechnet: 21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ O - Im Sintfeld 6, Bad Wünnenberg (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
 1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor

N NNO ONO O OSO SSS WSW W WNW NNW Summe  
 261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	Januar	Februar	März	April	Mai	Juni
1	08:32 16:26	08:06 17:14	07:13 18:04	07:03 19:58	07:54 (WP Hirsch-15) 19:22 (WP KLUS-13)	05:59 20:15 (WP KLUS-10)
2	08:32 16:28	08:04 17:15	07:11 18:06	07:01 19:59	07:54 (WP Hirsch-15) 19:21 (WP KLUS-13)	05:57 20:49
3	08:31 16:29	08:02 17:17	07:09 18:08	06:59 20:01	07:56 (WP Hirsch-15) 19:19 (WP KLUS-13)	05:55 20:51
4	08:31 16:30	08:01 17:19	07:06 18:10	06:56 20:03	07:59 (WP Hirsch-15) 08:12 (WP Hirsch-15)	05:54 20:53
5	08:31 16:31	07:59 17:21	07:04 18:12	06:54 20:04	05:52 20:54	05:45 20:15 (WP KLUS-10)
6	08:31 16:32	07:58 17:23	07:02 18:13	06:52 20:06	05:50 20:56	26 20:15 (WP KLUS-10) 21:37
7	08:30 16:33	07:56 17:25	07:00 18:15	06:50 20:08	05:48 20:57	22 20:15 (WP KLUS-10) 21:38
8	08:30 16:35	07:54 17:26	06:58 18:17	06:47 20:09	05:47 20:59	14 20:13 (WP KLUS-10) 21:39
9	08:29 16:36	07:52 17:28	06:55 18:18	06:45 20:11	05:45 21:01	5 20:11 (WP KLUS-10) 21:40
10	08:29 16:37	07:51 17:30	06:53 18:20	06:43 20:13	07:06 (WP Hirsch-13) 07:09 (WP Hirsch-13)	05:43 21:02
11	08:28 16:39	07:49 17:32	06:51 18:22	06:41 20:14	07:03 (WP Hirsch-13) 07:10 (WP Hirsch-13)	05:41 21:04
12	08:28 16:40	07:47 17:34	06:49 18:24	06:39 20:16	07:01 (WP Hirsch-13) 07:11 (WP Hirsch-13)	05:40 21:05
13	08:27 16:42	07:45 17:36	06:46 18:25	06:36 20:18	06:59 (WP Hirsch-13) 07:12 (WP Hirsch-13)	05:38 21:07
14	08:26 16:43	07:43 17:37	06:44 18:27	06:34 20:19	06:57 (WP Hirsch-13) 07:13 (WP Hirsch-13)	05:37 21:08
15	08:26 16:45	07:41 17:39	06:42 18:29	06:32 20:21	06:55 (WP Hirsch-13) 07:13 (WP Hirsch-13)	05:35 21:10
16	08:25 16:46	07:40 17:41	06:40 18:31	06:30 20:23	06:53 (WP Hirsch-13) 07:13 (WP Hirsch-13)	05:34 21:11
17	08:24 16:48	07:38 17:43	06:37 18:32	06:28 20:24	07:02 (WP Hirsch-15) 07:20 (WP Hirsch-15)	05:32 21:13
18	08:23 16:49	07:36 17:45	06:35 18:34	06:26 20:26	07:00 (WP Hirsch-15) 07:22 (WP Hirsch-15)	05:31 21:14
19	08:22 16:51	07:34 17:47	06:33 18:36	06:23 20:28	06:58 (WP Hirsch-15) 07:23 (WP Hirsch-15)	05:29 21:16
20	08:21 16:53	07:32 17:48	06:31 18:37	06:21 20:29	07:24 (WP Hirsch-15) 07:25 (WP Hirsch-15)	05:28 21:17
21	08:20 16:54	07:30 17:50	06:28 18:39	06:19 20:31	06:56 (WP Hirsch-15) 07:25 (WP Hirsch-15)	05:27 21:19
22	08:19 16:56	07:28 17:52	06:26 18:41	06:17 20:33	06:54 (WP Hirsch-15) 07:25 (WP Hirsch-15)	05:25 21:20
23	08:18 16:58	07:26 17:54	06:24 18:42	06:15 20:34	06:53 (WP Hirsch-15) 07:25 (WP Hirsch-15)	05:24 21:21
24	08:16 16:59	07:23 17:56	06:21 18:44	06:13 20:36	06:51 (WP Hirsch-13) 07:25 (WP Hirsch-15)	05:23 21:23
25	08:15 17:01	07:21 17:57	06:19 18:46	06:11 20:38	06:54 (WP Hirsch-13) 07:25 (WP Hirsch-15)	05:22 21:24
26	08:14 17:03	07:19 17:59	06:17 18:47	06:09 20:39	06:52 (WP Hirsch-15) 07:24 (WP Hirsch-15)	05:21 21:25
27	08:13 17:05	07:17 18:01	06:15 18:49	06:07 20:41	06:52 (WP Hirsch-15) 18:21 (WP KLUS-13)	05:20 21:27
28	08:11 17:06	07:15 18:03	06:12 18:51	06:05 20:43	06:52 (WP Hirsch-15) 18:23 (WP KLUS-13)	05:18 21:28
29	08:10 17:08	07:10 19:53	06:10 19:23	06:03 20:44	07:52 (WP Hirsch-15) 19:23 (WP KLUS-13)	05:17 21:29
30	08:08 17:10	07:08 19:54	06:08 19:23	06:01 20:46	07:52 (WP Hirsch-15) 19:23 (WP KLUS-13)	05:17 21:30
31	08:07 17:12	07:05 19:56	06:05 19:23	05:16 21:32	07:53 (WP Hirsch-15) 19:23 (WP KLUS-13)	05:16 21:32
Sonnenscheinstunden	261	278	367	415	483	497
astr. max. mögl. Beschattung			500	554	190	334
Red. Sonnenscheinwahrsch.			0,28	0,36	0,43	0,34
Reduktion Betriebsdauer			0,84	0,84	0,84	0,84
Reduktion Windrichtung			0,66	0,67	0,63	0,72
Gesamte Reduktion			0,16	0,20	0,23	0,20
Met. wahrsch. Beschattung			79	113	43	68

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

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



Projekt:

Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:

Auftraggeber: WBG Energie 1 GmbH & Co. KG
An der Grotte 17
D-33181 Bad Wünnenberg
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:

Power of Nature - Windenergie
Aulendorf 40
DE-48727 Billerbeck
02543 9304674
Fürtges / joerg.fuertges@powernature.de
Berechnet: 21.05.2024 09:58/3.6.366

SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ O - Im Sintfeld 6, Bad Wünnenberg (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Table with 12 columns: Jan, Feb, Mär, Apr, Mai, Jun, Jul, Aug, Sep, Okt, Nov, Dez. Values: 1,58, 3,21, 3,35, 5,03, 6,68, 5,58, 6,26, 5,85, 4,04, 3,08, 2,01, 1,34

Betriebsdauer je Sektor

Table with 13 columns: N, NNO, ONO, O, OSO, SSO, S, SSW, WSW, W, WNW, NNW, Summe. Values: 261, 393, 465, 559, 645, 475, 572, 869, 1.140, 1.059, 606, 326, 7.370

Main shadow calculation table with columns for months (Juli to Dezember) and rows for each hour of the day (05:12 to 21:17). Includes summary rows for solar hours and reduction factors.

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

Summary table with 4 columns: Tag im Monat, Sonnenaufgang (SS:MM), Sonnenuntergang (SS:MM), Minuten mit Schatten, Zeitpunkt (SS:MM) Schattenanfang, Zeitpunkt (SS:MM) Schattenende, (WEA mit erstem Schatten), (WEA mit letztem Schatten)

<b>Projekt:</b> Schattenwurf Bad Wünnenb.-Hirschweg	<b>Beschreibung:</b> Auftraggeber:  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	<b>Lizenzierter Anwender:</b> Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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### SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ P - Im Sintfeld 7, Bad Wünnenberg (MI)

Annahmen für Schattenwurfberechnung Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

#### Betriebsdauer je Sektor

N NNO ONO O OSO SSO S SSW WSW W WNWN NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	Januar	Februar	März		April		Mai		Juni		
1	08:32	08:05	07:13		07:03		08:16 (WP Hirsch-15)	05:59	06:29 (WP Hirsch-13)	05:15	06:09 (WP Hirsch-16)
	16:26	17:14	18:04		19:58	63	09:19 (WP Hirsch-15)	20:48	07:03 (WP Hirsch-13)	21:33	06:17 (WP Hirsch-16)
2	08:32	08:04	07:11		07:01		08:15 (WP Hirsch-15)	05:57	06:29 (WP Hirsch-13)	05:14	06:12 (WP Hirsch-16)
	16:27	17:15	18:06		19:59	63	09:18 (WP Hirsch-15)	20:49	07:04 (WP Hirsch-13)	21:34	06:14 (WP Hirsch-16)
3	08:31	08:02	07:09		06:59		08:15 (WP Hirsch-15)	05:55	06:28 (WP Hirsch-13)	05:13	
	16:29	17:17	18:08		20:01	63	09:18 (WP Hirsch-15)	20:51	07:04 (WP Hirsch-13)	21:35	
4	08:31	08:01	07:06		06:56		08:15 (WP Hirsch-15)	05:54	06:27 (WP Hirsch-13)	05:12	
	16:30	17:19	18:10		20:03	63	09:18 (WP Hirsch-15)	20:53	07:04 (WP Hirsch-13)	21:36	
5	08:31	07:59	07:04		06:54		08:15 (WP Hirsch-15)	05:52	06:27 (WP Hirsch-13)	05:12	
	16:31	17:21	18:11		20:04	62	09:17 (WP Hirsch-15)	20:54	07:04 (WP Hirsch-13)	21:37	
6	08:31	07:58	07:02		06:52		08:14 (WP Hirsch-15)	05:50	06:27 (WP Hirsch-13)	05:11	
	16:32	17:23	18:13		20:06	62	09:16 (WP Hirsch-15)	20:56	07:05 (WP Hirsch-13)	21:38	
7	08:30	07:56	07:00		06:50		08:14 (WP Hirsch-15)	05:48	06:13 (WP Hirsch-16)	05:11	
	16:33	17:25	18:15		20:08	61	09:15 (WP Hirsch-15)	20:57	07:04 (WP Hirsch-13)	21:39	
8	08:30	07:54	06:58		06:47		08:15 (WP Hirsch-15)	05:46	06:11 (WP Hirsch-16)	05:10	
	16:35	17:26	18:17		20:09	59	09:14 (WP Hirsch-15)	20:59	20:24 (WP KLUS-11)	21:40	
9	08:29	07:52	06:55		06:45		08:15 (WP Hirsch-15)	05:45	06:10 (WP Hirsch-16)	05:10	
	16:36	17:28	18:18		20:11	60	19:37 (WP KLUS-14)	21:01	20:26 (WP KLUS-11)	21:40	
10	08:29	07:51	06:53		06:43		08:14 (WP Hirsch-15)	05:43	06:08 (WP Hirsch-16)	05:09	05:38 (WP Hirsch-03(N))
	16:37	17:30	18:20		20:13	66	19:39 (WP KLUS-14)	21:02	20:26 (WP KLUS-11)	21:41	05:41 (WP Hirsch-03(N))
11	08:28	07:49	06:51		06:41		08:15 (WP Hirsch-15)	05:41	06:07 (WP Hirsch-16)	05:09	05:38 (WP Hirsch-03(N))
	16:39	17:32	18:22		20:14	67	19:41 (WP KLUS-14)	21:04	20:27 (WP KLUS-11)	21:42	05:43 (WP Hirsch-03(N))
12	08:28	07:47	06:49		06:39		08:16 (WP Hirsch-15)	05:40	06:05 (WP Hirsch-16)	05:08	05:38 (WP Hirsch-03(N))
	16:40	17:34	18:24		20:16	66	19:41 (WP KLUS-14)	21:05	20:27 (WP KLUS-11)	21:43	05:45 (WP Hirsch-03(N))
13	08:27	07:45	06:46		06:36		08:16 (WP Hirsch-15)	05:38	06:04 (WP Hirsch-16)	05:08	05:38 (WP Hirsch-03(N))
	16:42	17:36	18:25	18	08:02 (WP Hirsch-15)	20:18	19:41 (WP KLUS-14)	21:07	20:27 (WP KLUS-11)	21:43	05:46 (WP Hirsch-03(N))
14	08:26	07:43	06:44		06:34		08:17 (WP Hirsch-15)	05:37	06:02 (WP Hirsch-16)	05:08	05:38 (WP Hirsch-03(N))
	16:43	17:37	18:27	26	08:06 (WP Hirsch-15)	20:19	19:41 (WP KLUS-14)	21:08	20:27 (WP KLUS-11)	21:44	05:47 (WP Hirsch-03(N))
15	08:26	07:41	06:42		06:32		08:18 (WP Hirsch-15)	05:35	06:01 (WP Hirsch-16)	05:08	05:37 (WP Hirsch-03(N))
	16:45	17:39	18:29	33	08:09 (WP Hirsch-15)	20:21	19:41 (WP KLUS-14)	21:10	20:27 (WP KLUS-11)	21:44	05:49 (WP Hirsch-03(N))
16	08:25	07:39	06:40		06:30		08:19 (WP Hirsch-15)	05:34	06:01 (WP Hirsch-16)	05:08	05:37 (WP Hirsch-03(N))
	16:46	17:41	18:31	37	08:11 (WP Hirsch-15)	20:23	19:40 (WP KLUS-14)	21:11	20:26 (WP KLUS-11)	21:45	05:47 (WP Hirsch-03(N))
17	08:24	07:38	06:37		06:28		08:20 (WP Hirsch-15)	05:32	06:00 (WP Hirsch-16)	05:08	05:37 (WP Hirsch-03(N))
	16:48	17:43	18:32	41	08:13 (WP Hirsch-15)	20:24	19:38 (WP KLUS-14)	21:13	20:25 (WP KLUS-11)	21:45	05:48 (WP Hirsch-03(N))
18	08:23	07:36	06:35		06:26		08:22 (WP Hirsch-15)	05:31	06:00 (WP Hirsch-16)	05:08	05:37 (WP Hirsch-03(N))
	16:49	17:45	18:34	45	08:15 (WP Hirsch-15)	20:26	09:00 (WP Hirsch-15)	21:14	20:24 (WP KLUS-11)	21:46	05:48 (WP Hirsch-03(N))
19	08:22	07:34	06:33		06:23		08:22 (WP Hirsch-15)	05:29	06:01 (WP Hirsch-16)	05:08	05:38 (WP Hirsch-03(N))
	16:51	17:46	18:36	48	08:15 (WP Hirsch-15)	20:28	08:27 (WP Hirsch-15)	21:16	20:23 (WP KLUS-11)	21:46	05:49 (WP Hirsch-03(N))
20	08:21	07:32	06:31		06:21		08:24 (WP Hirsch-15)	05:28	06:00 (WP Hirsch-16)	05:08	05:38 (WP Hirsch-03(N))
	16:53	17:48	18:37	51	08:17 (WP Hirsch-15)	20:29	08:54 (WP Hirsch-15)	21:17	06:58 (WP Hirsch-13)	21:46	05:50 (WP Hirsch-03(N))
21	08:20	07:30	06:28		06:19		08:27 (WP Hirsch-15)	05:27	06:00 (WP Hirsch-16)	05:08	05:38 (WP Hirsch-03(N))
	16:54	17:50	18:39	53	08:18 (WP Hirsch-15)	20:31	08:51 (WP Hirsch-15)	21:19	06:58 (WP Hirsch-13)	21:47	05:50 (WP Hirsch-03(N))
22	08:19	07:28	06:26		06:17		08:30 (WP Hirsch-15)	05:25	06:01 (WP Hirsch-16)	05:08	05:38 (WP Hirsch-03(N))
	16:56	17:52	18:41	55	08:18 (WP Hirsch-15)	20:33	08:47 (WP Hirsch-15)	21:20	06:57 (WP Hirsch-13)	21:47	05:50 (WP Hirsch-03(N))
23	08:18	07:26	06:24		06:15		06:42 (WP Hirsch-13)	05:24	06:01 (WP Hirsch-16)	05:08	05:38 (WP Hirsch-03(N))
	16:58	17:54	18:42	57	08:19 (WP Hirsch-15)	20:34	06:52 (WP Hirsch-13)	21:21	06:56 (WP Hirsch-13)	21:47	05:50 (WP Hirsch-03(N))
24	08:16	07:23	06:21		06:13		06:38 (WP Hirsch-13)	05:23	06:02 (WP Hirsch-16)	05:09	05:39 (WP Hirsch-03(N))
	16:59	17:55	18:44	58	08:19 (WP Hirsch-15)	20:36	06:55 (WP Hirsch-13)	21:23	06:55 (WP Hirsch-13)	21:47	05:50 (WP Hirsch-03(N))
25	08:15	07:21	06:19		06:11		06:36 (WP Hirsch-13)	05:22	06:03 (WP Hirsch-16)	05:09	05:39 (WP Hirsch-03(N))
	17:01	17:57	18:46	60	08:19 (WP Hirsch-15)	20:38	06:57 (WP Hirsch-13)	21:24	06:53 (WP Hirsch-13)	21:47	05:50 (WP Hirsch-03(N))
26	08:14	07:19	06:17		06:09		06:35 (WP Hirsch-13)	05:21	06:03 (WP Hirsch-16)	05:09	05:40 (WP Hirsch-03(N))
	17:03	17:59	18:47	61	08:20 (WP Hirsch-15)	20:39	07:00 (WP Hirsch-13)	21:25	06:51 (WP Hirsch-13)	21:47	05:51 (WP Hirsch-03(N))
27	08:13	07:17	06:15		06:07		06:33 (WP Hirsch-13)	05:19	06:04 (WP Hirsch-16)	05:10	05:40 (WP Hirsch-03(N))
	17:05	18:01	18:49	62	08:20 (WP Hirsch-15)	20:41	07:01 (WP Hirsch-13)	21:27	06:49 (WP Hirsch-13)	21:47	05:50 (WP Hirsch-03(N))
28	08:11	07:15	06:12		06:05		06:32 (WP Hirsch-13)	05:18	06:04 (WP Hirsch-16)	05:10	05:40 (WP Hirsch-03(N))
	17:06	18:03	18:51	62	08:20 (WP Hirsch-15)	20:43	07:02 (WP Hirsch-13)	21:28	06:20 (WP Hirsch-16)	21:47	05:49 (WP Hirsch-03(N))
29	08:10	07:10	06:10		06:03		06:31 (WP Hirsch-13)	05:17	06:05 (WP Hirsch-16)	05:11	05:41 (WP Hirsch-03(N))
	17:08	17:52	18:49	63	09:19 (WP Hirsch-15)	20:44	07:02 (WP Hirsch-13)	21:29	06:20 (WP Hirsch-16)	21:47	05:49 (WP Hirsch-03(N))
30	08:08	07:08	06:10		06:01		06:30 (WP Hirsch-13)	05:16	06:06 (WP Hirsch-16)	05:11	05:42 (WP Hirsch-03(N))
	17:10	17:54	18:51	63	09:19 (WP Hirsch-15)	20:46	07:03 (WP Hirsch-13)	21:30	06:19 (WP Hirsch-16)	21:47	05:49 (WP Hirsch-03(N))
31	08:07	07:05	06:10		06:00		06:29 (WP Hirsch-13)	05:16	06:08 (WP Hirsch-16)	05:11	05:42 (WP Hirsch-03(N))
	17:12	17:56	18:53	64	09:20 (WP Hirsch-15)	20:48	07:03 (WP Hirsch-13)	21:31	06:18 (WP Hirsch-16)	21:48	05:49 (WP Hirsch-03(N))
Sonnenscheinstunden	261	278	367		415		483		497		210
astr.max.mögl.Beschattung			957		1393		1377				0,34
Red.Sonnenscheinwahrsch.			0,28		0,36		0,43				0,84
Reduktion Betriebsdauer			0,84		0,84		0,84				0,72
Reduktion Windrichtung			0,63		0,64		0,70				0,20
Gesamte Reduktion			0,15		0,20		0,25				0,20
Met.wahrsch.Beschattung			143		270		345				43

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

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

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ P - Im Sintfeld 7, Bad Wünnenberg (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

Juli		August		September		Oktober		November		Dezember	
1	05:12	05:42 (WP Hirsch-03(N))	05:48	06:16 (WP Hirsch-16)	06:37	08:14 (WP Hirsch-15)	07:25	08:29 (WP Hirsch-15)	07:18	08:08	
	21:46	05:48 (WP Hirsch-03(N))	21:15	20:37 (WP KLUS-11)	20:14	19:40 (WP KLUS-14)	19:05	08:37 (WP Hirsch-15)	17:00	16:21	
2	05:13	05:43 (WP Hirsch-03(N))	05:49	06:18 (WP Hirsch-16)	06:38	08:13 (WP Hirsch-15)	07:26		07:19	08:09	
	21:46	05:47 (WP Hirsch-03(N))	21:14	20:37 (WP KLUS-11)	20:12	19:38 (WP KLUS-14)	19:03		16:58	16:20	
3	05:13		05:51	06:19 (WP Hirsch-16)	06:40	08:13 (WP Hirsch-15)	07:28		07:21	08:11	
	21:46		21:12	20:36 (WP KLUS-11)	20:10	19:35 (WP KLUS-14)	19:01		16:57	16:19	
4	05:14		05:52	06:20 (WP Hirsch-16)	06:41	08:12 (WP Hirsch-15)	07:30		07:23	08:12	
	21:45		21:10	20:35 (WP KLUS-11)	20:07	19:11 (WP Hirsch-15)	18:59		16:55	16:19	
5	05:15		05:54	06:22 (WP Hirsch-16)	06:43	08:11 (WP Hirsch-15)	07:31		07:25	08:13	
	21:45		21:09	20:34 (WP KLUS-11)	20:05	19:12 (WP Hirsch-15)	18:56		16:53	16:18	
6	05:16		05:55	06:36 (WP Hirsch-13)	06:45	08:10 (WP Hirsch-15)	07:33		07:27	08:15	
	21:44		21:07	07:14 (WP Hirsch-13)	20:03	19:12 (WP Hirsch-15)	18:54		16:51	16:18	
7	05:17		05:57	06:37 (WP Hirsch-13)	06:46	08:10 (WP Hirsch-15)	07:35		07:28	08:16	
	21:44		21:05	07:14 (WP Hirsch-13)	20:01	19:12 (WP Hirsch-15)	18:52		16:50	16:17	
8	05:17		05:58	06:36 (WP Hirsch-13)	06:48	08:09 (WP Hirsch-15)	07:36		07:30	08:17	
	21:43		21:03	07:13 (WP Hirsch-13)	19:58	19:12 (WP Hirsch-15)	18:50		16:48	16:17	
9	05:18		06:00	06:37 (WP Hirsch-13)	06:49	08:09 (WP Hirsch-15)	07:38		07:32	08:18	
	21:43		21:01	07:14 (WP Hirsch-13)	19:56	19:12 (WP Hirsch-15)	18:47		16:46	16:17	
10	05:19		06:02	06:37 (WP Hirsch-13)	06:51	08:08 (WP Hirsch-15)	07:40		07:34	08:19	
	21:42		21:00	07:13 (WP Hirsch-13)	19:54	19:11 (WP Hirsch-15)	18:45		16:45	16:17	
11	05:20	06:18 (WP Hirsch-16)	06:03	06:37 (WP Hirsch-13)	06:53	08:08 (WP Hirsch-15)	07:41		07:35	08:20	
	21:41		20:58	07:13 (WP Hirsch-13)	19:51	19:12 (WP Hirsch-15)	18:43		16:43	16:17	
12	05:21	06:16 (WP Hirsch-16)	06:05	06:37 (WP Hirsch-13)	06:54	08:07 (WP Hirsch-15)	07:43		07:37	08:21	
	21:40		20:56	07:11 (WP Hirsch-13)	19:49	19:11 (WP Hirsch-15)	18:41		16:42	16:16	
13	05:22	06:15 (WP Hirsch-16)	06:06	06:38 (WP Hirsch-13)	06:56	08:07 (WP Hirsch-15)	07:45		07:39	08:22	
	21:39		20:54	07:11 (WP Hirsch-13)	19:47	19:11 (WP Hirsch-15)	18:39		16:40	16:16	
14	05:24	06:14 (WP Hirsch-16)	06:08	06:38 (WP Hirsch-13)	06:57	08:07 (WP Hirsch-15)	07:46		07:41	08:23	
	21:39		20:52	07:10 (WP Hirsch-13)	19:45	19:10 (WP Hirsch-15)	18:36		16:39	16:16	
15	05:25	06:14 (WP Hirsch-16)	06:09	06:40 (WP Hirsch-13)	06:59	08:07 (WP Hirsch-15)	07:48		07:42	08:24	
	21:38		20:50	07:09 (WP Hirsch-13)	19:42	19:10 (WP Hirsch-15)	18:34		16:37	16:16	
16	05:26	06:14 (WP Hirsch-16)	06:11	06:40 (WP Hirsch-13)	07:01	08:07 (WP Hirsch-15)	07:50		07:44	08:25	
	21:37		20:48	07:07 (WP Hirsch-13)	19:40	19:09 (WP Hirsch-15)	18:32		16:36	16:17	
17	05:27	06:13 (WP Hirsch-16)	06:13	06:42 (WP Hirsch-13)	07:02	08:07 (WP Hirsch-15)	07:51		07:46	08:26	
	21:36		20:46	07:06 (WP Hirsch-13)	19:38	19:08 (WP Hirsch-15)	18:30		16:35	16:17	
18	05:28	06:12 (WP Hirsch-16)	06:14	06:43 (WP Hirsch-13)	07:04	08:08 (WP Hirsch-15)	07:53		07:47	08:27	
	21:34		20:44	07:04 (WP Hirsch-13)	19:35	19:08 (WP Hirsch-15)	18:28		16:33	16:17	
19	05:30	06:12 (WP Hirsch-16)	06:16	06:46 (WP Hirsch-13)	07:05	08:07 (WP Hirsch-15)	07:55		07:49	08:27	
	21:33		20:42	07:01 (WP Hirsch-13)	19:33	19:06 (WP Hirsch-15)	18:26		16:32	16:17	
20	05:31	06:11 (WP Hirsch-16)	06:17	06:49 (WP Hirsch-13)	07:07	08:08 (WP Hirsch-15)	07:57		07:51	08:28	
	21:32		20:40	08:45 (WP Hirsch-15)	19:31	19:05 (WP Hirsch-15)	18:24		16:31	16:18	
21	05:32	06:12 (WP Hirsch-16)	06:19	08:35 (WP Hirsch-15)	07:09	08:08 (WP Hirsch-15)	07:58		07:52	08:29	
	21:31		20:38	08:53 (WP Hirsch-15)	19:28	19:04 (WP Hirsch-15)	18:22		16:30	16:18	
22	05:34	06:11 (WP Hirsch-16)	06:21	08:31 (WP Hirsch-15)	07:10	08:09 (WP Hirsch-15)	08:00		07:54	08:29	
	21:30		20:36	08:56 (WP Hirsch-15)	19:26	19:03 (WP Hirsch-15)	18:20		16:29	16:19	
23	05:35	06:11 (WP Hirsch-16)	06:22	08:29 (WP Hirsch-15)	07:12	08:10 (WP Hirsch-15)	08:02		07:56	08:30	
	21:28		20:34	08:59 (WP Hirsch-15)	19:24	19:02 (WP Hirsch-15)	18:18		16:28	16:19	
24	05:36	06:10 (WP Hirsch-16)	06:24	08:26 (WP Hirsch-15)	07:13	08:10 (WP Hirsch-15)	08:04		07:57	08:30	
	21:27		20:32	09:01 (WP Hirsch-15)	19:22	19:05 (WP Hirsch-15)	18:16		16:27	16:20	
25	05:38	06:11 (WP Hirsch-16)	06:25	08:24 (WP Hirsch-15)	07:15	08:12 (WP Hirsch-15)	07:05		07:59	08:31	
	21:26		20:29	09:03 (WP Hirsch-15)	19:19	19:08 (WP Hirsch-15)	17:14		16:26	16:20	
26	05:39	06:11 (WP Hirsch-16)	06:27	08:22 (WP Hirsch-15)	07:17	08:13 (WP Hirsch-15)	07:07		08:00	08:31	
	21:24		20:27	19:40 (WP KLUS-14)	19:17	19:05 (WP Hirsch-15)	17:12		16:25	16:21	
27	05:40	06:10 (WP Hirsch-16)	06:29	08:21 (WP Hirsch-15)	07:18	08:14 (WP Hirsch-15)	07:09		08:02	08:31	
	21:23		20:25	19:42 (WP KLUS-14)	19:15	19:04 (WP Hirsch-15)	17:10		16:24	16:22	
28	05:42	06:11 (WP Hirsch-16)	06:30	08:19 (WP Hirsch-15)	07:20	08:17 (WP Hirsch-15)	07:11		08:03	08:31	
	21:21		20:23	19:41 (WP KLUS-14)	19:12	19:05 (WP Hirsch-15)	17:08		16:23	16:22	
29	05:43	06:12 (WP Hirsch-16)	06:32	08:18 (WP Hirsch-15)	07:21	08:18 (WP Hirsch-15)	07:12		08:05	08:31	
	21:20		20:21	19:42 (WP KLUS-14)	19:10	19:08 (WP Hirsch-15)	17:06		16:22	16:23	
30	05:45	06:13 (WP Hirsch-16)	06:33	08:16 (WP Hirsch-15)	07:23	08:22 (WP Hirsch-15)	07:14		08:06	08:32	
	21:18		20:19	19:41 (WP KLUS-14)	19:08	19:04 (WP Hirsch-15)	17:04		16:21	16:24	
31	05:46	06:15 (WP Hirsch-16)	06:35	08:15 (WP Hirsch-15)		07:16			08:08	08:32	
	21:17		20:16	19:41 (WP KLUS-14)		17:02			16:21	16:25	
Sonnenscheinstunden	500		453		381		332		268	246	
astr.max.mögl.Beschattung	866		1240		1666		8				
Red.Sonnenscheinwahrsch.	0,39		0,40		0,32		0,29				
Reduktion Betriebsdauer	0,84		0,84		0,84		0,84				
Reduktion Windrichtung	0,70		0,67		0,63		0,63				
Gesamte Reduktion	0,23		0,23		0,17		0,15				
Met.wahrsch.Beschattung	198		279		280		1				

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

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



Projekt: Schattenwurf Bad Wünnenb.-Hirschweg	Beschreibung: Auftraggeber:  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	Lizenzierter Anwender: Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ Q - Kampstr. 33, Leihberg (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]  
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor  
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:32 16:27	08:06 17:14	07:13 18:05	07:03 19:58	05:59 20:48	05:15 21:33	05:12 21:47	05:48 21:15	06:37 20:14	07:25 19:06	07:18 17:00	08:08 16:21
2	08:32 16:28	08:04 17:16	07:11 18:06	07:01 19:59	05:58 20:49	05:14 21:34	05:13 21:46	05:50 21:14	06:38 20:12	07:27 19:03	07:20 16:59	08:09 16:20
3	08:32 16:29	08:03 17:17	07:09 18:08	06:59 20:01	05:56 20:51	05:13 21:35	05:14 21:46	05:51 21:12	06:40 20:10	07:28 19:01	07:21 16:57	08:11 16:20
4	08:31 16:30	08:01 17:19	07:07 18:10	06:57 20:03	05:54 20:53	05:13 21:36	05:14 21:46	05:53 21:10	06:42 20:08	07:30 18:59	07:23 16:55	08:12 16:19
5	08:31 16:31	07:59 17:21	07:04 18:12	06:54 20:04	05:52 20:54	05:12 21:37	05:15 21:45	05:54 21:09	06:43 20:05	07:32 18:57	07:25 16:53	08:14 16:19
6	08:31 16:32	07:58 17:23	07:02 18:13	06:52 20:06	05:50 20:56	05:11 21:38	05:16 21:45	05:56 21:07	06:45 20:03	07:33 18:54	07:27 16:52	08:15 16:18
7	08:30 16:34	07:56 17:25	07:00 18:15	06:50 20:08	05:48 20:58	05:11 21:39	05:17 21:44	05:57 21:05	06:46 20:01	07:35 18:52	07:28 16:50	08:16 16:18
8	08:30 16:35	07:54 17:27	06:58 18:17	06:48 20:09	05:47 20:59	05:10 21:40	05:18 21:43	05:59 21:03	06:48 19:59	07:37 18:50	07:30 16:48	08:17 16:17
9	08:30 16:36	07:53 17:28	06:56 18:19	06:45 20:11	05:45 21:01	05:10 21:40	05:19 21:43	06:00 21:02	06:50 19:56	07:38 18:48	07:32 16:47	08:18 16:17
10	08:29 16:38	07:51 17:30	06:53 18:20	06:43 20:13	05:43 21:02	05:09 21:41	05:20 21:42	06:02 21:00	06:51 19:54	07:40 18:45	07:34 16:45	08:19 16:17
11	08:29 16:39	07:49 17:32	06:51 18:22	06:41 20:14	05:42 21:04	05:09 21:42	05:21 21:41	06:03 20:58	06:53 19:52	07:42 18:43	07:35 16:44	08:21 16:17
12	08:28 16:40	07:47 17:34	06:49 18:24	06:39 20:16	05:40 21:05	05:09 21:43	05:22 21:40	06:05 20:56	06:54 19:49	07:43 18:41	07:37 16:42	08:22 16:17
13	08:27 16:42	07:45 17:36	06:47 18:26	06:37 20:18	05:38 21:07	05:08 21:43	05:23 21:40	06:07 20:54	06:56 19:47	07:45 18:39	07:39 16:41	08:23 16:17
14	08:26 16:43	07:43 17:38	06:44 18:27	06:34 20:20	05:37 21:09	05:08 21:44	05:24 21:39	06:08 20:52	06:58 19:45	07:47 18:37	07:41 16:39	08:24 16:17
15	08:26 16:45	07:42 17:39	06:42 18:29	06:32 20:21	05:35 21:10	05:08 21:44	05:25 21:38	06:10 20:50	06:59 19:43	07:48 18:35	07:42 16:38	08:24 16:17
16	08:25 16:46	07:40 17:41	06:40 18:31	06:30 20:23	05:34 21:12	05:08 21:45	05:26 21:37	06:11 20:48	07:01 19:40	07:50 18:32	07:44 16:36	08:25 16:17
17	08:24 16:48	07:38 17:43	06:38 18:32	06:28 20:25	05:32 21:13	05:05 21:45	05:27 21:36	06:13 20:46	07:02 19:38	07:52 18:30	07:46 16:35	08:26 16:17
18	08:23 16:50	07:36 17:45	06:35 18:34	06:26 20:26	05:31 21:15	05:08 21:46	05:29 21:35	06:15 20:44	07:04 19:36	07:53 18:28	07:48 16:34	08:27 16:17
19	08:22 16:51	07:34 17:47	06:33 18:36	06:24 20:28	05:30 21:16	05:08 21:46	05:30 21:33	06:16 20:42	07:06 19:33	07:55 18:26	07:49 16:32	08:28 16:18
20	08:21 16:53	07:32 17:49	06:31 18:38	06:22 20:30	05:28 21:17	05:08 21:47	05:31 21:32	06:18 20:40	07:07 19:31	07:57 18:24	07:51 16:31	08:28 16:18
21	08:20 16:55	07:30 17:50	06:28 18:39	06:19 20:31	05:27 21:19	05:08 21:47	05:32 21:31	06:19 20:38	07:09 19:29	07:59 18:22	07:53 16:30	08:29 16:18
22	08:19 16:56	07:28 17:52	06:26 18:41	06:17 20:33	05:26 21:20	05:08 21:47	05:34 21:30	06:21 20:36	07:10 19:26	08:00 18:20	07:54 16:29	08:29 16:19
23	08:18 16:58	07:26 17:54	06:24 18:43	06:15 20:35	05:24 21:22	05:09 21:47	05:35 21:29	06:22 20:34	07:12 19:24	08:02 18:18	07:56 16:28	08:30 16:19
24	08:17 17:00	07:24 17:56	06:22 18:44	06:13 20:36	05:23 21:23	05:09 21:47	05:37 21:27	06:24 20:32	07:14 19:22	08:04 18:16	07:57 16:27	08:30 16:20
25	08:15 17:01	07:22 17:58	06:19 18:46	06:11 20:38	05:22 21:24	05:09 21:47	05:38 21:26	06:26 20:30	07:15 19:19	07:06 17:14	07:59 16:26	08:31 16:21
26	08:14 17:03	07:19 17:59	06:17 18:48	06:09 20:40	05:21 21:26	05:10 21:47	05:39 21:25	06:27 20:27	07:17 19:17	07:07 17:12	08:01 16:25	08:31 16:21
27	08:13 17:05	07:17 18:01	06:15 18:49	06:07 20:41	05:20 21:27	05:10 21:47	05:41 21:23	06:29 20:25	07:18 19:15	07:09 17:10	08:02 16:24	08:31 16:22
28	08:11 17:07	07:15 18:03	06:12 18:51	06:05 20:43	05:19 21:28	05:10 21:47	05:42 21:22	06:30 20:23	07:20 19:13	07:11 17:08	08:04 16:23	08:31 16:23
29	08:10 17:08		07:10 19:53	06:03 20:44	05:18 21:29	05:11 21:47	05:44 21:20	06:32 20:21	07:22 19:10	07:13 17:06	08:05 16:22	08:32 16:24
30	08:09 17:10		07:08 19:54	06:01 20:46	05:17 21:30	05:12 21:47	05:45 21:19	06:34 20:19	07:23 19:08	07:14 17:04	08:07 16:22	08:32 16:24
31	08:07 17:12		07:06 19:56	05:16 21:32	05:16 21:32	05:16 21:17	05:47 20:17	06:35 20:17	07:16 17:02	07:16 17:02	08:16 16:25	08:32 16:25
Sonnenscheinstunden	261	278	367	415	483	497	500	453	381	332	268	246
astr. max. mögl. Beschattung												
Red. Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met. wahrsch. Beschattung												

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

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

Projekt: <b>Schattenwurf Bad Wünnenb.-Hirschweg</b>	Beschreibung: <b>Auftraggeber:</b>  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	Lizenzierter Anwender: <b>Power of Nature - Windenergie</b> Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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### SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ R - Kampstr. 22, Leihberg (MI)

#### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

#### Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

| Januar | Februar | März | April | Mai | Juni | Juli | August | September | Oktober | November | Dezember

1	08:32	08:06	07:13	07:03	05:59	05:15	05:12	05:48	06:37	07:25	07:18	08:08
	16:27	17:14	18:05	19:58	20:48	21:33	21:47	21:15	20:14	19:06	17:00	16:21
2	08:32	08:04	07:11	07:01	05:58	05:14	05:13	05:50	06:38	07:27	07:20	08:09
	16:28	17:16	18:06	19:59	20:49	21:34	21:46	21:14	20:12	19:03	16:59	16:20
3	08:32	08:03	07:09	06:59	05:56	05:13	05:14	05:51	06:40	07:28	07:21	08:11
	16:29	17:17	18:08	20:01	20:51	21:35	21:46	21:12	20:10	19:01	16:57	16:20
4	08:31	08:01	07:07	06:57	05:54	05:13	05:14	05:53	06:42	07:30	07:23	08:12
	16:30	17:19	18:10	20:03	20:53	21:36	21:46	21:10	20:08	18:59	16:55	16:19
5	08:31	07:59	07:04	06:54	05:52	05:12	05:15	05:54	06:43	07:32	07:25	08:13
	16:31	17:21	18:12	20:04	20:54	21:37	21:45	21:09	20:05	18:57	16:53	16:19
6	08:31	07:58	07:02	06:52	05:50	05:11	05:16	05:56	06:45	07:33	07:27	08:15
	16:32	17:23	18:13	20:06	20:56	21:38	21:45	21:07	20:03	18:54	16:52	16:18
7	08:30	07:56	07:00	06:50	05:48	05:11	05:17	05:57	06:46	07:35	07:28	08:16
	16:34	17:25	18:15	20:08	20:58	21:39	21:44	21:05	20:01	18:52	16:50	16:18
8	08:30	07:54	06:58	06:48	05:47	05:10	05:18	05:59	06:48	07:37	07:30	08:17
	16:35	17:27	18:17	20:09	20:59	21:40	21:43	21:03	19:59	18:50	16:48	16:17
9	08:30	07:53	06:56	06:45	05:45	05:10	05:19	06:00	06:50	07:38	07:32	08:18
	16:36	17:28	18:19	20:11	21:01	21:40	21:43	21:02	19:56	18:48	16:47	16:17
10	08:29	07:51	06:53	06:43	05:43	05:09	05:20	06:02	06:51	07:40	07:34	08:19
	16:38	17:30	18:20	20:13	21:02	21:41	21:42	21:00	19:54	18:45	16:45	16:17
11	08:29	07:49	06:51	06:41	05:42	05:09	05:21	06:03	06:53	07:42	07:35	08:21
	16:39	17:32	18:22	20:14	21:04	21:42	21:41	20:58	19:52	18:43	16:44	16:17
12	08:28	07:47	06:49	06:39	05:40	05:09	05:22	06:05	06:54	07:43	07:37	08:22
	16:40	17:34	18:24	20:16	21:05	21:43	21:40	20:56	19:49	18:41	16:42	16:17
13	08:27	07:45	06:47	06:37	05:38	05:08	05:23	06:07	06:56	07:45	07:39	08:23
	16:42	17:36	18:26	20:18	21:07	21:43	21:40	20:54	19:47	18:39	16:41	16:17
14	08:26	07:43	06:44	06:34	05:37	05:08	05:24	06:08	06:58	07:47	07:41	08:24
	16:43	17:38	18:27	20:20	21:09	21:44	21:39	20:52	19:45	18:37	16:39	16:17
15	08:26	07:42	06:42	06:32	05:35	05:08	05:25	06:10	06:59	07:48	07:42	08:24
	16:45	17:39	18:29	20:21	21:10	21:44	21:38	20:50	19:43	18:35	16:38	16:17
16	08:25	07:40	06:40	06:30	05:34	05:08	05:26	06:11	07:01	07:50	07:44	08:25
	16:46	17:41	18:31	20:23	21:12	21:45	21:37	20:48	19:40	18:32	16:36	16:17
17	08:24	07:38	06:38	06:28	05:32	05:08	05:27	06:13	07:02	07:52	07:46	08:26
	16:48	17:43	18:32	20:25	21:13	21:45	21:36	20:46	19:38	18:30	16:35	16:17
18	08:23	07:36	06:35	06:26	05:31	05:08	05:29	06:15	07:04	07:53	07:48	08:27
	16:50	17:45	18:34	20:26	21:14	21:46	21:35	20:44	19:36	18:28	16:34	16:17
19	08:22	07:34	06:33	06:24	05:30	05:08	05:30	06:16	07:06	07:55	07:49	08:28
	16:51	17:47	18:36	20:28	21:16	21:46	21:33	20:42	19:33	18:26	16:32	16:18
20	08:21	07:32	06:31	06:22	05:28	05:08	05:31	06:18	07:07	07:57	07:51	08:28
	16:53	17:49	18:38	20:30	21:17	21:47	21:32	20:40	19:31	18:24	16:31	16:18
21	08:20	07:30	06:28	06:19	05:27	05:08	05:32	06:19	07:09	07:59	07:53	08:29
	16:55	17:50	18:39	20:31	21:19	21:47	21:31	20:38	19:29	18:22	16:30	16:18
22	08:19	07:28	06:26	06:17	05:26	05:08	05:34	06:21	07:10	08:00	07:54	08:29
	16:56	17:52	18:41	20:33	21:20	21:47	21:30	20:36	19:26	18:20	16:29	16:19
23	08:18	07:26	06:24	06:15	05:24	05:09	05:35	06:22	07:12	08:02	07:56	08:30
	16:58	17:54	18:43	20:35	21:22	21:47	21:29	20:34	19:24	18:18	16:28	16:19
24	08:17	07:24	06:22	06:13	05:23	05:09	05:37	06:24	07:14	08:04	07:57	08:30
	17:00	17:56	18:44	20:36	21:23	21:47	21:27	20:32	19:22	18:16	16:27	16:20
25	08:15	07:22	06:19	06:11	05:22	05:09	05:38	06:26	07:15	07:06	07:59	08:31
	17:01	17:58	18:46	20:38	21:24	21:47	21:26	20:30	19:19	17:14	16:26	16:21
26	08:14	07:19	06:17	06:09	05:21	05:10	05:39	06:27	07:17	07:07	08:01	08:31
	17:03	17:59	18:48	20:40	21:26	21:47	21:25	20:27	19:17	17:12	16:25	16:21
27	08:13	07:17	06:15	06:07	05:20	05:10	05:41	06:29	07:18	07:09	08:02	08:31
	17:05	18:01	18:49	20:41	21:27	21:47	21:23	20:25	19:15	17:10	16:24	16:22
28	08:11	07:15	06:12	06:05	05:19	05:10	05:42	06:30	07:20	07:11	08:04	08:31
	17:07	18:03	18:51	20:43	21:28	21:47	21:22	20:23	19:13	17:08	16:23	16:23
29	08:10		07:10	06:03	05:18	05:11	05:44	06:32	07:22	07:13	08:05	08:32
	17:08		19:53	20:44	21:29	21:47	21:20	20:21	19:10	17:06	16:22	16:24
30	08:09		07:08	06:01	05:17	05:12	05:45	06:34	07:23	07:14	08:07	08:32
	17:10		19:54	20:46	21:30	21:47	21:19	20:19	19:08	17:04	16:22	16:24
31	08:07		07:06	06:05	05:16	05:16	05:47	06:35	07:24	07:16	08:08	08:32
	17:12		19:56	20:47	21:32	21:47	21:17	20:17		17:02	16:25	16:25
Sonnenscheinstunden	261	278	367	415	483	497	500	453	381	332	268	246
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

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

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

Projekt: <b>Schattenwurf Bad Wünnenb.-Hirschweg</b>	Beschreibung: Auftraggeber:  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	Lizenzierter Anwender: Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de Berechnet: 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ S - Kampstr. 14, Leihberg (MI)

Annahmen für Schattenwurfberechnung Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]  
 Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
 1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor												
N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

		Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:32	08:06	07:13	07:03	05:59	05:15	05:12	05:48	06:37	07:25	07:18	08:08	
	16:27	17:14	18:05	19:58	20:48	21:33	21:47	21:15	20:14	19:06	17:00	16:21	
2	08:32	08:04	07:11	07:01	05:58	05:14	05:13	05:50	06:38	07:27	07:20	08:09	
	16:28	17:16	18:06	19:59	20:49	21:34	21:46	21:14	20:12	19:03	16:59	16:20	
3	08:32	08:03	07:09	06:59	05:56	05:13	05:14	05:51	06:40	07:28	07:21	08:11	
	16:29	17:17	18:08	20:01	20:51	21:35	21:46	21:12	20:10	19:01	16:57	16:20	
4	08:31	08:01	07:07	06:57	05:54	05:13	05:14	05:53	06:42	07:30	07:23	08:12	
	16:30	17:19	18:10	20:03	20:53	21:36	21:46	21:10	20:08	18:59	16:55	16:19	
5	08:31	07:59	07:04	06:54	05:52	05:12	05:15	05:54	06:43	07:32	07:25	08:13	
	16:31	17:21	18:12	20:04	20:54	21:37	21:45	21:09	20:05	18:57	16:53	16:19	
6	08:31	07:58	07:02	06:52	05:50	05:11	05:16	05:56	06:45	07:33	07:27	08:15	
	16:32	17:23	18:13	20:06	20:56	21:38	21:45	21:07	20:03	18:54	16:52	16:18	
7	08:30	07:56	07:00	06:50	05:48	05:11	05:17	05:57	06:46	07:35	07:28	08:16	
	16:34	17:25	18:15	20:08	20:58	21:39	21:44	21:05	20:01	18:52	16:50	16:18	
8	08:30	07:54	06:58	06:48	05:47	05:10	05:18	05:59	06:48	07:37	07:30	08:17	
	16:35	17:27	18:17	20:09	20:59	21:40	21:43	21:03	19:59	18:50	16:48	16:17	
9	08:30	07:53	06:56	06:45	05:45	05:10	05:19	06:00	06:50	07:38	07:32	08:18	
	16:36	17:28	18:19	20:11	21:01	21:40	21:43	21:02	19:56	18:48	16:47	16:17	
10	08:29	07:51	06:53	06:43	05:43	05:09	05:20	06:02	06:51	07:40	07:34	08:19	
	16:38	17:30	18:20	20:13	21:02	21:41	21:42	21:00	19:54	18:45	16:45	16:17	
11	08:29	07:49	06:51	06:41	05:42	05:09	05:21	06:03	06:53	07:42	07:35	08:21	
	16:39	17:32	18:22	20:14	21:04	21:42	21:41	20:58	19:52	18:43	16:44	16:17	
12	08:28	07:47	06:49	06:39	05:40	05:09	05:22	06:05	06:54	07:43	07:37	08:22	
	16:40	17:34	18:24	20:16	21:05	21:43	21:40	20:56	19:49	18:41	16:42	16:17	
13	08:27	07:45	06:47	06:37	05:38	05:08	05:23	06:07	06:56	07:45	07:39	08:23	
	16:42	17:36	18:26	20:18	21:07	21:43	21:40	20:54	19:47	18:39	16:41	16:17	
14	08:26	07:43	06:44	06:34	05:37	05:08	05:24	06:08	06:58	07:47	07:41	08:24	
	16:43	17:38	18:27	20:20	21:09	21:44	21:39	20:52	19:45	18:37	16:39	16:17	
15	08:26	07:42	06:42	06:32	05:35	05:08	05:25	06:10	06:59	07:48	07:42	08:24	
	16:45	17:39	18:29	20:21	21:10	21:44	21:38	20:50	19:43	18:35	16:38	16:17	
16	08:25	07:40	06:40	06:30	05:34	05:08	05:26	06:11	07:01	07:50	07:44	08:25	
	16:46	17:41	18:31	20:23	21:12	21:45	21:37	20:48	19:40	18:32	16:36	16:17	
17	08:24	07:38	06:38	06:28	05:32	05:05	05:27	06:13	07:02	07:52	07:46	08:26	
	16:48	17:43	18:32	20:25	21:13	21:45	21:36	20:46	19:38	18:30	16:35	16:17	
18	08:23	07:36	06:35	06:26	05:31	05:08	05:29	06:15	07:04	07:53	07:48	08:27	
	16:50	17:45	18:34	20:26	21:14	21:46	21:35	20:44	19:36	18:28	16:34	16:17	
19	08:22	07:34	06:33	06:24	05:30	05:08	05:30	06:16	07:06	07:55	07:49	08:28	
	16:51	17:47	18:36	20:28	21:16	21:46	21:33	20:42	19:33	18:26	16:32	16:18	
20	08:21	07:32	06:31	06:22	05:28	05:08	05:31	06:18	07:07	07:57	07:51	08:28	
	16:53	17:49	18:38	20:30	21:17	21:47	21:32	20:40	19:31	18:24	16:31	16:18	
21	08:20	07:30	06:28	06:19	05:27	05:08	05:32	06:19	07:09	07:59	07:53	08:29	
	16:55	17:50	18:39	20:31	21:19	21:47	21:31	20:38	19:29	18:22	16:30	16:18	
22	08:19	07:28	06:26	06:17	05:26	05:08	05:34	06:21	07:10	08:00	07:54	08:29	
	16:56	17:52	18:41	20:33	21:20	21:47	21:30	20:36	19:26	18:20	16:29	16:19	
23	08:18	07:26	06:24	06:15	05:24	05:09	05:35	06:22	07:12	08:02	07:56	08:30	
	16:58	17:54	18:43	20:35	21:22	21:47	21:29	20:34	19:24	18:18	16:28	16:19	
24	08:17	07:24	06:22	06:13	05:23	05:09	05:37	06:24	07:14	08:04	07:57	08:30	
	17:00	17:56	18:44	20:36	21:23	21:47	21:27	20:32	19:22	18:16	16:27	16:20	
25	08:15	07:22	06:19	06:11	05:22	05:09	05:38	06:26	07:15	07:06	07:59	08:31	
	17:01	17:58	18:46	20:38	21:24	21:47	21:26	20:30	19:19	17:14	16:26	16:21	
26	08:14	07:19	06:17	06:09	05:21	05:10	05:39	06:27	07:17	07:07	08:01	08:31	
	17:03	17:59	18:48	20:40	21:26	21:47	21:25	20:27	19:17	17:12	16:25	16:21	
27	08:13	07:17	06:15	06:07	05:20	05:10	05:41	06:29	07:18	07:09	08:02	08:31	
	17:05	18:01	18:49	20:41	21:27	21:47	21:23	20:25	19:15	17:10	16:24	16:22	
28	08:11	07:15	06:12	06:05	05:19	05:10	05:42	06:30	07:20	07:11	08:04	08:31	
	17:07	18:03	18:51	20:43	21:28	21:47	21:22	20:23	19:13	17:08	16:23	16:23	
29	08:10		07:10	06:03	05:18	05:11	05:44	06:32	07:22	07:13	08:05	08:32	
	17:08		19:53	20:44	21:29	21:47	21:20	20:21	19:10	17:06	16:22	16:24	
30	08:09		07:08	06:01	05:17	05:12	05:45	06:34	07:23	07:14	08:07	08:32	
	17:10		19:54	20:46	21:30	21:47	21:19	20:19	19:08	17:04	16:22	16:24	
31	08:07		07:06	06:05	05:16	05:16	05:47	06:35	07:24	07:16	08:09	08:32	
	17:12		19:56		21:32		21:17	20:17		17:02		16:25	
Sonnenscheinstunden		261	278	367	415	483	497	500	453	381	332	268	246
astr.max.mögl.Beschattung													
Red.Sonnenscheinwahrsch.													
Reduktion Betriebsdauer													
Reduktion Windrichtung													
Gesamte Reduktion													
Met.wahrsch.Beschattung													

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

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

Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ T - Am Bleichplatz 5a, Leihberg (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember	
1	08:32 16:27	08:06 17:14	07:13 18:05	07:03 19:58	05:59 20:48	05:15 21:33	05:12 21:47	05:48 21:15	06:37 20:14	07:25 19:06	07:18 17:00	08:08 16:21	
2	08:32 16:28	08:04 17:16	07:11 18:06	07:01 19:59	05:58 20:49	05:14 21:34	05:13 21:46	05:50 21:14	06:38 20:12	07:27 19:03	07:20 16:59	08:09 16:20	
3	08:32 16:29	08:03 17:17	07:09 18:08	06:59 20:01	05:56 20:51	05:13 21:35	05:14 21:46	05:51 21:12	06:40 20:10	07:28 19:01	07:21 16:57	08:11 16:20	
4	08:31 16:30	08:01 17:19	07:07 18:10	06:57 20:03	05:54 20:53	05:13 21:36	05:14 21:45	05:53 21:10	06:42 20:08	07:30 18:59	07:23 16:55	08:12 16:19	
5	08:31 16:31	07:59 17:21	07:04 18:12	06:54 20:04	05:52 20:54	05:12 21:37	05:15 21:45	05:54 21:09	06:43 20:05	07:32 18:57	07:25 16:53	08:13 16:19	
6	08:31 16:32	07:58 17:23	07:02 18:13	06:52 20:06	05:50 20:56	05:11 21:38	05:16 21:45	05:56 21:07	06:45 20:03	07:33 18:54	07:27 16:52	08:15 16:18	
7	08:30 16:34	07:56 17:25	07:00 18:15	06:50 20:08	05:49 20:58	05:11 21:39	05:17 21:44	05:57 21:05	06:46 20:01	07:35 18:52	07:28 16:50	08:16 16:18	
8	08:30 16:35	07:54 17:27	06:58 18:17	06:48 20:09	05:47 20:59	05:10 21:40	05:18 21:43	05:59 21:03	06:48 19:59	07:37 18:50	07:30 16:48	08:17 16:17	
9	08:30 16:36	07:53 17:28	06:56 18:19	06:45 20:11	05:45 21:01	05:10 21:40	05:19 21:43	06:00 21:02	06:50 19:56	07:38 18:48	07:32 16:47	08:18 16:17	
10	08:29 16:38	07:51 17:30	06:53 18:20	06:43 20:13	05:43 21:02	05:09 21:41	05:20 21:42	06:02 21:00	06:51 19:54	07:40 18:45	07:34 16:45	08:19 16:17	
11	08:29 16:39	07:49 17:32	06:51 18:22	06:41 20:14	05:42 21:04	05:09 21:42	05:21 21:41	06:03 20:58	06:53 19:52	07:42 18:43	07:35 16:44	08:21 16:17	
12	08:28 16:40	07:47 17:34	06:49 18:24	06:39 20:16	05:40 21:05	05:09 21:43	05:22 21:40	06:05 20:56	06:54 19:49	07:43 18:41	07:37 16:42	08:22 16:17	
13	08:27 16:42	07:45 17:36	06:47 18:26	06:37 20:18	05:38 21:07	05:08 21:43	05:23 21:40	06:07 20:54	06:56 19:47	07:45 18:39	07:39 16:41	08:23 16:17	
14	08:26 16:43	07:43 17:38	06:44 18:27	06:34 20:20	05:37 21:09	05:08 21:44	05:24 21:39	06:08 20:52	06:58 19:45	07:47 18:37	07:41 16:39	08:24 16:17	
15	08:26 16:45	07:42 17:39	06:42 18:29	06:32 20:21	05:35 21:10	05:08 21:44	05:25 21:38	06:10 20:50	06:59 19:43	07:48 18:35	07:42 16:38	08:24 16:17	
16	08:25 16:46	07:40 17:41	06:40 18:31	06:30 20:23	05:34 21:12	05:08 21:45	05:26 21:37	06:11 20:48	07:01 19:40	07:50 18:32	07:44 16:36	08:25 16:17	
17	08:24 16:48	07:38 17:43	06:38 18:32	06:28 20:25	05:32 21:13	05:05 21:45	05:27 21:36	06:13 20:46	07:02 19:38	07:52 18:30	07:46 16:35	08:26 16:17	
18	08:23 16:50	07:36 17:45	06:35 18:34	06:26 20:26	05:31 21:14	05:08 21:46	05:29 21:35	06:15 20:44	07:04 19:36	07:53 18:28	07:48 16:34	08:27 16:17	
19	08:22 16:51	07:34 17:47	06:33 18:36	06:24 20:28	05:30 21:16	05:08 21:46	05:30 21:33	06:16 20:42	07:06 19:33	07:55 18:26	07:49 16:32	08:28 16:18	
20	08:21 16:53	07:32 17:49	06:31 18:38	06:22 20:30	05:28 21:17	05:08 21:47	05:31 21:32	06:18 20:40	07:07 19:31	07:57 18:24	07:51 16:31	08:28 16:18	
21	08:20 16:55	07:30 17:50	06:28 18:39	06:19 20:31	05:27 21:19	05:08 21:47	05:32 21:31	06:19 20:38	07:09 19:29	07:59 18:22	07:53 16:30	08:29 16:18	
22	08:19 16:56	07:28 17:52	06:26 18:41	06:17 20:33	05:26 21:20	05:08 21:47	05:34 21:30	06:21 20:36	07:10 19:26	08:00 18:20	07:54 16:29	08:29 16:19	
23	08:18 16:58	07:26 17:54	06:24 18:43	06:15 20:35	05:24 21:22	05:09 21:47	05:35 21:29	06:22 20:34	07:12 19:24	08:02 18:18	07:56 16:28	08:30 16:19	
24	08:17 17:00	07:24 17:56	06:22 18:44	06:13 20:36	05:23 21:23	05:09 21:47	05:37 21:27	06:24 20:32	07:14 19:22	08:04 18:16	07:57 16:27	08:30 16:20	
25	08:15 17:01	07:22 17:58	06:19 18:46	06:11 20:38	05:22 21:24	05:09 21:47	05:38 21:26	06:26 20:30	07:15 19:19	07:06 17:14	07:59 16:26	08:31 16:21	
26	08:14 17:03	07:19 17:59	06:17 18:48	06:09 20:40	05:21 21:26	05:10 21:47	05:39 21:25	06:27 20:27	07:17 19:17	07:07 17:12	08:01 16:25	08:31 16:21	
27	08:13 17:05	07:17 18:01	06:15 18:49	06:07 20:41	05:20 21:27	05:10 21:47	05:41 21:23	06:29 20:25	07:18 19:15	07:09 17:10	08:02 16:24	08:31 16:22	
28	08:11 17:07	07:15 18:03	06:12 18:51	06:05 20:43	05:19 21:28	05:10 21:47	05:42 21:22	06:30 20:23	07:20 19:13	07:11 17:08	08:04 16:23	08:31 16:23	
29	08:10 17:08		07:10 19:53	06:03 20:44	05:18 21:29	05:11 21:47	05:44 21:20	06:32 20:21	07:22 19:10	07:13 17:06	08:05 16:22	08:32 16:24	
30	08:09 17:10		07:08 19:54	06:01 20:46	05:17 21:30	05:12 21:47	05:45 21:19	06:34 20:19	07:23 19:08	07:14 17:04	08:07 16:22	08:32 16:24	
31	08:07 17:12		07:06 19:56	05:16 21:32	05:16 21:32	05:16 21:17	05:47 21:17	06:35 20:17	07:16 17:02	07:16 17:02	08:08 16:25	08:32 16:25	
	Sonnenscheinstunden	261	278	367	415	483	497	500	453	381	332	268	246
	astr.max.mögl.Beschattung												
	Red.Sonnenscheinwahrsch.												
	Reduktion Betriebsdauer												
	Reduktion Windrichtung												
	Gesamte Reduktion												
	Met.wahrsch.Beschattung												

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	Schattenanfang (WEA mit erstem Schatten)	Schattende (WEA mit letztem Schatten)
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Projekt:  
Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung:  
Auftraggeber:  
WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender:  
Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtgtes / joerg.fuertges@powernature.de  
Berechnet:  
21.05.2024 09:58/3.6.366

### SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ U - Am Mühlenbusch 2, Leihberg (MI)

#### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

#### Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
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2	08:32	08:04	07:11	07:01	05:58	05:14	05:13	05:50	06:38	07:27	07:20	08:09
	16:28	17:16	18:06	19:59	20:49	21:34	21:46	21:14	20:12	19:03	16:59	16:20
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	16:29	17:17	18:08	20:01	20:51	21:35	21:46	21:12	20:10	19:01	16:57	16:20
4	08:31	08:01	07:07	06:57	05:54	05:13	05:14	05:53	06:42	07:30	07:23	08:12
	16:30	17:19	18:10	20:03	20:53	21:36	21:45	21:10	20:08	18:59	16:55	16:19
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14	08:26	07:43	06:44	06:34	05:37	05:08	05:24	06:08	06:58	07:47	07:41	08:24
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	16:50	17:45	18:34	20:26	21:14	21:46	21:35	20:44	19:36	18:28	16:34	16:17
19	08:22	07:34	06:33	06:24	05:30	05:08	05:30	06:16	07:06	07:55	07:49	08:28
	16:51	17:47	18:36	20:28	21:16	21:46	21:33	20:42	19:33	18:26	16:32	16:18
20	08:21	07:32	06:31	06:22	05:28	05:08	05:31	06:18	07:07	07:57	07:51	08:28
	16:53	17:49	18:38	20:30	21:17	21:47	21:32	20:40	19:31	18:24	16:31	16:18
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	16:55	17:50	18:39	20:31	21:19	21:47	21:31	20:38	19:29	18:22	16:30	16:18
22	08:19	07:28	06:26	06:17	05:26	05:08	05:34	06:21	07:10	08:00	07:54	08:29
	16:56	17:52	18:41	20:33	21:20	21:47	21:30	20:36	19:26	18:20	16:29	16:19
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	17:00	17:56	18:44	20:36	21:23	21:47	21:27	20:32	19:22	18:16	16:27	16:20
25	08:15	07:22	06:19	06:11	05:22	05:09	05:38	06:26	07:15	07:06	07:59	08:31
	17:01	17:58	18:46	20:38	21:24	21:47	21:26	20:30	19:19	17:14	16:26	16:21
26	08:14	07:19	06:17	06:09	05:21	05:10	05:39	06:27	07:17	07:07	08:01	08:31
	17:03	17:59	18:48	20:39	21:26	21:47	21:24	20:27	19:17	17:12	16:25	16:21
27	08:13	07:17	06:15	06:07	05:20	05:10	05:41	06:29	07:18	07:09	08:02	08:31
	17:05	18:01	18:49	20:41	21:27	21:47	21:23	20:25	19:15	17:10	16:24	16:22
28	08:11	07:15	06:12	06:05	05:19	05:10	05:42	06:30	07:20	07:11	08:04	08:31
	17:07	18:03	18:51	20:43	21:28	21:47	21:22	20:23	19:13	17:08	16:23	16:23
29	08:10		07:10	06:03	05:18	05:11	05:44	06:32	07:22	07:13	08:05	08:32
	17:08		19:53	20:44	21:29	21:47	21:20	20:21	19:10	17:06	16:22	16:24
30	08:09		07:08	06:01	05:17	05:12	05:45	06:34	07:23	07:14	08:07	08:32
	17:10		19:54	20:46	21:30	21:47	21:19	20:19	19:08	17:04	16:22	16:24
31	08:07		07:06	06:05	05:16	05:16	05:47	06:35	07:24	07:16	08:08	08:32
	17:12		19:56	20:46	21:32	21:47	21:17	20:16		17:02	16:25	16:25
Sonnenscheinstunden	261	278	367	415	483	497	500	453	381	332	268	246
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

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

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



<b>Projekt:</b> Schattenwurf Bad Wünnenb.-Hirschweg	<b>Beschreibung:</b> <b>Auftraggeber:</b>  WBG Energie 1 GmbH & Co. KG An der Grotte 17  D-33181 Bad Wünnenberg  Bundesland des Projekts: Nordrhein-Westfalen	<b>Lizenzierter Anwender:</b> Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de <small>Berechnet:</small> 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ V - Am Mühlenbusch 3a, Leihberg (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:32	08:06	07:13	07:03	05:59	05:15	05:12	05:48	06:37	07:25	07:18	08:08
	16:27	17:14	18:05	19:58	20:48	21:33	21:47	21:15	20:14	19:06	17:00	16:21
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	17:00	17:56	18:44	20:36	21:23	21:47	21:27	20:32	19:22	18:16	16:27	16:20
25	08:15	07:22	06:19	06:11	05:22	05:09	05:38	06:26	07:15	07:06	07:59	08:31
	17:01	17:58	18:46	20:38	21:24	21:47	21:26	20:30	19:19	17:14	16:26	16:21
26	08:14	07:19	06:17	06:09	05:21	05:10	05:39	06:27	07:17	07:07	08:01	08:31
	17:03	17:59	18:48	20:39	21:26	21:47	21:25	20:27	19:17	17:12	16:25	16:21
27	08:13	07:17	06:15	06:07	05:20	05:10	05:41	06:29	07:18	07:09	08:02	08:31
	17:05	18:01	18:49	20:41	21:27	21:47	21:23	20:25	19:15	17:10	16:24	16:22
28	08:11	07:15	06:12	06:05	05:19	05:10	05:42	06:30	07:20	07:11	08:04	08:31
	17:07	18:03	18:51	20:43	21:28	21:47	21:22	20:23	19:13	17:08	16:23	16:23
29	08:10		07:10	06:03	05:18	05:11	05:44	06:32	07:22	07:13	08:05	08:32
	17:08		19:53	20:44	21:29	21:47	21:20	20:21	19:10	17:06	16:22	16:24
30	08:09		07:08	06:01	05:17	05:12	05:45	06:34	07:23	07:14	08:07	08:32
	17:10		19:54	20:46	21:30	21:47	21:19	20:19	19:08	17:04	16:22	16:24
31	08:07		07:06	06:00	05:16	05:16	05:47	06:35	07:24	07:16	08:09	08:32
	17:12		19:56	20:47	21:32	21:47	21:17	20:16		17:02	16:25	16:25
	Sonnenscheinstunden   261   278   367   415   483   497   500   453   381   332   268   246											
	astr.max.mögl.Beschattung											
	Red.Sonnenscheinwahrsch.											
	Reduktion Betriebsdauer											
	Reduktion Windrichtung											
	Gesamte Reduktion											
	Met.wahrsch.Beschattung											

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

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

<b>Projekt:</b> Schattenwurf Bad Wünnenb.-Hirschweg	<b>Beschreibung:</b> Auftraggeber: WBG Energie 1 GmbH & Co. KG An der Grotte 17 D-33181 Bad Wünnenberg Bundesland des Projekts: Nordrhein-Westfalen	<b>Lizenzierter Anwender:</b> Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674 Fürtges / joerg.fuertges@powernature.de <small>Berechnet:</small> 21.05.2024 09:58/3.6.366
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## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ W - Siedlung Eilern 15, Eilern (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

### Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:31	08:05	07:13	07:03	05:59	05:14	05:12	05:47	06:36	07:25	07:17	08:08
	16:26	17:13	18:04	19:57	20:47	21:32	21:46	21:15	20:14	19:05	17:00	16:20
2	08:31	08:04	07:11	07:01	05:57	05:14	05:12	05:49	06:38	07:26	07:19	08:09
	16:27	17:15	18:06	19:59	20:49	21:34	21:46	21:13	20:12	19:03	16:58	16:20
3	08:31	08:02	07:08	06:58	05:55	05:13	05:13	05:51	06:40	07:28	07:21	08:11
	16:28	17:17	18:08	20:01	20:51	21:35	21:46	21:12	20:09	19:01	16:56	16:19
4	08:31	08:01	07:06	06:56	05:53	05:12	05:14	05:52	06:41	07:29	07:23	08:12
	16:29	17:19	18:09	20:02	20:52	21:36	21:45	21:10	20:07	18:58	16:55	16:19
5	08:31	07:59	07:04	06:54	05:52	05:11	05:15	05:54	06:43	07:31	07:25	08:13
	16:31	17:21	18:11	20:04	20:54	21:37	21:45	21:08	20:05	18:56	16:53	16:18
6	08:31	07:57	07:02	06:52	05:50	05:11	05:15	05:55	06:44	07:33	07:26	08:14
	16:32	17:22	18:13	20:06	20:56	21:38	21:44	21:07	20:03	18:54	16:51	16:18
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	16:33	17:24	18:15	20:07	20:57	21:38	21:44	21:05	20:00	18:52	16:49	16:17
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	16:34	17:26	18:16	20:09	20:59	21:39	21:43	21:03	19:58	18:49	16:48	16:17
9	08:29	07:52	06:55	06:45	05:45	05:09	05:18	06:00	06:49	07:38	07:32	08:18
	16:36	17:28	18:18	20:11	21:00	21:40	21:42	21:01	19:56	18:47	16:46	16:17
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13	08:27	07:45	06:46	06:36	05:38	05:08	05:22	06:06	06:56	07:44	07:39	08:22
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14	08:26	07:43	06:44	06:34	05:36	05:08	05:23	06:08	06:57	07:46	07:40	08:23
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15	08:25	07:41	06:42	06:32	05:35	05:07	05:24	06:09	06:59	07:48	07:42	08:24
	16:44	17:39	18:29	20:21	21:10	21:44	21:37	20:50	19:42	18:34	16:37	16:16
16	08:25	07:39	06:39	06:30	05:33	05:07	05:26	06:11	07:00	07:50	07:44	08:25
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17	08:24	07:37	06:37	06:27	05:32	05:07	05:27	06:12	07:02	07:51	07:46	08:26
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	16:51	17:46	18:35	20:27	21:16	21:46	21:33	20:42	19:33	18:26	16:32	16:17
20	08:21	07:31	06:30	06:21	05:28	05:07	05:31	06:17	07:07	07:56	07:51	08:28
	16:52	17:48	18:37	20:29	21:17	21:46	21:32	20:40	19:31	18:23	16:31	16:17
21	08:20	07:29	06:28	06:19	05:26	05:08	05:32	06:19	07:08	07:58	07:52	08:28
	16:54	17:50	18:39	20:31	21:18	21:46	21:31	20:38	19:28	18:21	16:30	16:18
22	08:19	07:27	06:26	06:17	05:25	05:08	05:33	06:20	07:10	08:00	07:54	08:29
	16:56	17:52	18:40	20:32	21:20	21:47	21:30	20:36	19:26	18:19	16:28	16:18
23	08:17	07:25	06:23	06:15	05:24	05:08	05:35	06:22	07:12	08:02	07:55	08:30
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	16:59	17:55	18:44	20:36	21:23	21:47	21:27	20:31	19:21	18:15	16:26	16:19
25	08:15	07:21	06:19	06:11	05:21	05:09	05:37	06:25	07:15	07:05	07:59	08:30
	17:01	17:57	18:46	20:37	21:24	21:47	21:26	20:29	19:19	17:13	16:25	16:20
26	08:14	07:19	06:17	06:09	05:20	05:09	05:39	06:27	07:16	07:07	08:00	08:31
	17:03	17:59	18:47	20:39	21:25	21:47	21:24	20:27	19:17	17:11	16:24	16:21
27	08:12	07:17	06:14	06:07	05:19	05:09	05:40	06:28	07:18	07:09	08:02	08:31
	17:04	18:01	18:49	20:41	21:26	21:47	21:23	20:25	19:14	17:09	16:23	16:21
28	08:11	07:15	06:12	06:05	05:18	05:10	05:42	06:30	07:20	07:10	08:03	08:31
	17:06	18:02	18:51	20:42	21:28	21:47	21:21	20:23	19:12	17:07	16:23	16:22
29	08:10		07:10	06:03	05:17	05:10	05:43	06:32	07:21	07:12	08:05	08:31
	17:08		19:52	20:44	21:29	21:47	21:20	20:21	19:10	17:06	16:22	16:23
30	08:08		07:07	06:01	05:16	05:11	05:45	06:33	07:23	07:14	08:06	08:31
	17:10		19:54	20:46	21:30	21:47	21:18	20:18	19:08	17:04	16:21	16:24
31	08:07		07:05	06:00	05:15	05:10	05:46	06:35	07:24	07:16	08:08	08:31
	17:12		19:56	20:48	21:31	21:47	21:17	20:16		17:02	16:25	16:25
Sonnenscheinstunden	261	278	367	415	484	497	500	453	381	332	268	246
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

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

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

Projekt: Schattenwurf Bad Wünnenb.-Hirschweg

Beschreibung: Auftraggeber: WBG Energie 1 GmbH & Co. KG  
An der Grotte 17  
D-33181 Bad Wünnenberg  
Bundesland des Projekts: Nordrhein-Westfalen

Lizenzierter Anwender: Power of Nature - Windenergie  
Aulendorf 40  
DE-48727 Billerbeck  
02543 9304674  
Fürtges / joerg.fuertges@powernature.de  
Berechnet: 21.05.2024 09:58/3.6.366

### SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ X - Siedlung Eilern 16, Eilern (MI)

Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan	Feb	Mär	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1,58	3,21	3,35	5,03	6,68	5,58	6,26	5,85	4,04	3,08	2,01	1,34

Betriebsdauer je Sektor

N	NNO	ONO	O	OSO	SSO	S	SSW	WSW	W	WNW	NNW	Summe
261	393	465	559	645	475	572	869	1.140	1.059	606	326	7.370

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

Sonnenscheinstunden | 261 | 278 | 367 | 415 | 484 | 497 | 500 | 453 | 381 | 332 | 268 | 246

astr.max.mögl.Beschattung |

Red.Sonnenscheinwahrsch. |

Reduktion Betriebsdauer |

Reduktion Windrichtung |

Gesamte Reduktion |

Met.wahrsch.Beschattung |

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

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

**Projekt:** Schattenwurf Bad Wünnenb.-Hirschweg  
**Beschreibung:** Auftraggeber: WBG Energie 1 GmbH & Co. KG  
 An der Grotte 17  
 D-33181 Bad Wünnenberg  
 Bundesland des Projekts: Nordrhein-Westfalen

**Lizenzierter Anwender:** Power of Nature - Windenergie  
 Aulendorf 40  
 DE-48727 Billerbeck  
 02543 9304674  
 Fürtgtes / joerg.fuertges@powernature.de  
 Berechnet: 21.05.2024 09:58/3.6.366

## SHADOW - Kalender

**Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ Y - Tewesweg 1, Fürstenberg (MI)**

**Annahmen für Schattenwurfberechnung**

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]

Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
 1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

**Betriebsdauer je Sektor**

N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
 261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

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

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

Tag im Monat	Sonnenaufgang (SS:MM)	Sonnenuntergang (SS:MM)	Minuten mit Schatten	Zeitpunkt (SS:MM) Schattenanfang	Zeitpunkt (SS:MM) Schattende	(WEA mit erstem Schatten)	(WEA mit letztem Schatten)
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Projekt: Schattenwurf Bad Wünnenb.-Hirschweg	Beschreibung: Auftraggeber:	Lizenzierter Anwender:
	WBG Energie 1 GmbH & Co. KG An der Grotte 17	Power of Nature - Windenergie Aulendorf 40 DE-48727 Billerbeck 02543 9304674
	D-33181 Bad Wünnenberg	Fürtges / joerg.fuertges@powernature.de Berechnet:
	Bundesland des Projekts: Nordrhein-Westfalen	21.05.2024 09:58/3.6.366

## SHADOW - Kalender

Berechnung: Gesamtbelastung (Vorbelastung & 1 x Neuanlage) Schattenrezeptor: RZ Z - Tewesweg 3, Fürstenberg (MI)

### Annahmen für Schattenwurfberechnung

Sonnenscheinwahrscheinlichkeit S (Mittlere tägliche Sonnenstunden) [BAD LIPSPRINGE]  
Jan Feb Mär Apr Mai Jun Jul Aug Sep Okt Nov Dez  
1,58 3,21 3,35 5,03 6,68 5,58 6,26 5,85 4,04 3,08 2,01 1,34

Betriebsdauer je Sektor  
N NNO ONO O OSO SSO S SSW WSW W WNW NNW Summe  
261 393 465 559 645 475 572 869 1.140 1.059 606 326 7.370

	Januar	Februar	März	April	Mai	Juni	Juli	August	September	Oktober	November	Dezember
1	08:31 16:26	08:05 17:13	07:13 18:04	07:03 19:57	05:59 20:47	05:15 21:32	05:12 21:46	05:48 21:15	06:36 20:14	07:25 19:05	07:17 17:00	08:08 16:20
2	08:31 16:27	08:04 17:15	07:11 18:06	07:01 19:59	05:57 20:49	05:14 21:33	05:12 21:46	05:49 21:13	06:38 20:12	07:26 19:03	07:19 16:58	08:09 16:20
3	08:31 16:28	08:02 17:17	07:08 18:08	06:58 20:01	05:55 20:51	05:13 21:35	05:13 21:46	05:51 21:12	06:40 20:09	07:28 19:01	07:21 16:56	08:10 16:19
4	08:31 16:30	08:01 17:19	07:06 18:10	06:56 20:02	05:53 20:52	05:12 21:36	05:14 21:45	05:52 21:10	06:41 20:07	07:30 18:58	07:23 16:55	08:12 16:19
5	08:31 16:31	07:59 17:21	07:04 18:11	06:54 20:04	05:52 20:54	05:12 21:37	05:15 21:45	05:54 21:08	06:43 20:05	07:31 18:56	07:25 16:53	08:13 16:18
6	08:30 16:32	07:57 17:23	07:02 18:13	06:52 20:06	05:50 20:56	05:11 21:37	05:16 21:44	05:55 21:07	06:44 20:03	07:33 18:54	07:26 16:51	08:14 16:18
7	08:30 16:33	07:56 17:24	07:00 18:15	06:49 20:07	05:48 20:57	05:10 21:38	05:16 21:44	05:57 21:05	06:46 20:00	07:34 18:52	07:28 16:50	08:16 16:17
8	08:30 16:35	07:54 17:26	06:57 18:17	06:47 20:09	05:46 20:59	05:10 21:39	05:17 21:43	05:58 21:03	06:48 19:58	07:36 18:49	07:30 16:48	08:17 16:17
9	08:29 16:36	07:52 17:28	06:55 18:18	06:45 20:11	05:45 21:00	05:09 21:40	05:18 21:42	06:00 21:01	06:49 19:56	07:38 18:47	07:32 16:46	08:18 16:17
10	08:29 16:37	07:50 17:30	06:53 18:20	06:43 20:12	05:43 21:02	05:09 21:41	05:19 21:42	06:01 20:59	06:51 19:54	07:39 18:45	07:33 16:45	08:19 16:17
11	08:28 16:39	07:49 17:32	06:51 18:22	06:41 20:14	05:41 21:03	05:09 21:42	05:20 21:41	06:03 20:57	06:52 19:51	07:41 18:43	07:35 16:43	08:20 16:16
12	08:28 16:40	07:47 17:34	06:49 18:23	06:38 20:16	05:40 21:05	05:08 21:42	05:21 21:40	06:05 20:56	06:54 19:49	07:43 18:41	07:37 16:42	08:21 16:16
13	08:27 16:42	07:45 17:35	06:46 18:25	06:36 20:17	05:38 21:07	05:08 21:43	05:22 21:39	06:06 20:54	06:56 19:47	07:45 18:38	07:39 16:40	08:22 16:16
14	08:26 16:43	07:43 17:37	06:44 18:27	06:34 20:19	05:36 21:08	05:08 21:44	05:23 21:38	06:08 20:52	06:57 19:44	07:46 18:36	07:40 16:39	08:23 16:16
15	08:25 16:45	07:41 17:39	06:42 18:29	06:32 20:21	05:35 21:10	05:08 21:44	05:25 21:37	06:09 20:50	06:59 19:42	07:48 18:34	07:42 16:37	08:24 16:16
16	08:25 16:46	07:39 17:41	06:39 18:30	06:30 20:22	05:33 21:11	05:08 21:45	05:26 21:36	06:11 20:48	07:00 19:40	07:50 18:32	07:44 16:36	08:25 16:16
17	08:24 16:48	07:37 17:43	06:37 18:32	06:28 20:24	05:32 21:13	05:07 21:45	05:27 21:35	06:13 20:46	07:02 19:38	07:51 18:30	07:45 16:35	08:26 16:17
18	08:23 16:49	07:35 17:44	06:35 18:34	06:25 20:26	05:31 21:14	05:07 21:45	05:28 21:34	06:14 20:44	07:04 19:35	07:53 18:28	07:47 16:33	08:26 16:17
19	08:22 16:51	07:33 17:46	06:33 18:35	06:23 20:27	05:29 21:16	05:07 21:46	05:29 21:33	06:16 20:42	07:05 19:33	07:55 18:26	07:49 16:32	08:27 16:17
20	08:21 16:53	07:31 17:48	06:30 18:37	06:21 20:29	05:28 21:17	05:08 21:46	05:31 21:32	06:17 20:40	07:07 19:31	07:56 18:24	07:51 16:31	08:28 16:18
21	08:20 16:54	07:29 17:50	06:28 18:39	06:19 20:31	05:26 21:18	05:08 21:46	05:32 21:31	06:19 20:38	07:08 19:28	07:58 18:21	07:52 16:30	08:28 16:18
22	08:19 16:56	07:27 17:52	06:26 18:41	06:17 20:32	05:25 21:20	05:08 21:47	05:33 21:30	06:20 20:36	07:10 19:26	08:00 18:19	07:54 16:29	08:29 16:18
23	08:17 16:58	07:25 17:54	06:24 18:42	06:15 20:34	05:24 21:21	05:08 21:47	05:35 21:28	06:22 20:33	07:12 19:24	08:02 18:17	07:55 16:27	08:29 16:19
24	08:16 16:59	07:23 17:55	06:21 18:44	06:13 20:36	05:23 21:23	05:08 21:47	05:36 21:27	06:24 20:31	07:13 19:21	08:03 18:15	07:57 16:26	08:30 16:19
25	08:15 17:01	07:21 17:57	06:19 18:46	06:11 20:37	05:22 21:24	05:09 21:47	05:37 21:26	06:25 20:29	07:15 19:19	07:05 17:13	07:59 16:25	08:30 16:20
26	08:14 17:03	07:19 17:59	06:17 18:47	06:09 20:39	05:20 21:25	05:09 21:47	05:39 21:24	06:27 20:27	07:16 19:17	07:07 17:11	08:00 16:24	08:31 16:21
27	08:12 17:04	07:17 18:01	06:14 18:49	06:07 20:41	05:19 21:26	05:10 21:47	05:40 21:23	06:28 20:25	07:18 19:14	07:09 17:09	08:02 16:24	08:31 16:22
28	08:11 17:06	07:15 18:02	06:12 18:51	06:05 20:42	05:18 21:28	05:10 21:47	05:42 21:21	06:30 20:23	07:20 19:12	07:10 17:08	08:03 16:23	08:31 16:22
29	08:10 17:08		07:10 19:52	06:03 20:44	05:17 21:29	05:11 21:47	05:43 21:20	06:32 20:21	07:21 19:10	07:12 17:06	08:05 16:22	08:31 16:23
30	08:08 17:10		07:08 19:54	06:01 20:46	05:16 21:30	05:11 21:46	05:45 21:18	06:33 20:18	07:23 19:08	07:14 17:04	08:06 16:21	08:31 16:24
31	08:07 17:12		07:05 19:56		05:15 21:31		05:46 21:17	06:35 20:16		07:16 17:02		08:31 16:25
Sonnenscheinstunden	261	278	367	415	483	497	500	453	381	332	268	246
astr.max.mögl.Beschattung												
Red.Sonnenscheinwahrsch.												
Reduktion Betriebsdauer												
Reduktion Windrichtung												
Gesamte Reduktion												
Met.wahrsch.Beschattung												

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

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