

Project:

FW13

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2013-06-25 16:00 / 1

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Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** A - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (1)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:19	06:29 16:16	07:17 15:38
2	07:40 15:46	07:14 16:32	06:23 17:21	06:15 19:12	05:14 20:00	04:32 20:42	04:31 20:54	05:06 20:24	05:53 19:24	06:39 18:17	06:30 16:15	07:18 15:38
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 19:13	05:12 20:01	04:32 20:43	04:32 20:54	05:08 20:22	05:55 19:22	06:41 18:15	06:32 16:13	07:20 15:37
4	07:40 15:48	07:11 16:35	06:19 17:24	06:11 19:15	05:10 20:03	04:31 20:44	04:33 20:54	05:09 20:20	05:56 19:20	06:43 18:13	06:34 16:11	07:21 15:37
5	07:40 15:49	07:10 16:37	06:17 17:26	06:09 19:17	05:09 20:04	04:30 20:45	04:33 20:53	05:11 20:19	05:58 19:17	06:44 18:11	06:35 16:09	07:22 15:36
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	05:07 20:06	04:30 20:46	04:34 20:53	05:12 20:17	05:59 19:15	06:46 18:09	06:37 16:08	07:24 15:36
7	07:39 15:51	07:07 16:41	06:13 17:29	06:04 19:20	05:05 20:07	04:29 20:47	04:35 20:52	05:14 20:15	06:01 19:13	06:47 18:06	06:39 16:06	07:25 15:36
8	07:39 15:53	07:05 16:43	06:10 17:31	06:02 19:21	05:03 20:09	04:29 20:48	04:36 20:52	05:15 20:14	06:02 19:11	06:49 18:04	06:41 16:05	07:26 15:35
9	07:39 15:54	07:03 16:44	06:08 17:33	06:00 19:23	05:02 20:11	04:28 20:49	04:37 20:51	05:17 20:12	06:04 19:09	06:51 18:02	06:42 16:03	07:27 15:35
10	07:38 15:55	07:02 16:46	06:06 17:34	05:58 19:25	05:00 20:12	04:28 20:49	04:38 20:50	05:18 20:10	06:06 19:06	06:52 18:00	06:44 16:02	07:28 15:35
11	07:38 15:57	07:00 16:48	06:04 17:36	05:56 19:26	04:59 20:14	04:28 20:50	04:39 20:50	05:20 20:08	06:07 19:04	06:54 17:58	06:46 16:00	07:29 15:35
12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 19:28	04:57 20:15	04:27 20:51	04:40 20:49	05:21 20:06	06:09 19:02	06:55 17:56	06:47 15:59	07:30 15:35
13	07:36 15:59	06:56 16:51	06:00 17:39	05:52 19:29	04:56 20:17	04:27 20:51	04:41 20:48	05:23 20:05	06:10 19:00	06:57 17:53	06:49 15:57	07:31 15:35
14	07:36 16:01	06:55 16:53	05:57 17:41	05:50 19:31	04:54 20:18	04:27 20:52	04:42 20:47	05:24 20:03	06:12 18:57	06:59 17:51	06:51 15:56	07:32 15:35
15	07:35 16:02	06:53 16:55	05:55 17:43	05:47 19:33	04:53 20:19	04:27 20:53	04:43 20:46	05:26 20:01	06:13 18:55	07:00 17:49	06:52 15:54	07:33 15:35
16	07:34 16:04	06:51 16:57	05:53 17:44	05:45 19:34	04:51 20:21	04:27 20:53	04:44 20:45	05:27 19:59	06:15 18:53	07:02 17:47	06:54 15:53	07:34 15:35
17	07:33 16:05	06:49 16:58	05:51 17:46	05:43 19:36	04:50 20:22	04:26 20:54	04:45 20:45	05:29 19:57	06:16 18:51	07:04 17:45	06:56 15:52	07:35 15:35
18	07:32 16:07	06:47 17:00	05:49 17:47	05:41 19:37	04:48 20:24	04:26 20:54	04:46 20:43	05:30 19:55	06:18 18:49	07:05 17:43	06:57 15:51	07:35 15:35
19	07:32 16:08	06:45 17:02	05:46 17:49	05:39 19:39	04:47 20:25	04:26 20:54	04:48 20:42	05:32 19:53	06:19 18:46	07:07 17:41	06:59 15:49	07:36 15:36
20	07:31 16:10	06:43 17:04	05:44 17:51	05:37 19:41	04:46 20:27	04:27 20:55	04:49 20:41	05:33 19:51	06:21 18:44	07:08 17:39	07:01 15:48	07:37 15:36
21	07:30 16:12	06:41 17:05	05:42 17:52	05:35 19:42	04:44 20:28	04:27 20:55	04:50 20:40	05:35 19:49	06:22 18:42	07:10 17:37	07:02 15:47	07:37 15:36
22	07:29 16:13	06:39 17:07	05:40 17:54	05:33 19:44	04:43 20:29	04:27 20:55	04:51 20:39	05:36 19:47	06:24 18:40	07:12 17:35	07:04 15:46	07:38 15:37
23	07:27 16:15	06:37 17:09	05:38 17:56	05:31 19:45	04:42 20:31	04:27 20:55	04:53 20:38	05:38 19:45	06:25 18:37	07:13 17:33	07:05 15:45	07:38 15:37
24	07:26 16:17	06:35 17:11	05:35 17:57	05:29 19:47	04:41 20:32	04:27 20:55	04:54 20:36	05:40 19:43	06:27 18:35	07:15 17:31	07:07 15:44	07:39 15:38
25	07:25 16:18	06:33 17:12	05:33 17:59	05:27 19:49	04:40 20:33	04:28 20:55	04:55 20:35	05:41 19:41	06:29 18:33	06:17 16:29	07:08 15:43	07:39 15:39
26	07:24 16:20	06:31 17:14	05:31 18:00	05:25 19:50	04:39 20:34	04:28 20:55	04:57 20:34	05:43 19:39	06:30 18:31	06:18 16:27	07:10 15:42	07:40 15:39
27	07:23 16:22	06:29 17:16	05:29 18:02	05:23 19:52	04:38 20:36	04:29 20:55	04:58 20:32	05:44 19:37	06:32 18:28	06:20 16:25	07:11 15:41	07:40 15:40
28	07:21 16:23	06:27 17:17	05:26 18:04	05:21 19:53	04:37 20:37	04:29 20:55	04:59 20:31	05:46 19:35	06:33 18:26	06:22 16:24	07:13 15:41	07:40 15:41
29	07:20 16:25		06:24 19:05	05:19 19:55	04:36 20:38	04:30 20:55	05:01 20:30	05:47 19:33	06:35 18:24	06:24 16:22	07:14 15:40	07:40 15:42
30	07:19 16:27		06:22 19:07	05:18 19:57	04:35 20:39	04:30 20:55	05:02 20:28	05:49 19:30	06:36 18:22	06:25 16:20	07:16 15:39	07:40 15:43
31	07:17 16:29		06:20 19:09		04:34 20:40		05:04 20:27	05:50 19:28		06:27 16:18		07:40 15:43
Potential sun hours	265	280	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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SHADOW - Calendar**Shadow receptor:** B - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (2)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	07:40		14:58 (9)	07:16	15:06 (9)	06:25	16:21 (15)	06:18	05:16		04:33	
	15:45	9	15:07 (9)	16:30	15:21 (9)	17:19	16:41 (15)	19:10	19:58		20:41	
2	07:40		14:58 (9)	07:14	15:08 (9)	06:23	16:22 (15)	06:15	05:14		04:32	
	15:46	11	15:09 (9)	16:32	15:18 (9)	17:21	16:40 (15)	19:12	20:00		20:42	
3	07:40		14:57 (9)	07:13		06:21	16:23 (15)	06:13	05:12		04:32	
	15:47	13	15:10 (9)	16:34		17:23	16:38 (15)	19:13	20:01		20:43	
4	07:40		14:56 (9)	07:11		06:19	16:24 (15)	06:11	05:10		04:31	
	15:48	15	15:11 (9)	16:36		17:24	16:35 (15)	19:15	20:03		20:44	
5	07:40		14:56 (9)	07:10		06:17		06:09	05:09		04:30	
	15:49	16	15:12 (9)	16:37		17:26		19:17	20:04		20:45	
6	07:40		14:57 (9)	07:08		06:15		06:07	05:07		04:30	
	15:50	17	15:14 (9)	16:39		17:28		19:18	20:06		20:46	
7	07:39		14:56 (9)	07:07		06:13		06:05	05:05		04:29	
	15:51	18	15:14 (9)	16:41		17:29		19:20	20:08		20:47	
8	07:39		14:56 (9)	07:05		06:10		06:02	05:04		04:29	
	15:53	20	15:16 (9)	16:43		17:31		19:21	20:09		20:48	
9	07:39		14:56 (9)	07:03		06:08		06:00	05:02		04:28	
	15:54	21	15:17 (9)	16:44		17:33		19:23	20:11		20:49	
10	07:38		14:55 (9)	07:02		06:06		05:58	05:00		04:28	
	15:55	22	15:17 (9)	16:46		17:34		19:25	20:12		20:49	
11	07:38		14:56 (9)	07:00		06:04		05:56	04:59		04:28	
	15:57	23	15:19 (9)	16:48		17:36		19:26	20:14		20:50	
12	07:37		14:55 (9)	06:58		06:02		05:54	04:57		04:27	
	15:58	24	15:19 (9)	16:50		17:38		19:28	20:15		20:51	
13	07:36		14:55 (9)	06:56		06:00		05:52	04:56		04:27	
	16:00	25	15:20 (9)	16:51		17:39		19:29	20:17		20:51	
14	07:36		14:55 (9)	06:55		05:57		05:50	04:54		04:27	
	16:01	25	15:20 (9)	16:53		17:41		19:31	20:18		20:52	
15	07:35		14:56 (9)	06:53		05:55		05:47	04:53		04:27	
	16:02	26	15:22 (9)	16:55		17:43		19:33	20:19		20:53	
16	07:34		14:56 (9)	06:51		05:53		05:45	04:51		04:27	
	16:04	27	15:23 (9)	16:57		17:44		19:34	20:21		20:53	
17	07:33		14:56 (9)	06:49		05:51		05:43	04:50		04:27	
	16:05	27	15:23 (9)	16:58		17:46		19:36	20:22		20:54	
18	07:33		14:56 (9)	06:47	16:30 (15)	05:49		05:41	04:48		04:27	
	16:07	28	15:24 (9)	17:00	16:34 (15)	17:48		19:37	20:24		20:54	
19	07:32		14:56 (9)	06:45	16:26 (15)	05:46		05:39	04:47		04:27	
	16:09	28	15:24 (9)	17:02	16:36 (15)	17:49		19:39	20:25		20:54	
20	07:31		14:56 (9)	06:43	16:24 (15)	05:44		05:37	04:46		04:27	
	16:10	28	15:24 (9)	17:04	16:38 (15)	17:51		19:41	20:27		20:55	
21	07:30		14:56 (9)	06:41	16:23 (15)	05:42		05:35	04:45		04:27	
	16:12	28	15:24 (9)	17:05	16:40 (15)	17:52		19:42	20:28		20:55	
22	07:29		14:57 (9)	06:39	16:22 (15)	05:40		05:33	04:43		04:27	
	16:13	28	15:25 (9)	17:07	16:42 (15)	17:54		19:44	20:29		20:55	
23	07:27		14:57 (9)	06:37	16:20 (15)	05:38		05:31	04:42		04:27	
	16:15	28	15:25 (9)	17:09	16:42 (15)	17:56		19:45	20:31		20:55	
24	07:26		14:58 (9)	06:35	16:20 (15)	05:35		05:29	04:41		04:27	
	16:17	28	15:26 (9)	17:11	16:42 (15)	17:57		19:47	20:32		20:55	
25	07:25		14:58 (9)	06:33	16:20 (15)	05:33		05:27	04:40		04:28	
	16:18	27	15:25 (9)	17:12	16:42 (15)	17:59		19:49	20:33		20:55	
26	07:24		14:59 (9)	06:31	16:20 (15)	05:31		05:25	04:39		04:28	
	16:20	26	15:25 (9)	17:14	16:42 (15)	18:01		19:50	20:34		20:55	
27	07:23		14:59 (9)	06:29	16:20 (15)	05:29		05:23	04:38		04:29	
	16:22	25	15:24 (9)	17:16	16:42 (15)	18:02		19:52	20:36		20:55	
28	07:21		15:00 (9)	06:27	16:20 (15)	05:27		05:21	04:37		04:29	
	16:23	24	15:24 (9)	17:18	16:42 (15)	18:04		19:53	20:37		20:55	
29	07:20		15:02 (9)			06:24		05:20	04:36		04:30	
	16:25	22	15:24 (9)			19:05		19:55	20:38		20:55	
30	07:19		15:02 (9)			06:22		05:18	04:35		04:30	
	16:27	21	15:23 (9)			19:07		19:57	20:39		20:55	
31	07:17		15:04 (9)			06:20			04:34			
	16:29	19	15:23 (9)			19:09			20:40			
Potential sun hours	265		280			367		413	479		491	
Total, worst case		699		222		64						
Sun reduction		0,26		0,31		0,31						
Oper. time red.		0,86		0,86		0,86						
Wind dir. red.		0,70		0,69		0,69						
Total reduction		0,15		0,18		0,18						
Total, real		106		40		12						

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

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Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October		November		December
1	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20		06:29 16:16		07:17 15:39
2	04:31 20:55	05:07 20:24	05:53 19:24	06:39 18:17		06:30 16:15	23	07:18 15:39
3	04:32 20:54	05:08 20:22	05:55 19:22	06:41 18:15		06:32 16:13	22	07:20 15:37
4	04:33 20:54	05:09 20:20	05:56 19:20	06:43 18:13		06:34 16:11	21	07:21 15:37
5	04:34 20:53	05:11 20:19	05:58 19:17	06:44 18:11		06:36 16:10	20	07:22 15:36
6	04:34 20:53	05:12 20:17	05:59 19:15	06:46 18:09		06:37 16:08	19	07:24 15:36
7	04:35 20:52	05:14 20:15	06:01 19:13	06:47 18:06		06:39 16:06	17	07:25 15:36
8	04:36 20:52	05:15 20:14	06:03 19:11	06:49 18:04		06:41 16:05	16	07:26 15:35
9	04:37 20:51	05:17 20:12	06:04 19:09	06:51 18:02	7	06:42 17:01 (15)	15	07:27 14:38 (9)
10	04:38 20:51	05:18 20:10	06:06 19:06	06:52 18:00	11	06:44 17:08 (15)	14	07:28 14:49 (9)
11	04:39 20:50	05:20 20:08	06:07 19:04	06:54 17:58	16	06:46 17:13 (15)	13	07:29 14:50 (9)
12	04:40 20:49	05:21 20:06	06:09 19:02	06:55 17:56	13	06:47 17:13 (15)	11	07:30 14:51 (9)
13	04:41 20:48	05:23 20:05	06:10 19:00	06:57 17:54	16	06:49 17:14 (15)	9	07:31 14:52 (9)
14	04:42 20:47	05:24 20:03	06:12 18:58	06:59 17:51	21	06:51 17:15 (15)	8	07:32 14:53 (9)
15	04:43 20:46	05:26 20:01	06:13 18:55	07:00 17:49	24	06:52 17:15 (15)	4	07:33 14:54 (9)
16	04:44 20:46	05:27 19:59	06:15 18:53	07:02 17:47	25	06:54 17:16 (15)		07:34 14:55 (9)
17	04:45 20:45	05:29 19:57	06:16 18:51	07:04 17:45	26	06:56 17:17 (15)		07:35 14:56 (9)
18	04:47 20:44	05:30 19:55	06:18 18:49	07:05 17:43	27	06:57 17:18 (15)		07:36 14:57 (9)
19	04:48 20:42	05:32 19:53	06:19 18:46	07:07 17:41	28	06:59 17:19 (15)		07:37 14:58 (9)
20	04:49 20:41	05:33 19:51	06:21 18:44	07:09 17:39	28	07:01 17:20 (15)		07:37 14:59 (9)
21	04:50 20:40	05:35 19:49	06:22 18:42	07:10 17:37	28	07:02 17:21 (15)		07:37 15:00 (9)
22	04:51 20:39	05:37 19:47	06:24 18:40	07:12 17:35	28	07:04 17:22 (15)		07:38 15:01 (9)
23	04:53 20:38	05:38 19:45	06:25 18:37	07:14 17:33	28	07:05 17:23 (15)		07:38 15:02 (9)
24	04:54 20:37	05:40 19:43	06:27 18:35	07:15 17:31	28	07:07 17:24 (15)		07:39 15:03 (9)
25	04:55 20:35	05:41 19:41	06:29 18:33	07:17 17:29	28	07:08 17:25 (15)		07:39 15:04 (9)
26	04:57 20:34	05:43 19:39	06:30 18:31	07:19 17:27	27	07:10 17:26 (15)		07:40 15:05 (9)
27	04:58 20:33	05:44 19:37	06:32 18:28	07:20 17:25	27	07:11 17:27 (15)		07:40 15:06 (9)
28	04:59 20:31	05:46 19:35	06:33 18:26	07:22 17:24	26	07:13 17:28 (15)		07:40 15:07 (9)
29	05:01 20:30	05:47 19:33	06:35 18:24	07:24 17:22	26	07:14 17:29 (15)		07:40 15:08 (9)
30	05:02 20:28	05:49 19:30	06:36 18:22	07:25 17:20	25	07:16 17:30 (15)		07:40 15:09 (9)
31	05:04 20:27	05:50 19:28	06:27 18:18	07:27 17:16	24	07:18 17:31 (15)	2	07:40 15:10 (9)
Potential sun hours	495	450	380	334		271		251
Total, worst case				263		543		206
Sun reduction				0,37		0,25		0,19
Oper. time red.				0,86		0,86		0,86
Wind dir. red.				0,69		0,70		0,70
Total reduction				0,22		0,15		0,11
Total, real				57		82		23

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

FW13

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2013-06-25 16:00 / 4

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Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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+48 58 558 40 10

Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (3)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
---	----	---	----	---	----	---	----	-----

525 525 600 750 825 1 125 2 025 1 125 7 500

Idle start wind speed: Cut in wind speed from power curve

		January		February		March		April		May		June		July		August		September		October		November		December								
1	07:41			12:54 (15)	07:16			13:13 (15)	06:25		06:18		05:16		04:33		04:31		05:05		05:52		06:38		06:29		15:24 (3)	07:17		12:40 (15)		
	15:45	79		15:08 (4)	16:30	40		13:53 (15)	17:19		19:10		19:58		20:41		20:55		20:25		19:26		18:20		16:16	24	15:48 (2)	15:39	82	14:55 (4)		
2	07:41			12:55 (15)	07:15			13:15 (15)	06:23		06:16		05:14		04:32		04:31		05:07		05:53		06:40		06:30		15:24 (3)	07:19		12:40 (15)		
	15:46	80		15:09 (4)	16:32	36		13:51 (15)	17:21		19:12		20:00		20:42		20:55		20:24		19:24		18:17		16:15	21	15:45 (2)	15:38	82	14:55 (4)		
3	07:40			12:55 (15)	07:13			13:17 (15)	06:21		06:13		05:12		04:32		04:32		05:08		05:55		06:41		06:32		15:25 (3)	07:20		12:41 (15)		
	15:47	80		15:09 (4)	16:34	33		13:50 (15)	17:23		19:13		20:01		20:43		20:54		20:22		19:22		18:15		16:13	19	15:44 (2)	15:37	82	14:56 (4)		
4	07:40			12:56 (15)	07:12			13:19 (15)	06:19		06:11		05:10		04:31		04:33		05:09		05:56		06:43		06:34		13:01 (5)	07:21		12:41 (15)		
	15:48	80		15:10 (4)	16:36	29		13:48 (15)	17:24		19:15		20:03		20:44		20:54		20:20		19:20		18:13		16:11	21	15:42 (2)	15:37	82	14:56 (4)		
5	07:40			12:56 (15)	07:10			13:23 (15)	06:17		06:09		05:09		04:30		04:34		05:11		05:58		06:44		06:36		12:55 (5)	07:22		12:41 (15)		
	15:49	81		15:10 (4)	16:37	32		16:09 (3)	17:26		19:17		20:04		20:45		20:53		20:19		19:18		18:11		16:10	30	15:41 (3)	15:37	82	14:56 (4)		
6	07:40			12:57 (15)	07:08			13:26 (15)	06:15		06:07		05:07		04:30		04:34		05:12		06:00		06:46		06:37		12:52 (5)	07:24		12:43 (15)		
	15:50	80		15:11 (4)	16:39	29		16:11 (3)	17:28		19:18		20:06		20:46		20:53		20:17		19:15		18:09		16:08	32	15:39 (3)	15:36	81	14:57 (4)		
7	07:39			12:56 (15)	07:07			15:57 (3)	06:13		06:05		05:05		04:29		04:35		05:14		06:01		06:47		06:39		12:50 (5)	07:25		12:43 (15)		
	15:52	81		15:11 (4)	16:41	16		16:13 (2)	17:29		19:20		20:08		20:47		20:52		20:15		19:13		18:06		16:06	29	13:19 (5)	15:36	81	14:57 (4)		
8	07:39			12:57 (15)	07:05			15:55 (3)	06:11		06:02		05:04		04:29		04:36		05:15		06:03		06:49		06:41		12:47 (5)	07:26		12:43 (15)		
	15:53	81		15:12 (4)	16:43	19		16:14 (2)	17:31		19:21		20:09		20:48		20:52		20:14		19:11		18:04		16:05	33	13:20 (5)	15:35	80	14:57 (4)		
9	07:39			12:57 (15)	07:03			15:55 (3)	06:08		06:00		05:02		04:28		04:37		05:17		06:04		06:51		06:42		12:45 (5)	07:27		12:43 (15)		
	15:54	81		15:12 (4)	16:44	22		16:17 (2)	17:33		19:23		20:11		20:49		20:51		20:12		19:09		18:02		16:03	37	13:22 (5)	15:35	80	14:57 (4)		
10	07:38			12:58 (15)	07:02			15:54 (3)	06:06		05:58		05:00		04:28		04:38		05:18		06:06		06:52		06:44		12:44 (5)	07:28		12:44 (15)		
	15:55	82		15:13 (4)	16:46	25		16:19 (2)	17:34		19:25		20:12		20:50		20:51		20:10		19:07		18:00		16:02	40	13:24 (5)	15:35	80	14:58 (4)		
11	07:38			12:58 (15)	07:00			15:53 (3)	06:04		05:56		04:59		04:28		04:39		05:20		06:07		06:54		06:46		12:43 (5)	07:29		12:44 (15)		
	15:57	82		15:13 (4)	16:48	28		16:21 (2)	17:36		19:26		20:14		20:50		20:50		20:08		19:04		17:58		16:00	42	13:25 (5)	15:35	79	14:58 (4)		
12	07:37			12:58 (15)	06:58			15:53 (3)	06:02		05:54		04:57		04:27		04:40		05:21		06:09		06:55		06:47		12:42 (5)	07:30		12:45 (15)		
	15:58	81		15:13 (4)	16:50	29		16:22 (2)	17:38		19:28		20:15		20:51		20:51		20:07		19:03		17:57		16:01	44	13:26 (5)	15:34	78	14:59 (4)		
13	07:36			12:59 (15)	06:56			15:52 (3)	06:00		05:52		04:56		04:27		04:41		05:23		06:10		06:57		06:49		12:42 (5)	07:31		12:45 (15)		
	16:00	79		15:12 (4)	16:51	32		16:24 (2)	17:39		19:30		20:17		20:52		20:48		20:05		19:00		17:54		15:57	45	13:27 (5)	15:35	79	14:59 (4)		
14	07:36			12:59 (15)	06:55			15:52 (3)	05:58		05:50		04:54		04:27		04:42		05:24		06:12		06:59		06:51		12:40 (5)	07:32		12:46 (15)		
	16:01	78		15:12 (4)	16:53	34		16:26 (2)	17:41		19:31		20:18		20:52		20:47		20:03		18:58		17:51		15:56	47	13:27 (5)	15:35	79	14:59 (4)		
15	07:35			13:00 (15)	06:53			15:52 (3)	05:55		05:48		04:53		04:27		04:43		05:26		06:13		07:00		06:52		12:40 (5)	07:33		12:47 (15)		
	16:02	78		15:13 (4)	16:55	34		16:26 (2)	17:43		19:33		20:20		20:53		20:47		20:01		18:55		17:49		15:55	48	13:28 (5)	15:35	78	15:00 (4)		
16	07:34			13:01 (15)	06:51			15:53 (3)	05:53		05:45		04:51		04:27		04:44		05:27		06:15		07:02		06:54		12:39 (5)	07:34		12:47 (15)		
	16:04	77		15:13 (4)	16:57	34		16:27 (2)	17:44		19:34		20:21		20:53		20:46		19:59		18:53		17:47		15:53	50	13:29 (5)	15:35	78	15:00 (4)		
17	07:33			13:01 (15)	06:49			15:53 (3)	05:51		05:43		04:50		04:27		04:45		05:29		06:16		07:04		06:56		12:39 (5)	07:35		12:48 (15)		
	16:05	76		15:13 (4)	16:59	33		16:26 (2)	17:46		19:36		20:22		20:54		20:45		19:57		18:51		17:45		15:52	51	13:30 (5)	15:35	77	15:01 (4)		
18	07:33			13:02 (15)	06:47			15:53 (3)	05:49		05:41		04:48		04:27		04:47		05:30		06:18		07:05		06:57		12:39 (5)	07:35		12:49 (15)		
	16:07	74		15:13 (4)	17:00	32		16:25 (2)	17:48		19:38		20:24		20:54		20:44		19:55		18:49		17:43		9	16:42 (3)	15:51	52	13:31 (5)	15:36	78	15:02 (4)
19	07:32			13:02 (15)	06:45			15:54 (3)	05:47		05:43		04:47		04:26		04:48		05:32		06:17		07:07		06:57		16:29 (3)	06:59		12:49 (15)		
	16:08	72		15:14 (4)	17:02	29		16:23 (2)	17:49		19:39		20:25		20:54		20:44		19:53		18:46		17:40		15	16:44 (3)	15:53	53	13:31 (5)	15:36	77	15:01 (4)
20	07:31			13:02 (15)	06:43			15:55 (3)	05:44		05:37		04:46		04:27		04:49		05:34		06:21		07:09		06:57		16:27 (3)	07:01		12:49 (15)		
	16:10	69		15:11 (4)	17:04	25		16:20 (2)	17:51		19:41		20:27		20:55		20:41		19:51		18:44		17:39		19	16:46 (3)	15:48	62	14:43 (4)	15:36	78	15:02 (4)
21	07:30			13:03 (15)	06:41			15:56 (3)	05:42		05:35		04:45		04:27		04:50		05:35		06:22		07:10		12:39 (5)		16:26 (3)	07:02		12:49 (15)		
	16:12	67		15:10 (4)	17:05	21		16:17 (3)	17:52		19:42		20:28		20:55		20:40		19:49		18:42		17:37		22	16:48 (3)	15:47	67	14:46 (4)	15:37	78	15:02 (4)
22	07:29			13:03 (15)	06:40			15:57 (3)	05:40		05:33		04:43		04:27		04:52		05:37		06:24		07:12		12:38 (5)		16:25 (3)	07:04		12:50 (15)		
	16:13	62		15:08 (4)	17:07	18		16:15 (3)	17:54		19:44		20:29		20:55		20:39		19:47		18:40		17:35		26	16:51 (2)	15:46	69	14:47 (4)	15:37	78	15:03 (4)
23	07:28			13:04 (15)	06:38			15:59 (3)	05:38		05:31		04:42		04:28		04:53		05:38		06:26		07:14		12:37 (5)		16:23 (3)	07:05		12:53 (15)		
	16:15	53		13:57 (15)	17:09	14		16:13 (3)	17:56		19:46		20:31		20:55		20:38		19:45		18:37		17:33		30	16:53 (2)	15:45	72	14:48 (4)	15:38	78	15:03 (4)
24	07:26			13:05 (15)	06:36			16:02 (3)	05:35		05:29		04:41		04:28		04:54		05:40		06:27		07:15		12:33 (5)		16:23 (3)	07:07		12:52 (15)		
	16:17	52		13:57 (15)	17:11	6		16:08 (3)	17:57		19:47		20:32		20:55		20:37		19:43		18:35		17:31		31	16:54 (2)	15:44	74	14:50 (4)	15:38	77	15:04 (4)
25	07:25			13:05 (15)	06:34			05:33	05:27		04:40		04:28		04:55		05:41		06:29		06:17		07:08		12:38 (5)		15:22 (3)	07:08		12:52 (15)		
	16:18	51		13:06 (15)	17:12			17:59	19:49		20:33		20:55		20:35		19:41		18:33		16:29		15:33		33	15:55 (2)	15:43	76	14:50 (4)	15:39	77	15:04 (4)
26	07:24			13:07 (15)	06:32			05:31																								

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

FW13

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (4)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:41	09:05 (9)	07:16	06:25	06:18	05:16	04:33	04:31	05:05	05:52	06:38	07:17
15:45	97	15:09 (2)	16:30	17:19	19:10	19:58	20:41	20:55	20:25	19:26	18:20	15:39
2	07:41	09:06 (9)	07:15	06:23	06:16	05:14	04:32	04:31	05:07	05:53	06:40	07:19
15:46	94	15:10 (2)	16:32	17:21	19:12	20:00	20:42	20:55	20:24	19:24	18:17	15:38
3	07:40	09:07 (9)	07:13	06:21	06:13	05:12	04:32	04:32	05:08	05:55	06:41	07:20
15:47	93	15:11 (2)	16:34	17:23	19:13	20:01	20:43	20:54	20:22	19:22	18:15	15:37
4	07:40	09:09 (9)	07:12	06:19	06:11	05:10	04:31	04:33	05:10	05:56	06:43	07:21
15:48	86	15:11 (2)	16:36	17:24	19:15	20:03	20:44	20:54	20:20	19:20	18:13	15:37
5	07:40	09:11 (9)	07:10	06:17	06:09	05:09	04:30	04:34	05:11	05:58	06:44	07:22
15:49	81	15:11 (2)	16:37	17:26	19:17	20:05	20:45	20:53	20:19	19:18	18:11	15:37
6	07:40	10:11 (15)	07:08	06:15	06:07	05:07	04:30	04:34	05:12	06:00	06:46	07:24
15:50	73	15:12 (2)	16:39	17:28	19:18	20:06	20:46	20:53	20:17	19:15	18:09	15:36
7	07:39	10:12 (15)	07:07	06:13	06:05	05:05	04:29	04:35	05:14	06:01	06:47	07:25
15:52	71	15:12 (2)	16:41	17:29	19:20	20:08	20:47	20:52	20:15	19:13	18:06	15:36
8	07:39	10:15 (15)	07:05	06:11	06:02	05:04	04:29	04:36	05:15	06:03	06:49	07:26
15:53	65	15:13 (2)	16:43	17:31	19:22	20:09	20:48	20:52	20:14	19:11	18:04	15:35
9	07:39	10:17 (15)	07:03	06:08	06:00	05:02	04:28	04:37	05:17	06:04	06:51	07:27
15:54	59	15:13 (2)	16:44	17:33	19:23	20:11	20:49	20:51	20:12	19:09	18:02	15:35
10	07:38	14:02 (3)	07:02	06:06	05:58	05:00	04:28	04:38	05:18	06:06	06:52	07:28
15:55	49	15:14 (2)	16:46	17:34	19:25	20:12	20:50	20:51	20:10	19:07	18:00	15:35
11	07:38	14:03 (3)	07:00	06:04	05:56	04:59	04:28	04:39	05:20	06:07	06:54	07:29
15:57	47	15:14 (2)	16:48	17:36	19:26	20:14	20:50	20:50	20:08	19:04	17:58	15:35
12	07:37	14:05 (3)	06:58	06:02	05:54	04:57	04:27	04:40	05:21	06:09	06:56	07:30
15:58	43	15:13 (2)	16:50	17:38	19:28	20:15	20:51	20:49	20:07	19:02	17:56	15:35
13	07:36	14:06 (3)	06:57	06:00	05:52	04:56	04:27	04:41	05:23	06:10	06:57	07:31
16:00	40	15:13 (2)	16:52	17:39	19:30	20:17	20:52	20:48	20:05	19:00	17:54	15:35
14	07:36	14:08 (3)	06:55	16:23 (1)	05:58	05:50	04:54	04:27	04:42	05:24	06:12	07:32
16:01	37	15:13 (2)	16:53	16:26 (1)	17:41	19:31	20:18	20:52	20:47	20:03	18:58	15:35
15	07:35	14:11 (3)	06:53	16:21 (1)	05:55	05:48	04:53	04:27	04:43	05:26	06:13	07:33
16:02	32	15:14 (2)	16:55	16:28 (1)	17:43	19:33	20:20	20:53	20:47	20:01	18:55	15:35
16	07:34	14:53 (2)	06:51	16:20 (1)	05:53	05:45	04:51	04:27	04:44	05:27	06:15	07:34
16:04	21	15:14 (2)	16:57	16:30 (1)	17:44	19:34	20:21	20:53	20:46	20:01	18:53	15:35
17	07:33	14:54 (2)	06:49	16:19 (1)	05:51	05:43	04:50	04:27	04:45	05:29	06:16	07:35
16:06	19	15:13 (2)	16:59	16:32 (1)	17:46	19:36	20:22	20:54	20:45	20:01	18:51	15:35
18	07:33	14:55 (2)	06:47	16:19 (1)	05:49	05:41	04:48	04:27	04:47	05:30	06:18	07:35
16:07	18	15:13 (2)	17:00	16:34 (1)	17:48	19:38	20:24	20:54	20:44	20:00	18:51	15:36
19	07:32	14:56 (2)	06:45	16:18 (1)	05:47	05:39	04:47	04:27	04:48	05:32	06:19	07:36
16:09	17	15:13 (2)	17:02	16:36 (1)	17:49	19:39	20:25	20:54	20:43	20:00	18:46	15:36
20	07:31	14:57 (2)	06:43	16:18 (1)	05:44	05:37	04:46	04:27	04:49	05:34	06:21	07:37
16:10	14	15:11 (2)	17:04	16:38 (1)	17:51	19:41	20:27	20:55	20:41	20:00	18:44	15:36
21	07:30	14:59 (2)	06:42	16:18 (1)	05:42	05:35	04:45	04:27	04:50	05:35	06:22	07:37
16:12	10	15:09 (2)	17:06	16:39 (1)	17:53	19:42	20:28	20:55	20:40	20:00	18:42	15:37
22	07:29	15:04 (2)	06:40	16:18 (1)	05:40	05:33	04:43	04:27	04:52	05:37	06:24	07:38
16:13	2	15:06 (2)	17:07	16:39 (1)	17:54	19:44	20:29	20:55	20:39	20:00	18:40	15:37
23	07:28	17:09	06:38	16:18 (1)	05:38	05:31	04:42	04:27	04:53	05:38	06:26	07:39
16:15	17:11	17:09	21	16:39 (1)	17:56	19:46	20:31	20:55	20:38	20:00	18:37	15:38
24	07:26	17:11	06:36	16:19 (1)	05:35	05:29	04:41	04:28	04:54	05:40	06:27	07:40
16:17	17:12	17:11	19	16:38 (1)	17:57	19:47	20:32	20:55	20:37	20:00	18:35	15:38
25	07:25	17:12	06:34	16:19 (1)	05:33	05:27	04:40	04:28	04:55	05:41	06:29	07:41
16:18	17:13	17:12	17	16:36 (1)	17:59	19:49	20:33	20:56	20:35	20:00	18:33	15:39
26	07:24	17:14	06:32	16:20 (1)	05:31	05:25	04:39	04:28	04:57	05:43	06:30	07:42
16:20	17:15	17:14	15	16:35 (1)	18:01	19:50	20:34	20:56	20:34	20:00	18:31	15:40
27	07:23	17:16	06:29	16:22 (1)	05:29	05:23	04:38	04:29	04:58	05:44	06:32	07:43
16:22	17:17	17:16	10	16:32 (1)	18:02	19:52	20:36	20:56	20:33	20:00	18:29	15:40
28	07:22	17:18	06:27	16:32 (1)	18:02	19:52	20:36	20:56	20:33	20:00	18:29	15:40
16:23	17:18	17:18	10	16:32 (1)	18:02	19:52	20:36	20:56	20:33	20:00	18:29	15:40
29	07:20	17:19	06:25	16:32 (1)	18:02	19:52	20:36	20:56	20:33	20:00	18:29	15:40
16:25	17:19	17:19	10	16:32 (1)	18:02	19:52	20:36	20:56	20:33	20:00	18:29	15:40
30	07:19	17:20	06:22	16:32 (1)	18:02	19:52	20:36	20:56	20:33	20:00	18:29	15:40
16:27	17:20	17:20	10	16:32 (1)	18:02	19:52	20:36	20:56	20:33	20:00	18:29	15:40
31	07:17	17:21	06:20	16:32 (1)	18:02	19:52	20:36	20:56	20:33	20:00	18:29	15:40
16:29	17:21	17:21	10	16:32 (1)	18:02	19:52	20:36	20:56	20:33	20:00	18:29	15:40
Potential sun hours	265	280	367	413	479	491	495	450	380	334	271	251
Total, worst case	1068	210	367	413	479	491	495	450	380	334	271	251
Sun reduction	0,26	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31
Oper. time red.	0,86	0,86	0,86	0,86	0,86	0,86	0,86	0,86	0,86	0,86	0,86	0,86
Wind dir. red.	0,65	0,68	0,68	0,68	0,68	0,68	0,68	0,68	0,68	0,68	0,68	0,68
Total reduction	0,14	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18	0,18
Total, real	150	37	37	37	37	37	37	37	37	37	37	37

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

FW13

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2013-06-25 16:00 / 6

Licensed user:

Biuro Projektow i Wdrozen Proekologicznych PROEKO Maciej Przewozniak

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Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** E - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (5)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:41 15:45	08:44 (15) 14:42 (1)	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:16
2	07:41 15:46	08:46 (15) 14:42 (1)	07:15 16:32	06:23 17:21	06:16 19:12	05:14 20:00	04:33 20:42	04:31 20:55	05:07 20:24	05:53 19:24	06:40 18:17	06:31 16:15
3	07:40 15:47	08:47 (15) 14:42 (1)	07:13 16:34	06:21 17:23	06:13 19:14	05:12 20:01	04:32 20:43	04:32 20:54	05:08 20:22	05:55 19:22	06:41 18:15	06:32 16:13
4	07:40 15:48	08:48 (15) 14:42 (1)	07:12 16:36	06:19 17:24	06:11 19:15	05:11 20:03	04:31 20:44	04:33 20:54	05:10 20:21	05:57 19:20	06:43 18:13	06:34 16:11
5	07:40 15:49	08:49 (15) 14:41 (1)	07:10 16:37	06:17 17:26	06:09 19:17	05:09 20:05	04:30 20:45	04:34 20:54	05:11 20:19	05:58 19:18	06:44 18:11	06:36 16:10
6	07:40 15:50	08:51 (15) 14:41 (1)	07:08 16:39	06:15 17:28	06:07 19:18	05:07 20:06	04:30 20:46	05:12 20:53	06:00 20:17	06:46 19:15	06:37 18:09	06:37 16:08
7	07:40 15:52	08:53 (15) 14:40 (1)	07:07 16:41	06:13 17:29	06:05 19:20	05:05 20:08	04:29 20:47	05:14 20:53	06:01 20:15	06:48 19:13	06:39 18:06	06:39 16:06
8	07:39 15:53	14:31 (1) 14:40 (1)	07:05 16:43	06:11 17:31	06:02 19:22	05:04 20:09	04:29 20:48	04:36 20:52	05:15 20:14	06:03 19:11	06:49 18:04	06:41 16:05
9	07:39 15:54	14:40 (1) 16:44	07:03 17:33	06:08 19:23	06:00 20:11	05:02 20:49	04:28 20:51	04:37 20:12	05:17 20:19	06:04 19:09	06:51 18:02	06:42 16:03
10	07:38 15:55	16:02 16:46	07:02 17:34	06:06 19:25	05:58 20:12	05:00 20:50	04:28 20:51	05:18 20:10	06:06 19:07	06:52 18:00	06:44 16:02	06:44 15:35
11	07:38 15:57	16:00 16:48	07:00 17:36	06:04 19:26	05:56 20:14	04:59 20:50	04:28 20:50	04:39 20:08	05:20 19:04	06:07 17:58	06:54 16:00	06:46 15:35
12	07:37 15:58	16:06 16:50	06:02 17:38	05:54 19:28	05:54 20:15	04:57 20:49	04:27 20:49	05:21 20:07	06:09 19:02	06:56 17:56	06:47 15:59	06:47 15:35
13	07:37 16:00	16:07 16:52	06:00 17:39	05:52 19:30	05:52 20:17	04:56 20:52	04:27 20:48	05:23 20:05	06:10 19:00	06:57 17:54	06:49 15:57	06:49 15:35
14	07:36 16:01	16:05 16:53	05:58 17:41	05:50 19:31	05:50 20:18	04:54 20:52	04:27 20:47	05:24 20:03	06:12 18:58	06:59 17:52	06:51 15:56	06:51 15:35
15	07:35 16:03	16:03 16:55	05:55 17:43	05:48 19:33	05:48 20:20	04:53 20:53	04:27 20:47	05:26 20:01	06:13 18:55	07:00 17:49	06:53 15:55	06:53 15:35
16	07:34 16:04	16:05 16:57	05:53 17:44	05:45 19:34	05:45 20:21	04:51 20:53	04:27 20:46	05:27 19:59	06:15 18:53	07:02 17:47	06:54 15:53	06:54 15:35
17	07:33 16:06	16:09 16:59	05:51 17:46	05:43 19:36	05:43 20:22	04:50 20:54	04:27 20:45	05:29 19:57	06:16 18:51	07:04 17:45	06:56 15:52	06:56 15:35
18	07:33 16:07	16:07 17:00	05:49 17:48	05:41 19:38	05:41 20:24	04:48 20:54	04:27 20:44	05:31 19:55	06:18 18:49	07:05 17:43	06:57 15:51	06:57 15:36
19	07:32 16:09	16:08 17:02	05:47 17:49	05:39 19:39	05:39 20:25	04:47 20:54	04:27 20:43	05:32 19:53	06:19 18:46	07:07 17:41	06:59 15:50	06:59 15:36
20	07:31 16:10	16:04 17:04	05:44 17:51	05:37 19:41	05:37 20:27	04:46 20:55	04:27 20:41	05:34 19:51	06:21 18:44	07:09 17:39	07:01 15:48	07:01 15:36
21	07:30 16:12	16:06 17:06	05:42 17:53	05:35 19:42	05:35 20:28	04:45 20:55	04:27 20:40	05:35 19:49	06:23 18:42	07:10 17:37	07:02 15:47	07:02 15:37
22	07:29 16:13	16:07 17:07	05:40 17:54	05:33 19:44	05:33 20:29	04:43 20:55	04:27 20:39	05:37 19:47	06:24 18:40	07:12 17:35	07:04 15:46	07:04 15:37
23	07:28 16:15	16:08 17:09	05:38 17:56	05:31 19:46	05:31 20:31	04:42 20:55	04:27 20:38	05:38 19:45	06:26 18:37	07:14 17:33	07:05 15:45	07:05 15:38
24	07:26 16:17	16:06 17:11	05:35 17:57	05:29 19:47	05:29 20:32	04:41 20:56	04:28 20:37	05:40 19:43	06:27 18:35	07:15 17:31	07:07 15:44	07:07 15:38
25	07:25 16:18	16:09 17:12	05:33 17:59	05:27 19:49	05:27 20:33	04:40 20:56	04:28 20:35	05:41 19:41	06:29 18:33	06:17 16:29	07:09 15:43	07:09 15:39
26	07:24 16:20	16:10 17:14	05:31 18:01	05:25 19:50	05:25 20:34	04:39 20:56	04:28 20:34	05:43 19:39	06:30 18:31	06:19 16:27	07:10 15:42	07:10 15:39
27	07:23 16:22	16:11 17:16	05:29 18:02	05:23 19:52	05:23 20:36	04:38 20:56	04:29 20:33	05:44 19:37	06:32 18:29	06:20 16:26	07:12 15:42	07:12 15:40
28	07:22 16:23	16:12 17:18	05:27 18:04	05:21 19:54	05:21 20:37	04:37 20:55	04:29 20:31	05:00 19:35	05:46 18:26	06:33 16:24	06:22 15:41	06:22 15:41
29	07:20 16:25	16:14 17:19	05:24 18:05	05:20 19:55	05:20 20:38	04:36 20:55	04:30 20:30	05:01 19:33	05:47 18:24	06:35 16:22	06:24 15:40	06:24 15:42
30	07:19 16:27	16:16 17:21	05:22 18:07	05:18 19:57	05:18 20:39	04:35 20:55	04:30 20:28	05:02 19:31	05:49 18:22	06:36 16:20	06:25 15:39	06:25 15:43
31	07:17 16:29	16:18 17:23	06:20 19:09	06:20 19:09	06:20 20:40	04:34 20:40	05:04 20:27	05:50 19:28	06:27 16:18	06:27 15:44	06:27 15:44	06:27 14:41
Potential sun hours	265	280	367	413	479	491	495	450	380	334	271	251
Total, worst case	198											1003
Sun reduction	0,26											0,19
Oper. time red.	0,86											0,86
Wind dir. red.	0,64											0,64
Total reduction	0,14											0,10
Total, real	28											104

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

FW13

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2013-06-25 16:00 / 7

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** F - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (6)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:41 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:17	07:17 15:39
2	07:41 15:46	07:15 16:32	06:23 17:21	06:16 19:12	05:14 20:00	04:33 20:43	04:31 20:55	05:07 20:24	05:53 19:24	06:40 18:17	06:31 16:15	07:19 15:38
3	07:41 15:47	07:13 16:34	06:21 17:23	06:13 19:14	05:12 20:01	04:32 20:44	04:32 20:54	05:08 20:22	05:55 19:22	06:41 18:15	06:32 16:13	07:20 15:38
4	07:40 15:48	07:12 16:36	06:19 17:24	06:11 19:15	05:11 20:03	04:31 20:45	04:33 20:54	05:10 20:21	05:57 19:20	06:43 18:13	06:34 16:11	07:21 15:37
5	07:40 15:49	07:10 16:37	06:17 17:26	06:09 19:17	05:09 20:05	04:30 20:45	04:34 20:54	05:11 20:19	05:58 19:18	06:44 18:11	06:36 16:10	07:23 15:37
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	05:07 20:06	04:30 20:46	04:34 20:53	05:12 20:17	06:00 19:15	06:46 18:09	06:37 16:08	07:24 15:36
7	07:40 15:52	07:07 16:41	06:13 17:29	06:05 19:20	05:05 20:08	04:29 20:47	04:35 20:53	05:14 20:16	06:01 19:13	06:48 18:07	06:39 16:06	07:25 15:36
8	07:39 15:53	07:05 16:43	06:11 17:31	06:03 19:22	05:04 20:09	04:29 20:48	04:36 20:52	05:15 20:14	06:03 19:11	06:49 18:04	06:41 16:05	07:26 15:36
9	07:39 15:54	07:04 16:44	06:08 17:33	06:00 19:23	05:02 20:11	04:28 20:49	04:37 20:51	05:17 20:12	06:04 19:09	06:51 18:02	06:42 16:03	07:27 15:35
10	07:38 15:55	07:02 16:46	06:06 17:34	05:58 19:25	05:00 20:12	04:28 20:50	04:38 20:51	05:18 20:10	06:06 19:07	06:52 18:00	06:44 16:02	07:28 15:35
11	07:38 15:57	07:00 16:48	06:04 17:36	05:56 19:26	04:59 20:14	04:28 20:50	04:39 20:50	05:20 20:08	06:07 19:04	06:54 17:58	06:46 16:00	07:29 15:35
12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 19:28	04:57 20:15	04:27 20:51	04:40 20:49	05:21 20:07	06:09 19:02	06:56 17:56	06:48 15:59	07:30 15:35
13	07:37 16:00	06:57 16:52	06:00 17:39	05:52 19:30	04:56 20:17	04:27 20:52	04:41 20:48	05:23 20:05	06:10 19:00	06:57 17:54	06:49 15:57	07:31 15:35
14	07:36 16:01	06:55 16:53	05:58 17:41	05:50 19:31	04:54 20:18	04:27 20:52	04:42 20:48	05:24 20:03	06:12 18:58	06:59 17:52	06:51 15:56	07:32 15:35
15	07:35 16:03	06:53 16:55	05:55 17:43	05:48 19:33	04:53 20:20	04:27 20:53	04:43 20:47	05:26 20:01	06:13 18:55	07:00 17:49	06:53 15:55	07:33 15:35
16	07:34 16:04	06:51 16:57	05:53 17:44	05:45 19:34	04:51 20:21	04:27 20:53	04:44 20:46	05:27 19:59	06:15 18:53	07:02 17:47	06:54 15:53	07:34 15:35
17	07:34 16:06	06:49 16:59	05:51 17:46	05:43 19:36	04:50 20:23	04:27 20:54	04:45 20:45	05:29 19:57	06:16 18:51	07:04 17:45	06:56 15:52	07:35 15:35
18	07:33 16:07	06:47 17:00	05:49 17:48	05:41 19:38	04:49 20:24	04:27 20:54	04:47 20:44	05:31 19:55	06:18 18:49	07:05 17:43	06:57 15:51	07:36 15:36
19	07:32 16:09	06:45 17:02	05:47 17:49	05:39 19:39	04:47 20:25	04:27 20:54	04:48 20:43	05:32 19:53	06:19 18:46	07:07 17:41	06:59 15:50	07:36 15:36
20	07:31 16:10	06:44 17:04	05:44 17:51	05:37 19:41	04:46 20:27	04:27 20:55	04:49 20:42	05:34 19:51	06:21 18:44	07:09 17:39	07:01 15:48	07:37 15:36
21	07:30 16:12	06:42 17:06	05:42 17:53	05:35 19:42	04:45 20:28	04:27 20:55	04:50 20:40	05:35 19:49	06:23 18:42	07:10 17:37	07:02 15:47	07:38 15:37
22	07:29 16:13	06:40 17:07	05:40 17:54	05:33 19:44	04:43 20:29	04:27 20:55	04:52 20:39	05:37 19:47	06:24 18:40	07:12 17:35	07:04 15:46	07:38 15:37
23	07:28 16:15	06:38 17:09	05:38 17:56	05:31 19:46	04:42 20:31	04:27 20:55	04:53 20:38	05:38 19:45	06:26 18:38	07:14 17:33	07:05 15:45	07:39 15:38
24	07:27 16:17	06:36 17:11	05:36 17:57	05:29 19:47	04:41 20:32	04:28 20:56	04:54 20:37	05:40 19:43	06:27 18:35	07:15 17:31	07:07 15:44	07:39 15:38
25	07:25 16:18	06:34 17:12	05:33 17:59	05:27 19:49	04:40 20:33	04:28 20:56	04:55 20:35	05:41 19:41	06:29 18:33	06:17 16:29	07:09 15:43	07:39 15:39
26	07:24 16:20	06:32 17:14	05:31 18:01	05:25 19:50	04:39 20:35	04:28 20:56	04:57 20:34	05:43 19:39	06:30 18:31	06:19 16:27	07:10 15:42	07:40 15:39
27	07:23 16:22	06:30 17:16	05:29 18:02	05:23 19:52	04:38 20:36	04:29 20:56	04:58 20:33	05:44 19:37	06:32 18:29	06:20 16:26	07:12 15:42	07:40 15:40
28	07:22 16:24	06:27 17:18	05:27 18:04	05:22 19:54	04:37 20:37	04:29 20:56	05:00 20:31	05:46 19:35	06:33 18:26	06:22 16:24	07:13 15:41	07:40 15:41
29	07:20 16:25		06:24 19:05	05:20 19:55	04:36 20:38	04:30 20:55	05:01 20:30	05:47 19:33	06:35 18:24	06:24 16:22	07:14 15:40	07:40 15:42
30	07:19 16:27		06:22 19:07	05:18 19:57	04:35 20:39	04:30 20:55	05:02 20:28	05:49 19:31	06:36 18:22	06:25 16:20	07:16 15:39	07:41 15:43
31	07:18 16:29		06:20 19:09		04:34 20:40		05:04 20:27	05:50 19:28		06:27 16:18		07:41 15:44
Potential sun hours	265	280	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

FW13

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2013-06-25 16:00 / 8

Licensed user:

Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** G - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (7)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December					
1	07:41	08:24 (4)	07:16	07:55 (3)	06:25	06:18	05:16	04:33	04:31	05:05	05:52	06:38	06:29	07:17	08:15 (4)		
15:45	75	10:32 (1)	16:30	24	08:19 (3)	17:19	19:10	19:58	20:41	20:55	20:25	19:26	18:20	16:17	15:39	51	10:15 (1)
2	07:41	08:24 (4)	07:15	07:57 (3)	06:23	06:16	05:14	04:33	04:32	05:07	05:54	06:40	06:31	07:19	08:14 (4)		
15:46	71	10:32 (1)	16:32	23	08:20 (3)	17:21	19:12	20:00	20:43	20:55	20:24	19:24	18:17	16:15	15:38	55	10:16 (1)
3	07:41	08:25 (4)	07:13	07:57 (3)	06:21	06:13	05:12	04:32	04:32	05:08	05:55	06:41	06:32	07:20	08:14 (4)		
15:47	66	10:33 (1)	16:34	22	08:19 (3)	17:23	19:14	20:01	20:44	20:54	20:22	19:22	18:15	16:13	15:38	57	10:17 (1)
4	07:40	08:26 (4)	07:12	07:57 (3)	06:19	06:11	05:11	04:31	04:33	05:10	05:57	06:43	06:34	07:21	08:13 (4)		
15:48	64	10:33 (1)	16:36	21	08:18 (3)	17:24	19:15	20:03	20:45	20:54	20:21	19:20	18:13	16:11	15:37	60	10:18 (1)
5	07:40	08:26 (4)	07:10	07:59 (3)	06:17	06:09	05:09	04:31	04:34	05:11	05:58	06:44	06:36	07:23	08:13 (4)		
15:49	64	10:33 (1)	16:37	19	08:18 (3)	17:26	19:17	20:05	20:45	20:54	20:19	19:18	18:11	16:10	15:37	61	10:18 (1)
6	07:40	08:28 (4)	07:08	08:00 (3)	06:15	06:07	05:07	04:30	04:35	05:13	06:00	06:46	06:37	07:29	08:14 (4)		
15:50	61	10:33 (1)	16:39	16	08:16 (3)	17:28	19:18	20:06	20:46	20:53	20:17	19:15	18:09	16:08	15:36	61	10:19 (1)
7	07:40	08:28 (4)	07:07	08:02 (3)	06:13	06:05	05:05	04:29	04:35	05:14	06:01	06:48	06:39	07:28	08:13 (4)		
15:52	61	10:33 (1)	16:41	12	08:14 (3)	17:30	19:20	20:08	20:47	20:53	20:16	19:13	18:07	16:06	15:36	64	10:20 (1)
8	07:39	08:29 (4)	07:05	08:04 (3)	06:11	06:03	05:04	04:29	04:36	05:15	06:03	06:49	06:41	07:28	08:13 (4)		
15:53	59	10:33 (1)	16:43	7	08:11 (3)	17:31	19:22	20:09	20:48	20:52	20:14	19:11	18:04	16:05	15:36	64	10:20 (1)
9	07:39	08:30 (4)	07:04	06:08	06:00	05:02	04:28	04:37	05:17	06:04	06:51	06:42	07:26	08:13 (4)			
15:54	57	10:33 (1)	16:45	17:33	19:23	20:11	20:49	20:51	20:12	19:09	18:02	16:03	23	07:49	08:15 (4)	66	10:21 (1)
10	07:38	08:32 (4)	07:02	06:06	05:58	05:00	04:28	04:38	05:18	06:06	06:52	06:44	07:26	08:13 (4)			
15:55	55	10:34 (1)	16:46	17:35	19:25	20:12	20:50	20:51	20:10	19:07	18:00	16:02	24	07:50	08:15 (4)	70	10:22 (1)
11	07:38	08:33 (4)	07:00	06:04	05:56	04:59	04:28	04:39	05:20	06:07	06:54	06:46	07:26	08:13 (4)			
15:57	51	10:33 (1)	16:48	17:36	19:26	20:14	20:50	20:50	20:08	19:04	17:58	16:00	25	07:51	08:15 (4)	75	10:23 (1)
12	07:37	08:34 (4)	06:58	06:02	05:54	04:57	04:27	04:40	05:21	06:09	06:56	06:48	07:27	08:13 (4)			
15:58	49	10:33 (1)	16:50	17:38	19:28	20:15	20:51	20:49	20:07	19:02	17:56	15:59	24	07:51	08:15 (4)	77	10:23 (1)
13	07:37	08:35 (4)	06:57	06:00	05:52	04:56	04:27	04:41	05:23	06:10	06:57	06:49	07:27	08:13 (4)			
16:00	39	10:32 (1)	16:52	17:39	19:30	20:17	20:52	20:48	20:05	19:00	17:54	15:57	24	07:51	08:15 (4)	80	10:24 (1)
14	07:36	08:35 (4)	06:55	05:58	05:50	04:54	04:27	04:42	05:25	06:12	06:59	06:51	07:27	08:13 (4)			
16:01	38	10:33 (1)	16:53	17:41	19:31	20:18	20:52	20:48	20:03	18:58	17:52	15:56	25	07:52	08:15 (4)	82	10:24 (1)
15	07:35	08:36 (4)	06:53	05:55	05:48	04:53	04:27	04:43	05:26	06:13	07:00	06:53	07:27	08:13 (4)			
16:03	36	10:32 (1)	16:55	17:43	19:33	20:20	20:53	20:47	20:01	18:55	17:49	15:55	24	07:51	08:15 (4)	82	10:24 (1)
16	07:34	08:37 (4)	06:51	05:53	05:46	04:51	04:27	04:44	05:28	06:15	07:02	06:54	07:28	08:13 (4)			
16:04	34	10:31 (1)	16:57	17:44	19:34	20:21	20:53	20:46	19:59	18:53	17:47	15:53	23	07:51	08:15 (4)	84	10:25 (1)
17	07:34	08:39 (4)	06:49	05:51	05:43	04:50	04:27	04:46	05:29	06:16	07:04	06:56	07:28	08:13 (4)			
16:06	31	10:30 (1)	16:59	17:46	19:36	20:23	20:54	20:45	19:57	18:51	17:45	15:52	23	07:51	08:15 (4)	84	10:26 (1)
18	07:33	08:01 (3)	06:47	05:49	05:41	04:49	04:27	04:47	05:31	06:18	07:05	06:57	07:29	08:13 (4)			
16:07	37	10:30 (1)	17:00	17:48	19:38	20:24	20:54	20:44	19:55	18:49	17:43	15:51	22	07:51	08:15 (4)	86	10:27 (1)
19	07:32	07:59 (3)	06:45	05:47	05:39	04:47	04:27	04:48	05:32	06:19	07:07	06:59	07:30	08:13 (4)			
16:09	37	10:28 (1)	17:02	17:49	19:39	20:25	20:54	20:43	19:53	18:47	17:41	15:50	20	07:50	08:15 (4)	86	10:27 (1)
20	07:31	07:58 (3)	06:44	05:44	05:37	04:46	04:27	04:49	05:34	06:21	07:09	07:01	07:31	08:13 (4)			
16:10	37	10:27 (1)	17:04	17:51	19:41	20:27	20:55	20:42	19:51	18:44	17:39	15:49	29	09:56	08:15 (4)	85	10:27 (1)
21	07:30	07:56 (3)	06:42	05:42	05:35	04:45	04:27	04:50	05:35	06:23	07:10	07:02	07:32	08:13 (4)			
16:12	35	10:24 (1)	17:06	17:53	19:42	20:28	20:55	20:40	19:49	18:42	17:37	15:47	35	10:00	08:15 (4)	86	10:27 (1)
22	07:29	07:56 (3)	06:40	05:40	05:33	04:43	04:27	04:52	05:37	06:24	07:12	07:04	07:34	08:13 (4)			
16:14	29	10:21 (1)	17:07	17:54	19:44	20:29	20:55	20:39	19:47	18:40	17:35	15:46	37	10:03	08:15 (4)	86	10:28 (1)
23	07:28	07:56 (3)	06:38	05:38	05:31	04:42	04:27	04:53	05:38	06:26	07:14	07:05	07:35	08:13 (4)			
16:15	20	08:16 (3)	17:09	17:56	19:46	20:31	20:55	20:38	19:45	18:38	17:33	15:45	38	10:04	08:15 (4)	86	10:28 (1)
24	07:27	07:55 (3)	06:36	05:36	05:29	04:41	04:28	04:54	05:40	06:27	07:15	07:07	07:38	08:13 (4)			
16:17	22	08:17 (3)	17:11	17:57	19:47	20:32	20:56	20:37	19:43	18:35	17:31	15:44	37	10:07	08:15 (4)	86	10:30 (1)
25	07:25	07:55 (3)	06:34	05:33	05:27	04:40	04:28	04:56	05:41	06:29	07:17	07:09	07:39	08:13 (4)			
16:18	22	08:17 (3)	17:13	17:59	19:49	20:33	20:56	20:35	19:41	18:33	17:29	15:43	31	10:08	08:15 (4)	86	10:30 (1)
26	07:24	07:55 (3)	06:32	05:31	05:25	04:39	04:28	04:57	05:43	06:30	07:19	07:10	07:40	08:13 (4)			
16:20	23	08:18 (3)	17:14	18:01	19:50	20:35	20:56	20:34	19:39	18:31	17:28	15:42	34	10:09	08:15 (4)	85	10:30 (1)
27	07:23	07:55 (3)	06:30	05:29	05:23	04:38	04:29	04:58	05:44	06:32	07:20	07:12	07:41	08:13 (4)			
16:22	24	08:19 (3)	17:16	18:02	19:52	20:36	20:56	20:33	19:37	18:29	17:26	15:42	36	10:11	08:15 (4)	84	10:30 (1)
28	07:22	07:54 (3)	06:28	05:27	05:22	04:37	04:29	05:00	05:46	06:33	07:22	07:13	07:42	08:13 (4)			
16:24	25	08:19 (3)	17:18	18:04	19:54	20:37	20:56	20:31	19:35	18:26	17:24	15:41	38	10:12	08:15 (4)	83	10:31 (1)
29	07:20	07:55 (3)		06:24	05:20	04:36	04:30	05:01	05:47	06:35	07:24	07:14	07:43	08:13 (4)			
16:25	24	08:19 (3)		19:06	19:55	20:38	20:55	20:30	19:33	18:24	17:22	15:40	39	10:13	08:15 (4)	82	10:32 (1)
30	07:19	07:55 (3)		06:22	05:18	04:35	04:30	05:02	05:49	06:37	07:26	07:16	07:45	08:13 (4)			
16:27	24	08:19 (3)		19:07	19:57	20:39	20:55	20:28	19:31	18:22	17:20	15:39	49	10:14	08:15 (4)	82	10:32 (1)
31	07:18	07:56 (3)		06:20		04:34		05:04	05:50		06:27		07:41	08:13 (4)			
16:29	24	08:20 (3)		19:09		20:40		20:27	19:28		16:18		251	15:44	77	10:32 (1)	
Potential sun hours	265	280	367	413	479	491	495	450	380	334	271	251					
Total, worst case	1294	144									760	2353					
Sun reduction	0,26	0,31									0,25	0,19					
Oper. time red.	0,86	0,86									0,86	0,86					
Wind dir. red.	0,56	0,63									0,58	0,55					
Total reduction	0,12	0,16									0,13	0,09					
Total, real	157	24									96	210					

Project:

FW13

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Biuro Projektow i Wdrozen Proekologicznych PROEKO Maciej Przewozniak

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** H - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (8)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:41 15:45 39	08:23 (2) 09:02 (1) 16:30	06:25 07:19 16:23	06:18 17:19 16:16	05:16 19:10 15:14	04:33 20:41 10:43	04:31 20:55 05:07	05:05 20:25 05:54	05:52 19:26 06:40	06:38 18:20 06:31	06:29 16:17 06:31	07:17 15:39 31
2	07:41 15:46 39	08:24 (2) 09:03 (1) 16:32	06:23 07:21 16:21	06:16 17:21 16:13	05:14 19:12 10:43	04:33 20:43 10:43	04:32 20:55 05:08	05:07 20:24 05:55	05:54 19:24 06:41	06:40 18:18 06:32	06:31 16:15 06:32	07:19 15:38 34
3	07:41 15:47 38	08:25 (2) 09:03 (1) 16:34	06:21 07:23 16:19	06:13 17:23 16:11	05:12 19:14 10:43	04:32 20:44 10:43	04:32 20:54 05:11	05:08 20:22 05:57	05:55 19:22 06:43	06:41 18:15 06:34	06:32 16:13 06:34	07:20 15:38 35
4	07:40 15:48 38	08:26 (2) 09:04 (1) 16:36	06:19 07:24 16:17	06:11 17:24 16:09	05:11 19:15 10:43	04:31 20:45 10:43	04:31 20:54 05:11	05:10 20:21 05:58	05:57 19:20 06:44	06:43 18:13 06:36	06:34 16:11 06:36	07:21 15:37 36
5	07:40 15:49 38	08:26 (2) 09:04 (1) 16:37	06:17 07:26 16:15	06:09 17:26 16:07	05:09 19:17 10:43	04:31 20:45 10:43	04:31 20:54 05:13	05:11 20:19 06:00	05:58 19:18 06:46	06:44 18:11 06:37	06:36 16:10 06:37	07:23 15:37 36
6	07:40 15:50 37	08:27 (2) 09:04 (1) 16:39	06:15 07:28 16:13	06:07 17:28 16:05	05:07 19:18 10:43	04:30 20:46 10:43	04:35 20:53 05:14	05:13 20:17 06:01	06:00 19:15 06:48	06:46 18:09 06:39	06:37 16:08 06:39	07:24 15:36 37
7	07:40 15:52 36	08:28 (2) 09:04 (1) 16:41	06:13 07:30 16:11	06:05 17:30 16:03	05:05 19:20 10:43	04:29 20:47 10:43	04:35 20:53 05:16	05:14 20:16 06:03	06:01 19:13 06:49	06:48 18:07 06:41	06:39 16:06 06:41	07:25 15:36 38
8	07:39 15:53 36	08:29 (2) 09:05 (1) 16:43	06:11 07:33 16:13	06:03 17:33 16:00	05:04 19:22 10:43	04:28 20:49 10:43	04:36 20:52 05:16	05:16 20:14 06:04	06:03 19:11 06:51	06:49 18:04 06:43	06:41 16:05 06:43	07:26 15:36 38
9	07:39 15:54 35	08:30 (2) 09:05 (1) 16:45	06:09 07:33 16:13	06:00 17:33 16:00	05:02 19:23 10:43	04:28 20:49 10:43	04:37 20:51 05:16	05:17 20:12 06:04	06:04 19:09 06:51	06:51 18:02 06:43	06:43 16:03 06:43	07:27 15:35 38
10	07:38 15:56 34	08:32 (2) 09:06 (1) 16:46	06:06 07:35 16:13	05:58 17:35 16:00	05:00 19:25 10:43	04:28 20:50 10:43	04:38 20:51 05:16	05:18 20:10 06:06	06:06 19:07 06:52	06:52 18:00 06:44	06:44 16:02 06:44	07:28 15:35 39
11	07:38 15:57 31	08:34 (2) 09:05 (1) 16:48	06:04 07:36 16:13	05:56 17:36 16:00	04:59 19:26 10:43	04:28 20:50 10:43	04:39 20:50 05:16	05:20 20:08 06:07	06:07 19:04 06:54	06:46 17:58 06:46	06:46 16:00 06:46	07:29 15:35 39
12	07:37 15:58 26	08:35 (1) 09:05 (1) 16:50	06:02 07:38 16:13	05:54 17:38 16:00	04:57 19:28 10:43	04:27 20:51 10:43	04:40 20:49 05:16	05:21 20:07 06:09	06:09 19:02 06:56	06:56 17:56 06:49	06:48 15:59 06:49	07:30 15:35 40
13	07:37 16:00 26	08:39 (1) 09:05 (1) 16:52	06:00 07:40 16:13	05:52 17:40 16:00	04:56 19:30 10:43	04:27 20:52 10:43	04:41 20:48 05:16	05:23 20:05 06:10	06:10 19:00 06:57	06:57 17:54 06:51	06:49 15:57 06:51	07:31 15:35 39
14	07:36 16:01 25	08:41 (1) 09:06 (1) 16:53	05:58 07:41 16:13	05:50 17:41 16:00	04:54 19:31 10:43	04:27 20:52 10:43	04:42 20:48 05:16	05:25 20:03 06:18	06:12 18:58 06:52	06:59 17:52 06:56	06:51 15:56 06:56	07:32 15:35 40
15	07:35 16:03 23	08:42 (1) 09:05 (1) 16:55	05:55 07:43 16:13	05:48 17:43 16:00	04:53 19:33 10:43	04:27 20:53 10:43	04:43 20:47 05:16	05:26 20:01 06:13	06:13 18:55 06:52	07:00 17:50 06:55	06:53 15:55 06:55	07:33 15:35 39
16	07:34 16:04 22	08:43 (1) 09:05 (1) 16:57	05:53 07:44 16:13	05:46 17:44 16:00	04:51 19:34 10:43	04:27 20:53 10:43	04:44 20:46 05:16	05:28 19:59 06:16	06:15 18:53 06:56	07:02 17:47 06:56	06:54 15:53 06:56	07:34 15:35 40
17	07:34 16:06 20	08:44 (1) 09:04 (1) 16:59	05:51 07:46 16:13	05:43 17:46 16:00	04:50 19:36 10:43	04:27 20:54 10:43	04:46 20:45 05:16	05:29 19:57 06:16	06:16 18:51 06:56	07:04 17:45 06:58	06:56 15:52 06:58	07:35 15:35 40
18	07:33 16:07 19	08:45 (1) 09:04 (1) 17:00	05:49 07:48 16:13	05:41 17:48 16:00	04:49 19:38 10:43	04:27 20:54 10:43	04:47 20:44 05:16	05:31 19:55 06:18	06:18 18:49 06:58	07:05 17:43 06:58	06:58 15:51 06:58	07:36 15:36 39
19	07:32 16:09 16	08:47 (1) 09:03 (1) 17:02	05:47 07:49 16:13	05:39 17:49 16:00	04:47 19:39 10:43	04:27 20:55 10:43	04:48 20:43 05:16	05:32 19:53 06:18	06:20 18:47 06:58	07:07 17:41 06:58	06:59 15:50 06:58	07:36 15:36 40
20	07:31 16:10 12	08:49 (1) 09:01 (1) 17:04	05:44 07:51 16:13	05:37 17:51 16:00	04:46 19:41 10:43	04:27 20:55 10:43	04:49 20:42 05:16	05:34 19:51 06:18	06:21 18:44 06:58	07:09 17:39 06:58	07:01 15:49 06:58	07:37 15:36 40
21	07:30 16:12 7	08:51 (1) 08:58 (1) 17:06	05:42 07:53 16:13	05:35 17:53 16:00	04:45 19:42 10:43	04:27 20:55 10:43	04:50 20:40 05:16	05:35 19:49 06:18	06:23 18:42 06:58	07:10 17:37 06:58	07:02 15:47 06:58	07:38 15:37 40
22	07:29 16:14	08:52 (1) 07:07 17:06	05:40 07:54 16:13	05:33 17:54 16:00	04:43 19:44 10:43	04:27 20:55 10:43	04:52 20:39 05:16	05:37 19:47 06:18	06:24 18:40 06:58	07:12 17:35 06:58	07:04 15:46 06:58	07:39 15:37 40
23	07:28 16:15	08:53 (1) 07:09 17:06	05:38 07:56 16:13	05:31 17:56 16:00	04:42 19:45 10:43	04:27 20:55 10:43	04:53 20:38 05:16	05:38 19:45 06:18	06:26 18:38 06:58	07:14 17:33 06:58	07:05 15:45 06:58	07:40 15:38 40
24	07:27 16:17	08:54 (1) 07:11 17:06	05:36 07:57 16:13	05:29 17:57 16:00	04:41 19:46 10:43	04:28 20:56 10:43	04:54 20:37 05:16	05:40 19:43 06:18	06:27 18:35 06:58	07:15 17:31 06:58	07:07 15:44 06:58	07:41 15:38 40
25	07:25 16:18	08:55 (1) 07:13 17:06	05:33 07:59 16:13	05:27 17:59 16:00	04:40 19:49 10:43	04:28 20:56 10:43	04:56 20:35 05:16	05:41 19:41 06:18	06:29 18:33 06:58	06:17 17:29 06:58	07:09 15:43 06:58	07:42 15:39 39
26	07:24 16:20	08:56 (1) 07:14 17:06	05:31 08:01 16:13	05:25 18:01 16:00	04:39 19:50 10:43	04:28 20:56 10:43	04:57 20:34 05:16	05:43 19:39 06:18	06:30 18:31 06:58	06:19 17:28 06:58	07:10 15:42 06:58	07:43 15:40 39
27	07:23 16:22	08:57 (1) 07:16 17:06	05:29 08:02 16:13	05:23 18:02 16:00	04:38 19:52 10:43	04:29 20:56 10:43	04:58 20:33 05:16	05:44 19:37 06:18	06:32 18:29 06:58	06:20 17:26 06:58	07:12 15:42 06:58	07:44 15:40 40
28	07:22 16:24	08:58 (1) 07:18 17:06	05:27 08:04 16:13	05:22 18:04 16:00	04:37 19:54 10:43	04:29 20:56 10:43	05:00 20:31 05:16	05:46 19:35 06:18	06:33 18:26 06:58	06:22 17:24 06:58	07:13 15:41 06:58	07:45 15:41 39
29	07:20 16:25	08:59 (1) 07:19 17:06	05:24 08:06 16:13	05:20 18:06 16:00	04:36 19:55 10:43	04:30 20:55 10:43	05:01 20:30 05:16	05:47 19:33 06:18	06:35 18:24 06:58	06:24 17:22 06:58	07:14 15:40 06:58	07:46 15:42 39
30	07:19 16:27	09:00 (1) 07:20 17:06	05:22 08:08 16:13	05:18 18:08 16:00	04:35 19:57 10:43	04:30 20:55 10:43	05:02 20:28 05:16	05:49 19:31 06:18	06:37 18:22 06:58	06:25 17:20 06:58	07:16 15:39 06:58	07:47 15:43 39
31	07:18 16:29	09:01 (1) 07:21 17:06	05:20 08:10 16:13	05:16 18:10 16:00	04:34 19:58 10:43	04:30 20:56 10:43	05:04 20:27 05:16	05:50 19:28 06:18	06:27 18:18 06:58	06:27 17:18 06:58	07:17 15:44 06:58	07:48 15:44 39
Potential sun hours	265	280	367	413	479	491	495	450	380	334	271	251
Total, worst case	597										196	1192
Sun reduction	0,26										0,25	0,19
Oper. time red.	0,86										0,86	0,86
Wind dir. red.	0,60										0,60	0,60
Total reduction	0,13										0,13	0,10
Total, real	78										25	117

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

FW13

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2013-06-25 16:00 / 10

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Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** I - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (9)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:41	07:16	07:41 (1)	06:25	06:18	05:16	04:33	04:31	05:05	05:52	06:38	06:29
	15:45	16:30	11	07:52 (1)	17:19	19:10	19:58	20:42	20:55	20:25	19:26	18:20
2	07:41	07:15	07:40 (1)	06:23	06:16	05:14	04:33	04:32	05:07	05:54	06:40	06:31
	15:46	16:32	15	07:55 (1)	17:21	19:12	20:00	20:43	20:55	20:24	19:24	18:18
3	07:41	07:13	07:38 (1)	06:21	06:13	05:12	04:32	04:32	05:08	05:55	06:41	06:32
	15:47	16:34	17	07:55 (1)	17:23	19:14	20:02	20:44	20:54	20:22	19:22	18:15
4	07:40	07:12	07:37 (1)	06:19	06:11	05:11	04:31	04:33	05:10	05:57	06:43	06:34
	15:48	16:36	19	07:56 (1)	17:25	19:15	20:03	20:45	20:54	20:21	19:20	18:13
5	07:40	07:10	07:37 (1)	06:17	06:09	05:09	04:31	04:34	05:11	05:58	06:44	06:36
	15:49	16:38	21	07:58 (1)	17:26	19:17	20:05	20:46	20:54	20:19	19:18	18:11
6	07:40	07:09	07:36 (1)	06:15	06:07	05:07	04:30	04:35	05:13	06:00	06:46	06:37
	15:50	16:39	22	07:58 (1)	17:28	19:18	20:06	20:46	20:53	20:17	19:15	18:09
7	07:40	07:07	07:36 (1)	06:13	06:05	05:05	04:29	04:35	05:14	06:01	06:48	06:39
	15:52	16:41	22	07:58 (1)	17:30	19:20	20:08	20:47	20:53	20:16	19:13	18:07
8	07:39	07:05	07:37 (1)	06:11	06:03	05:04	04:29	04:36	05:16	06:03	06:49	06:41
	15:53	16:43	22	07:59 (1)	17:31	19:22	20:09	20:48	20:52	20:14	19:11	18:04
9	07:39	07:04	07:36 (1)	06:09	06:00	05:02	04:29	04:37	05:17	06:04	06:51	06:43
	15:54	16:45	23	07:59 (1)	17:33	19:23	20:11	20:49	20:51	20:12	19:09	18:02
10	07:38	07:02	07:37 (1)	06:06	05:58	05:00	04:28	04:38	05:19	06:06	06:52	06:44
	15:56	16:46	21	07:58 (1)	17:35	19:25	20:12	20:50	20:51	20:10	19:07	18:00
11	07:38	07:00	07:37 (1)	06:04	05:56	04:59	04:28	04:39	05:20	06:07	06:54	06:46
	15:57	16:48	21	07:58 (1)	17:36	19:26	20:14	20:50	20:50	20:09	19:04	17:58
12	07:37	06:58	07:37 (1)	06:02	05:54	04:57	04:27	04:40	05:22	06:09	06:56	06:48
	15:58	16:50	20	07:57 (1)	17:38	19:28	20:15	20:51	20:49	20:07	19:02	17:56
13	07:37	06:57	07:38 (1)	06:00	05:52	04:56	04:27	04:41	05:23	06:10	06:57	06:49
	16:00	16:52	18	07:56 (1)	17:40	19:30	20:17	20:52	20:48	20:05	19:00	17:54
14	07:36	06:55	07:40 (1)	05:58	05:50	04:54	04:27	04:42	05:25	06:12	06:59	06:51
	16:01	16:53	16	07:56 (1)	17:41	19:31	20:18	20:52	20:48	20:03	18:58	17:52
15	07:35	06:53	07:41 (1)	05:55	05:48	04:53	04:27	04:43	05:26	06:13	07:01	06:53
	16:03	16:55	13	07:54 (1)	17:43	19:33	20:20	20:53	20:47	20:01	18:56	17:50
16	07:34	06:51	07:44 (1)	05:53	05:46	04:51	04:27	04:44	05:28	06:15	07:02	06:54
	16:04	16:57	7	07:51 (1)	17:44	19:34	20:21	20:53	20:46	19:59	18:53	17:47
17	07:34	06:49	05:51	05:43	04:50	04:27	04:46	05:29	06:16	07:04	06:56	06:48
	16:06	16:59	17:46	19:36	20:23	20:54	20:45	19:57	18:51	17:45	15:52	15:35
18	07:33	06:47	05:49	05:41	04:49	04:27	04:47	05:31	06:18	07:05	06:58	06:50
	16:07	17:00	17:48	19:38	20:24	20:54	20:44	19:55	18:49	17:43	15:51	15:36
19	07:32	06:46	05:47	05:39	04:47	04:27	04:48	05:32	06:20	07:07	06:59	06:51
	16:09	17:02	17:49	19:39	20:25	20:55	20:43	19:53	18:47	17:41	15:50	15:36
20	07:31	06:44	05:44	05:37	04:46	04:27	04:49	05:34	06:21	07:09	07:01	06:53
	16:10	17:04	17:51	19:41	20:27	20:55	20:42	19:51	18:44	17:39	15:49	15:36
21	07:30	06:42	05:42	05:35	04:45	04:27	04:50	05:35	06:23	07:10	07:02	06:54
	16:12	17:06	17:53	19:42	20:28	20:55	20:40	19:49	18:42	17:37	15:47	15:37
22	07:29	06:40	05:40	05:33	04:43	04:27	04:52	05:37	06:24	07:12	07:04	06:55
	16:14	17:07	17:54	19:44	20:29	20:55	20:39	19:47	18:40	17:35	15:46	15:37
23	07:28	06:38	05:38	05:31	04:42	04:27	04:53	05:38	06:26	07:14	07:06	06:56
	16:15	17:09	17:56	19:46	20:31	20:55	20:38	19:45	18:38	17:33	15:45	15:38
24	07:27	06:36	05:36	05:29	04:41	04:28	04:54	05:40	06:27	07:15	07:07	06:57
	16:17	17:11	17:57	19:47	20:32	20:56	20:37	19:43	18:35	17:31	15:44	15:38
25	07:25	06:34	05:33	05:27	04:40	04:28	04:56	05:41	06:29	06:17	07:09	06:59
	16:19	17:13	17:59	19:49	20:33	20:56	20:35	19:41	18:33	16:29	15:43	15:39
26	07:24	06:32	05:31	05:25	04:39	04:28	04:57	05:43	06:30	06:19	07:10	07:00
	16:20	17:14	18:01	19:50	20:35	20:56	20:34	19:39	18:31	16:28	9	07:22 (1)
27	07:23	06:30	05:29	05:24	04:38	04:29	04:58	05:44	06:32	06:20	07:11 (1)	07:12
	16:22	17:16	18:02	19:52	20:36	20:56	20:33	19:37	18:29	16:26	13	07:24 (1)
28	07:22	06:28	05:27	05:22	04:37	04:29	05:00	05:46	06:33	06:22	07:08 (1)	07:13
	16:24	17:18	18:04	19:54	20:37	20:56	20:31	19:35	18:26	16:24	17	07:25 (1)
29	07:20	16:25	06:25	05:20	04:36	04:30	05:01	05:47	06:35	06:24	07:07 (1)	07:15
	16:27	16:25	19:06	19:55	20:38	20:55	20:30	19:33	18:24	16:22	19	07:26 (1)
30	07:19	16:27	06:22	05:18	04:35	04:30	05:02	05:49	06:37	06:26	07:07 (1)	07:16
	16:27	16:27	19:07	19:57	20:39	20:55	20:28	19:31	18:22	16:20	20	07:27 (1)
31	07:18	16:29	06:20	05:19	04:34	20:40	05:04	05:50	06:27	06:18	22	07:28 (1)
	16:29	7	07:50 (1)	19:09	20:40	20:27	19:29	19:29	16:18	22	07:28 (1)	15:44
Potential sun hours	265	280	367	413	479	491	495	450	380	334	271	251
Total, worst case	7	288								100	199	
Sun reduction	0,26	0,31								0,37	0,25	
Oper. time red.	0,86	0,86								0,86	0,86	
Wind dir. red.	0,63	0,63								0,63	0,63	
Total reduction	0,14	0,17								0,20	0,14	
Total, real	1	48								20	27	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

FW13

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2013-06-25 16:00 / 11

Licensed user:

Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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+48 58 558 40 10

Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar

Shadow receptor: J - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (10)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December				
1	07:41	07:16	06:25	06:52 (1)	06:18	05:16	04:33	04:31	05:05	05:52	06:38	07:28 (1)	06:29	07:17		
	15:45	16:31	17:19	17	07:09 (1)	19:10	19:58	20:42	20:55	19:26	18:20	17	07:45 (1)	16:17	15:39	
2	07:41	07:15	06:23	06:50 (1)	06:16	05:14	04:33	04:32	05:07	05:54	06:40	07:27 (1)	06:31	07:19		
	15:46	16:32	17:21	20	07:10 (1)	19:12	20:00	20:43	20:55	20:24	19:24	18:18	19	07:46 (1)	16:15	15:38
3	07:41	07:13	06:21	06:49 (1)	06:13	05:12	04:32	04:32	05:08	05:55	06:41	07:26 (1)	06:32	07:20		
	15:47	16:34	17:23	22	07:11 (1)	19:14	20:02	20:44	20:54	20:22	19:22	18:15	21	07:47 (1)	16:13	15:38
4	07:40	07:12	06:19	06:48 (1)	06:11	05:11	04:31	04:33	05:10	05:57	06:43	07:24 (1)	06:34	07:21		
	15:48	16:36	17:25	24	07:12 (1)	19:15	20:03	20:45	20:54	20:21	19:20	18:13	23	07:47 (1)	16:11	15:37
5	07:40	07:10	06:17	06:48 (1)	06:09	05:09	04:31	04:34	05:11	05:58	06:44	07:24 (1)	06:36	07:23		
	15:49	16:38	17:26	24	07:12 (1)	19:17	20:05	20:46	20:54	20:19	19:18	18:11	24	07:48 (1)	16:10	15:37
6	07:40	07:09	06:15	06:47 (1)	06:07	05:07	04:30	04:35	05:13	06:00	06:46	07:23 (1)	06:37	07:24		
	15:50	16:39	17:28	24	07:11 (1)	19:18	20:06	20:46	20:53	20:17	19:15	18:09	25	07:48 (1)	16:08	15:36
7	07:40	07:07	06:13	06:46 (1)	06:05	05:05	04:29	04:35	05:14	06:01	06:48	07:22 (1)	06:39	07:25		
	15:52	16:41	17:30	25	07:11 (1)	19:20	20:08	20:47	20:53	20:16	19:13	18:07	25	07:47 (1)	16:06	15:36
8	07:39	07:05	06:11	06:47 (1)	06:03	05:04	04:29	04:36	05:16	06:03	06:49	07:23 (1)	06:41	07:26		
	15:53	16:43	17:31	24	07:11 (1)	19:22	20:09	20:48	20:52	20:14	19:11	18:04	24	07:47 (1)	16:05	15:36
9	07:39	07:04	06:09	06:47 (1)	06:00	05:02	04:29	04:37	05:17	06:04	06:51	07:22 (1)	06:43	07:27		
	15:54	16:45	17:33	24	07:11 (1)	19:23	20:11	20:49	20:51	20:12	19:09	18:02	24	07:46 (1)	16:03	15:35
10	07:38	07:02	06:06	06:47 (1)	05:58	05:00	04:28	04:38	05:19	06:06	06:52	07:23 (1)	06:44	07:28		
	15:56	16:46	17:35	23	07:10 (1)	19:25	20:12	20:50	20:51	20:10	19:07	18:00	22	07:45 (1)	16:02	15:35
11	07:38	07:00	06:04	06:47 (1)	05:56	04:59	04:28	04:39	05:20	06:07	06:54	07:24 (1)	06:46	07:29		
	15:57	16:48	17:36	21	07:08 (1)	19:26	20:14	20:50	20:50	20:09	19:04	17:58	21	07:45 (1)	16:00	15:35
12	07:37	06:58	06:02	06:48 (1)	05:54	04:57	04:27	04:40	05:22	06:09	06:56	07:24 (1)	06:48	07:30		
	15:58	16:50	17:38	19	07:07 (1)	19:28	20:15	20:51	20:49	20:07	19:02	17:56	19	07:43 (1)	15:59	15:35
13	07:37	06:57	06:00	06:50 (1)	05:52	04:56	04:27	04:41	05:23	06:10	06:57	07:25 (1)	06:49	07:31		
	16:00	16:52	17:40	15	07:05 (1)	19:30	20:17	20:52	20:48	20:05	19:00	17:54	16	07:41 (1)	15:57	15:35
14	07:36	06:55	05:58	06:53 (1)	05:50	04:54	04:27	04:42	05:25	06:12	06:59	07:28 (1)	06:51	07:32		
	16:01	16:53	17:41	9	07:02 (1)	19:31	20:18	20:52	20:48	20:03	18:58	17:52	11	07:39 (1)	15:56	15:35
15	07:35	06:53	05:55	05:48	04:53	04:27	04:43	05:26	06:13	07:01	06:53	07:25 (1)	06:53	07:33		
	16:03	16:55	17:43	19:33	20:20	20:53	20:47	20:01	18:56	17:50	15:55	15:35				
16	07:34	06:51	05:53	05:46	04:51	04:27	04:44	05:28	06:15	07:02	06:54	07:24 (1)	06:54	07:34		
	16:04	16:57	17:44	19:34	20:21	20:53	20:46	19:59	18:53	17:47	15:53	15:35				
17	07:34	06:49	05:51	05:43	04:50	04:27	04:46	05:29	06:16	07:04	06:56	07:25 (1)	06:56	07:35		
	16:06	16:59	17:46	19:36	20:23	20:54	20:45	19:57	18:51	17:45	15:52	15:35				
18	07:33	06:47	05:49	05:41	04:49	04:27	04:47	05:31	06:18	07:05	06:58	07:26 (1)	06:58	07:36		
	16:07	17:00	17:48	19:38	20:24	20:54	20:44	19:55	18:49	17:43	15:51	15:36				
19	07:32	06:46	05:47	05:39	04:47	04:27	04:48	05:32	06:20	07:07	06:59	07:27 (1)	06:59	07:36		
	16:09	17:02	17:49	19:39	20:25	20:55	20:43	19:53	18:47	17:41	15:50	15:36				
20	07:31	06:44	05:44	05:37	04:46	04:27	04:49	05:34	06:21	07:09	06:59	07:28 (1)	06:59	07:36		
	16:10	17:04	17:51	19:41	20:27	20:55	20:42	19:51	18:44	17:39	15:49	15:36				
21	07:30	06:42	05:42	05:35	04:45	04:27	04:50	05:35	06:23	07:10	06:59	07:29 (1)	06:59	07:36		
	16:12	17:06	17:53	19:42	20:28	20:55	20:40	19:49	18:42	17:37	15:47	15:37				
22	07:29	06:40	05:40	05:33	04:43	04:27	04:52	05:37	06:24	07:12	06:59	07:30 (1)	06:59	07:36		
	16:14	17:07	17:54	19:44	20:29	20:55	20:39	19:47	18:40	17:35	15:46	15:37				
23	07:28	06:38	05:38	05:31	04:42	04:27	04:53	05:38	06:26	07:14	06:59	07:31 (1)	06:59	07:36		
	16:15	17:09	17:56	19:46	20:31	20:55	20:38	19:45	18:38	17:33	15:46	15:38				
24	07:27	06:36	05:36	05:29	04:41	04:28	04:54	05:40	06:27	07:15	06:59	07:32 (1)	06:59	07:36		
	16:17	17:11	17:57	19:47	20:32	20:56	20:37	19:43	18:35	17:31	15:44	15:38				
25	07:25	06:34	05:33	05:27	04:40	04:28	04:56	05:41	06:29	07:17	06:59	07:33 (1)	06:59	07:36		
	16:19	17:13	17:59	19:49	20:33	20:56	20:35	19:41	18:33	17:29	15:43	15:39				
26	07:24	06:32	05:31	05:25	04:39	04:28	04:57	05:43	06:30	07:19	06:59	07:34 (1)	06:59	07:36		
	16:20	17:14	18:01	19:50	20:35	20:56	20:34	19:39	18:31	17:28	15:43	15:40				
27	07:23	06:30	05:29	05:24	04:38	04:29	04:58	05:44	06:32	07:20	06:59	07:35 (1)	06:59	07:36		
	16:22	17:16	7	07:04 (1)	18:02	19:52	20:36	20:56	20:33	19:37	18:29	16:26	15:42	15:40		
28	07:22	06:28	05:27	05:22	04:37	04:29	05:00	05:46	06:33	07:21	06:59	07:36 (1)	06:59	07:36		
	16:24	17:18	14	07:07 (1)	18:04	19:54	20:37	20:56	20:31	19:35	18:26	16:24	15:41	15:41		
29	07:20		06:25	05:20	04:36	04:30	05:01	05:47	06:35		07:35 (1)	06:24	07:15	07:40		
	16:25		19:06	19:55	20:38	20:55	20:30	19:33	18:24	5	07:40 (1)	16:22	15:40	15:42		
30	07:19		06:22	05:18	04:35	04:30	05:02	05:49	06:37		07:31 (1)	06:26	07:16	07:41		
	16:27		19:07	19:57	20:39	20:55	20:28	19:31	18:22	13	07:44 (1)	16:20	15:39	15:43		
31	07:18		06:20		04:34		05:04	05:51			06:27		07:16	07:41		
	16:29		19:09		20:40		20:27	19:29			16:18		15:44			
Potential sun hours	265	280	367		413	479	491	495	450	380	334		271	251		
Total, worst case			21		291					18		291				
Sun reduction			0,31		0,31					0,34		0,37				
Oper. time red.			0,86		0,86					0,86		0,86				
Wind dir. red.			0,65		0,65					0,65		0,65				
Total reduction			0,17		0,17					0,19		0,20				
Total, real			4		51					3		60				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)

Project:

FW13

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2013-06-25 16:00 / 12

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar

Shadow receptor: K - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (11)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:41 15:45	07:16 16:31	06:25 17:19	06:18 19:10	06:50 (1) 05:16	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:48 (1) 18:20	07:19 (2) 16:17	06:29 15:39
2	07:41 15:46	07:15 16:32	06:23 17:21	06:16 19:12	06:49 (1) 05:14	04:33 20:43	04:32 20:55	05:07 20:24	05:54 19:24	06:47 (1) 18:18	07:18 (2) 16:15	06:31 15:38
3	07:41 15:47	07:13 16:34	06:21 17:23	06:13 19:14	06:48 (1) 05:12	04:32 20:44	04:32 20:54	05:08 20:22	05:55 19:22	06:46 (1) 18:15	07:17 (2) 16:13	06:32 15:38
4	07:40 15:48	07:12 16:36	06:19 17:25	06:11 19:15	06:47 (1) 05:11	04:31 20:45	04:33 20:54	05:10 20:21	05:57 19:20	06:45 (1) 18:13	07:15 (2) 16:11	06:34 15:37
5	07:40 15:49	07:10 16:38	06:17 17:26	06:09 19:17	06:47 (1) 05:09	04:31 20:45	04:34 20:54	05:11 20:19	05:58 19:18	06:44 (1) 18:11	07:15 (2) 16:10	06:36 15:37
6	07:40 15:50	07:09 16:39	06:15 17:28	06:07 19:18	06:47 (1) 05:07	04:30 20:46	04:35 20:53	05:13 20:17	06:00 19:15	06:43 (1) 18:09	07:15 (2) 16:08	06:37 15:36
7	07:40 15:52	07:07 16:41	06:13 17:30	06:05 19:20	06:48 (1) 05:05	04:29 20:47	04:35 20:53	05:14 20:16	06:01 19:13	06:42 (1) 18:07	07:15 (2) 16:06	06:39 15:36
8	07:39 15:53	07:05 16:43	06:11 17:31	06:03 19:22	06:48 (1) 05:04	04:29 20:48	04:36 20:52	05:16 20:14	06:03 19:11	06:43 (1) 18:04	07:15 (2) 16:05	06:41 15:36
9	07:39 15:54	07:04 16:45	06:09 17:33	06:00 19:23	06:48 (1) 05:02	04:29 20:49	04:37 20:51	05:17 20:12	06:04 19:09	06:42 (1) 18:02	07:15 (2) 16:03	06:43 15:35
10	07:38 15:56	07:02 16:46	06:06 17:35	05:58 19:25	06:48 (1) 05:00	04:28 20:50	04:38 20:51	05:19 20:10	06:06 19:07	06:42 (1) 18:00	07:17 (2) 16:02	06:44 15:35
11	07:38 15:57	07:00 16:48	06:04 17:36	05:56 19:26	06:49 (1) 04:59	04:28 20:50	04:39 20:50	05:20 20:08	06:07 19:04	06:42 (1) 17:58	07:19 (2) 16:01	06:46 15:35
12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 19:28	06:51 (1) 04:57	04:27 20:51	04:40 20:50	05:22 20:07	06:09 19:02	06:42 (1) 17:56	07:20 (2) 16:00	06:48 15:35
13	07:37 16:00	06:57 16:52	06:00 17:40	05:52 19:30	06:53 (1) 04:56	04:27 20:52	04:41 20:48	05:23 20:05	06:10 19:00	06:43 (1) 17:54	07:21 (2) 16:00	06:49 15:35
14	07:36 16:01	06:55 16:53	05:58 17:41	05:50 19:31	06:54 (1) 04:57	04:27 20:52	04:42 20:48	05:25 20:03	06:12 18:58	06:43 (1) 17:52	07:22 (2) 16:00	06:51 15:35
15	07:35 16:03	06:53 16:55	05:55 17:43	05:48 19:33	06:55 (1) 04:58	04:27 20:53	04:43 20:47	05:26 20:01	06:13 18:56	06:45 (1) 17:50	07:23 (2) 16:00	06:53 15:35
16	07:34 16:04	06:51 16:57	05:53 17:44	05:46 19:34	06:56 (1) 04:59	04:27 20:54	04:44 20:46	05:28 19:59	06:15 18:53	06:46 (1) 17:47	07:24 (2) 16:00	06:54 15:35
17	07:34 16:06	06:49 16:59	05:51 17:46	05:43 19:36	06:57 (1) 04:59	04:27 20:54	04:46 20:45	05:29 19:57	06:16 18:51	06:50 (1) 17:45	07:25 (2) 16:00	06:56 15:35
18	07:33 16:07	06:47 17:00	05:49 17:48	05:41 19:38	06:58 (1) 04:59	04:27 20:54	04:47 20:44	05:31 19:55	06:18 18:49	06:57 (1) 17:43	07:26 (2) 16:00	06:57 15:35
19	07:32 16:09	06:45 17:02	05:47 17:49	05:39 19:39	06:59 (1) 04:59	04:27 20:55	04:48 20:43	05:32 19:53	06:20 18:47	06:58 (1) 17:41	07:27 (2) 16:00	06:59 15:35
20	07:31 16:10	06:44 17:04	05:44 17:51	05:37 19:41	07:00 (1) 04:59	04:27 20:55	04:49 20:42	05:34 19:51	06:21 18:44	06:59 (1) 17:39	07:28 (2) 16:00	07:01 15:35
21	07:30 16:12	06:42 17:06	05:42 17:53	05:35 19:42	07:01 (1) 04:59	04:27 20:55	04:50 20:40	05:35 19:49	06:23 18:42	07:00 (1) 17:37	07:29 (2) 16:00	07:02 15:35
22	07:29 16:14	06:40 17:07	05:40 17:54	05:33 19:44	07:02 (1) 04:59	04:27 20:55	04:52 20:39	05:37 19:47	06:24 18:40	07:01 (1) 17:35	07:30 (2) 16:00	07:04 15:35
23	07:28 16:15	06:38 17:09	05:38 17:56	05:31 19:46	07:03 (1) 04:59	04:27 20:55	04:53 20:38	05:38 19:45	06:26 18:38	07:02 (1) 17:33	07:31 (2) 16:00	07:05 15:35
24	07:27 16:17	06:36 17:11	05:36 17:57	05:29 19:47	07:04 (1) 04:59	04:28 20:56	04:54 20:37	05:40 19:43	06:27 18:35	07:03 (1) 17:31	07:32 (2) 16:00	07:07 15:35
25	07:25 16:19	06:34 17:13	05:33 17:59	05:27 19:49	07:05 (1) 04:59	04:40 20:56	04:56 20:35	05:41 19:41	06:29 18:33	07:04 (1) 17:29	07:33 (2) 16:00	07:09 15:35
26	07:24 16:20	06:32 17:14	05:31 18:01	05:25 19:50	07:06 (1) 04:59	04:39 20:56	04:57 20:34	05:43 19:39	06:30 18:31	07:05 (1) 17:26	07:34 (2) 16:00	07:10 15:35
27	07:23 16:22	06:30 17:16	05:29 18:02	05:24 19:52	07:07 (1) 04:59	04:38 20:56	04:58 20:33	05:44 19:37	06:32 18:29	07:06 (1) 17:24	07:35 (2) 16:00	07:12 15:35
28	07:22 16:24	06:28 17:18	05:27 18:04	05:22 19:54	07:08 (1) 04:59	04:37 20:56	05:00 20:31	05:46 19:35	06:33 18:26	07:07 (1) 17:22	07:36 (2) 16:00	07:13 15:35
29	07:20 16:25	06:24 17:06	05:24 17:54	05:20 19:55	07:09 (1) 04:59	04:36 20:55	05:01 20:30	05:47 19:33	06:35 18:24	07:08 (1) 17:20	07:37 (2) 16:00	07:14 15:35
30	07:19 16:27	06:22 17:07	05:22 17:57	05:18 19:57	07:10 (1) 04:59	04:35 20:55	05:02 20:28	05:49 19:31	06:37 18:22	07:09 (1) 17:19	07:38 (2) 16:00	07:16 15:35
31	07:18 16:29	06:20 17:09	05:20 17:57	05:16 19:57	07:11 (1) 04:59	04:34 20:56	05:04 20:27	05:50 19:28	06:38 18:17	07:10 (1) 17:17	07:39 (2) 16:00	07:17 15:35
Potential sun hours	265	280	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction				318	323			29	421		197	
Oper. time red.				0,31	0,31			0,39	0,34		0,37	
Wind dir. red.				0,86	0,86			0,86	0,86		0,86	
Total reduction				0,68	0,71			0,71	0,70		0,66	
Total, real				0,18	0,19			0,23	0,20		0,21	
				58	61			7	86		41	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)

Project:

FW13

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** L - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (12)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:41 15:45	07:16 16:31	06:25 17:19	07:10 (6) 07:20 (6)	06:18 19:10	07:02 (4) 19:58
2	07:41 15:46	07:15 16:32	06:23 17:21	06:16 19:12	07:03 (4) 19:13 (4)	19:58 20:00
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 19:14	05:12 20:01	06:06 (3) 20:42
4	07:40 15:48	07:12 16:36	06:19 17:24	06:11 19:15	05:11 20:03	06:22 (2) 20:44
5	07:40 15:49	07:10 16:38	06:17 17:26	06:09 19:17	05:09 20:05	04:31 20:45
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	05:07 20:06	04:30 20:46
7	07:40 15:52	07:07 16:41	06:13 17:30	06:05 19:20	05:05 20:08	04:29 20:47
8	07:39 15:53	07:05 16:43	06:11 17:31	06:03 19:22	05:04 20:09	04:29 20:48
9	07:39 15:54	07:04 16:45	06:09 17:33	06:00 19:23	05:02 20:11	04:29 20:49
10	07:38 15:56	07:02 16:46	06:06 17:35	05:58 19:25	05:00 20:12	04:28 20:50
11	07:38 15:57	07:00 16:48	06:04 17:36	05:56 19:26	04:59 20:14	04:28 20:50
12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 19:28	04:57 20:15	04:27 20:51
13	07:37 16:00	06:57 16:52	06:00 17:40	05:52 19:30	04:56 20:17	04:27 20:52
14	07:36 16:01	06:55 16:53	05:58 17:41	05:50 19:31	04:54 20:18	04:27 20:52
15	07:35 16:03	06:53 16:55	05:55 17:43	05:48 19:33	04:53 20:20	04:27 20:53
16	07:34 16:04	06:51 16:57	05:53 17:44	05:46 19:34	04:51 20:21	04:27 20:53
17	07:34 16:06	06:49 16:59	05:51 17:46	05:43 19:36	04:50 20:23	04:27 20:54
18	07:33 16:07	06:47 17:00	05:49 17:48	05:41 19:38	04:49 20:24	04:27 20:54
19	07:32 16:09	06:45 17:02	05:47 17:49	05:39 19:39	04:47 20:25	04:27 20:54
20	07:31 16:10	06:44 17:04	05:44 17:51	05:37 19:41	04:46 20:27	04:27 20:55
21	07:30 16:12	06:42 17:06	05:42 17:53	05:35 19:42	04:45 20:28	04:27 20:55
22	07:29 16:14	06:40 17:07	05:40 17:54	05:33 19:44	04:43 20:29	04:27 20:55
23	07:28 16:15	06:38 17:09	05:38 17:56	05:31 19:46	04:42 20:31	04:27 20:55
24	07:27 16:17	06:36 17:11	05:36 17:57	05:29 19:47	04:41 20:32	04:28 20:56
25	07:25 16:19	06:34 17:13	05:33 17:59	05:27 19:49	04:40 20:33	04:28 20:56
26	07:24 16:20	06:32 17:14	05:31 18:01	05:25 19:50	04:39 20:35	04:28 20:56
27	07:23 16:22	06:30 17:16	05:29 18:02	05:23 19:52	04:38 20:36	04:29 20:56
28	07:22 16:24	06:28 17:18	05:27 18:04	05:22 19:54	04:37 20:37	04:29 20:55
29	07:20 16:25		05:24 19:06	05:20 19:55	04:36 20:38	04:30 20:55
30	07:19 16:27		05:22 19:07	05:18 19:57	04:35 20:39	04:30 20:55
31	07:18 16:29		05:20 19:09	05:16 19:17 (4)	04:34 20:40	
Potential sun hours	265	280	367	413	479	491
Total, worst case		183	205	674	93	
Sun reduction		0,31	0,31	0,31	0,35	
Oper. time red.		0,86	0,86	0,86	0,86	
Wind dir. red.		0,63	0,70	0,71	0,71	
Total reduction		0,16	0,19	0,19	0,21	
Total, real		30	38	127	20	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** L - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (12)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:17	07:17 15:39
2	04:32 20:55	05:07 20:24	05:54 19:24	06:40 18:18	06:31 16:15	07:19 15:38
3	04:32 20:54	05:08 20:22	05:55 19:22	06:41 18:15	06:32 16:13	07:20 15:38
4	04:33 20:54	05:10 20:21	05:57 19:20	06:43 18:13	06:34 16:11	07:21 15:37
5	04:34 20:54	05:11 20:19	05:58 19:18	06:44 18:11	06:36 16:10	07:23 15:37
6	04:35 20:53	05:13 20:17	06:00 19:15	06:46 18:09	06:37 16:08	07:24 15:36
7	04:35 20:53	05:14 20:16	06:01 19:13	06:48 18:07	06:39 16:06	07:25 15:36
8	04:36 20:52	05:16 20:14	06:03 19:11	06:49 18:04	06:41 16:05	07:26 15:36
9	04:37 20:51	05:17 20:12	06:04 19:09	06:51 18:02	06:42 16:03	07:27 15:35
10	04:38 20:51	05:19 20:10	06:06 19:07	06:52 18:00	06:44 16:02	07:28 15:35
11	04:39 20:50	05:20 20:08	06:07 19:04	06:54 17:58	06:46 16:00	07:29 15:35
12	04:40 20:49	05:22 20:07	06:09 19:02	06:56 17:56	06:48 15:59	07:30 15:35
13	04:41 20:48	05:23 20:05	06:10 19:00	06:57 17:54	06:49 15:57	07:31 15:35
14	04:42 20:48	05:25 20:03	06:12 18:58	06:59 17:52	06:51 15:56	07:32 15:35
15	04:43 20:47	05:26 20:01	06:13 18:55	07:00 17:50	06:53 15:55	07:33 15:35
16	04:44 20:46	05:28 19:59	06:15 18:53	07:02 17:47	06:54 15:53	07:34 15:35
17	04:46 20:45	05:29 19:57	06:16 18:51	07:04 17:45	06:56 15:52	07:35 15:35
18	04:47 20:44	05:31 19:55	06:18 18:49	07:05 17:43	06:57 15:51	07:36 15:36
19	04:48 20:43	05:32 19:53	06:20 18:47	07:07 17:41	06:59 15:50	07:37 15:36
20	04:49 20:41	05:34 19:51	06:21 18:44	07:09 17:39	07:01 15:49	07:37 15:36
21	04:50 20:40	05:35 19:49	06:23 18:42	07:10 17:37	07:02 15:47	07:37 15:37
22	04:52 20:39	05:37 19:47	06:24 18:40	07:12 17:35	07:04 15:46	07:38 15:37
23	04:53 20:38	05:38 19:45	06:26 18:38	07:14 17:33	07:05 15:45	07:39 15:38
24	04:54 20:37	05:40 19:43	06:27 18:35	07:15 17:31	07:07 15:44	07:39 15:38
25	04:56 20:35	05:41 19:41	06:29 18:33	07:17 16:29	07:09 15:43	07:39 15:39
26	04:57 20:34	05:43 19:39	06:30 18:31	07:19 16:28	07:10 15:43	07:40 15:40
27	04:58 20:33	05:44 19:37	06:32 18:29	07:20 16:26	07:12 15:42	07:40 15:40
28	05:00 20:31	05:46 19:35	06:33 18:26	07:22 16:24	07:13 15:41	07:40 15:41
29	05:01 20:30	05:47 19:33	06:35 18:24	07:24 16:22	07:14 15:40	07:40 15:42
30	05:02 20:28	05:49 19:31	06:37 18:22	07:25 16:20	07:16 15:39	07:41 15:43
31	05:04 20:27	05:50 19:28	06:38 18:20	07:27 16:18	07:17 15:44	07:41 15:44
Potential sun hours	495	450	380	334	271	251
Total, worst case		749	224	201		
Sun reduction		0,39	0,34	0,37		
Oper. time red.		0,86	0,86	0,86		
Wind dir. red.		0,71	0,70	0,63		
Total reduction		0,23	0,20	0,20		
Total, real		175	46	39		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** M - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (13)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:41 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	05:50 (4) 06:14 (4)
2	07:41 15:46	07:15 16:32	06:23 17:21	06:16 19:12	05:14 20:00	05:50 (4) 06:16 (4)
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 19:14	05:12 20:01	05:49 (4) 06:16 (4)
4	07:40 15:48	07:12 16:36	06:19 17:24	06:11 19:15	05:11 20:03	05:48 (4) 06:16 (4)
5	07:40 15:49	07:10 16:38	06:17 17:26	06:09 19:17	05:09 20:05	05:48 (4) 06:16 (4)
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	05:07 20:06	05:48 (4) 06:16 (4)
7	07:39 15:52	07:07 16:41	06:13 17:30	06:05 19:20	05:05 20:08	05:47 (4) 06:15 (4)
8	07:39 15:53	07:05 16:43	06:11 17:31	06:03 19:22	05:04 20:09	05:48 (4) 06:16 (4)
9	07:39 15:54	07:04 16:45	06:08 17:33	06:00 19:23	05:02 20:11	05:47 (4) 06:15 (4)
10	07:38 15:56	07:02 16:46	06:06 17:35	05:58 19:25	05:00 20:12	05:48 (4) 06:15 (4)
11	07:38 15:57	07:00 16:48	06:04 17:36	05:56 19:26	04:59 20:14	05:48 (4) 06:14 (4)
12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 19:28	04:57 20:15	05:49 (4) 06:14 (4)
13	07:36 16:00	06:57 16:52	06:00 17:39	05:52 19:30	04:56 20:17	05:50 (4) 06:14 (4)
14	07:36 16:01	06:55 16:53	05:58 17:41	05:50 19:31	04:54 20:18	05:50 (4) 06:13 (4)
15	07:35 16:03	06:53 16:55	05:55 17:43	05:48 19:33	04:53 20:20	05:51 (4) 06:12 (4)
16	07:34 16:04	06:51 16:57	05:53 17:44	05:46 19:34	04:51 20:21	05:52 (4) 06:12 (4)
17	07:33 16:06	06:49 16:59	05:51 17:46	05:43 19:36	04:50 20:22	05:52 (4) 06:10 (4)
18	07:33 16:07	06:47 17:00	05:49 17:48	05:41 19:38	04:49 20:24	05:54 (4) 06:09 (4)
19	07:32 16:09	06:45 17:02	05:47 17:49	05:39 19:39	04:47 20:25	05:56 (4) 06:07 (4)
20	07:31 16:10	06:44 17:04	05:44 17:51	05:37 19:41	04:46 20:27	05:58 (4) 06:05 (4)
21	07:30 16:12	06:42 17:06	05:42 17:53	05:35 19:42	04:45 20:28	06:05 (4) 20:55
22	07:29 16:14	06:40 17:07	05:40 17:54	05:33 19:44	04:43 20:29	20:55
23	07:28 16:15	06:38 17:09	05:38 17:56	05:31 19:46	04:42 20:31	04:27
24	07:26 16:17	06:36 17:11	05:36 17:57	05:29 19:47	04:41 20:32	04:28
25	07:25 16:19	06:34 17:13	05:33 17:59	05:27 19:49	04:40 20:33	20:55
26	07:24 16:20	06:32 17:14	05:31 18:01	05:25 19:50	04:39 20:34	04:28
27	07:23 16:22	06:30 17:16	05:29 18:02	05:23 19:52	04:38 20:36	20:56
28	07:22 16:24	06:27 17:18	05:27 18:04	05:22 19:54	04:37 20:37	04:29
29	07:20 16:25	06:24 19:06	05:24 18:06	05:20 19:55	04:36 20:38	20:55
30	07:19 16:27	06:22 19:07	05:22 18:07	05:18 19:57	04:35 20:39	04:30
31	07:17 16:29	06:20 19:09	05:20 18:09	05:16 19:59	04:34 20:40	20:55
Potential sun hours	265	281	367	413	479	491
Total, worst case			367	87	462	
Sun reduction			0,31	0,31	0,35	
Oper. time red.			0,86	0,86	0,86	
Wind dir. red.			0,68	0,70	0,70	
Total reduction			0,18	0,19	0,21	
Total, real			67	16	96	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** M - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (13)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	04:31 20:55	05:05 20:25	05:59 (4) 19:26	05:52 18:20	06:38 17:20	07:10 (6) 16:17
2	04:32 20:55	05:07 20:24	05:58 (4) 19:24	05:54 18:17	06:40 17:13	07:12 (6) 16:15
3	04:32 20:54	05:08 20:22	05:58 (4) 19:22	05:55 18:15	06:41 17:11	07:12 (6) 16:13
4	04:33 20:54	05:10 20:21	05:58 (4) 19:20	05:57 18:13	06:43 17:09	07:12 (6) 16:11
5	04:34 20:53	05:11 20:19	05:57 (4) 19:18	05:58 18:11	06:44 17:07	07:12 (6) 16:10
6	04:35 20:53	05:13 20:17	05:58 (4) 19:15	06:00 18:09	06:46 17:05	07:12 (6) 16:08
7	04:35 20:52	05:14 20:15	05:57 (4) 19:13	06:01 18:07	06:48 17:03	07:12 (6) 16:06
8	04:36 20:52	05:16 20:14	05:58 (4) 19:11	06:03 18:04	06:49 17:01	07:12 (6) 16:05
9	04:37 20:51	05:17 20:12	05:58 (4) 19:09	06:04 18:02	06:51 16:59	07:12 (6) 16:03
10	04:38 20:51	05:19 20:10	05:57 (4) 19:07	06:06 18:00	06:52 16:57	07:12 (6) 16:02
11	04:39 20:50	05:20 20:08	05:58 (4) 19:04	06:07 17:58	06:54 16:55	07:12 (6) 16:00
12	04:40 20:49	05:22 20:07	05:58 (4) 19:02	06:09 17:56	06:56 16:53	07:12 (6) 15:59
13	04:41 20:48	05:23 20:05	06:00 (4) 19:00	06:10 17:54	06:57 16:51	07:12 (6) 15:57
14	04:42 20:47	05:25 20:03	06:00 (4) 18:58	06:12 17:52	06:59 16:49	07:12 (6) 15:56
15	04:43 20:47	05:26 20:01	06:02 (4) 18:55	06:13 17:50	07:00 16:47	07:12 (6) 15:55
16	04:44 20:46	05:28 19:59	06:03 (4) 18:53	06:15 17:47	07:02 16:45	07:12 (6) 15:53
17	04:46 20:45	05:29 19:57	06:06 (4) 18:51	06:16 17:45	07:04 16:43	07:12 (6) 15:52
18	04:47 20:44	05:31 19:55	06:18 18:49	07:13 (6) 17:43	07:05 16:41	07:12 (6) 15:51
19	04:48 20:43	05:32 19:53	06:19 18:46	07:12 (6) 17:41	07:07 16:39	07:12 (6) 15:50
20	04:49 20:41	05:34 19:51	06:21 18:44	07:10 (6) 17:39	07:09 16:37	07:12 (6) 15:49
21	04:50 20:40	05:35 19:49	06:23 18:42	07:10 (6) 17:37	07:10 16:35	07:12 (6) 15:47
22	04:52 20:39	05:37 19:47	06:24 18:40	07:08 (6) 17:35	07:12 16:33	07:12 (6) 15:46
23	04:53 20:38	05:38 19:45	06:26 18:38	07:08 (6) 17:33	07:14 16:31	07:12 (6) 15:45
24	04:54 20:37	05:40 19:43	06:27 18:35	07:08 (6) 17:31	07:15 16:29	07:12 (6) 15:44
25	04:56 20:35	06:05 (4) 19:41	06:29 18:33	07:07 (6) 17:29	07:16 16:27	07:12 (6) 15:43
26	04:57 20:34	06:04 (4) 19:39	06:30 18:31	07:08 (6) 17:28	07:17 16:26	07:12 (6) 15:43
27	04:58 20:33	06:02 (4) 19:37	06:32 18:29	07:07 (6) 17:26	07:18 16:24	07:12 (6) 15:42
28	05:00 20:31	06:02 (4) 19:35	06:33 18:26	07:08 (6) 17:24	07:19 16:23	07:12 (6) 15:41
29	05:01 20:30	06:01 (4) 19:33	06:35 18:24	07:08 (6) 17:22	07:20 16:21	07:12 (6) 15:40
30	05:02 20:28	06:00 (4) 19:31	06:37 18:22	07:09 (6) 17:20	07:21 16:20	07:12 (6) 15:39
31	05:04 20:27	06:00 (4) 19:28	06:39 18:20	07:10 (6) 17:18	07:22 16:18	07:12 (6) 15:38
Potential sun hours	495	450	380	334	271	251
Total, worst case	150	408	341	30		
Sun reduction	0,36	0,39	0,34	0,37		
Oper. time red.	0,86	0,86	0,86	0,86		
Wind dir. red.	0,70	0,70	0,68	0,68		
Total reduction	0,22	0,23	0,20	0,21		
Total, real	32	94	67	6		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** N - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (14)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:41 15:45	07:16 16:30	06:25 17:19	07:00 (7) 07:24 (7)	06:18 08:17 (6)	05:16 06:04 (5)
2	07:41 15:46	07:15 16:32	06:23 17:21	07:00 (7) 07:24 (7)	06:16 08:14 (6)	05:14 06:05 (5)
3	07:40 15:47	07:13 16:34	06:21 17:23	07:00 (7) 07:24 (7)	06:13 08:13 (6)	05:12 06:06 (5)
4	07:40 15:48	07:12 16:36	06:19 17:24	07:00 (7) 07:23 (7)	06:11 08:11 (6)	05:11 06:07 (5)
5	07:40 15:49	07:10 16:37	06:17 17:26	06:59 (7) 07:22 (7)	06:09 08:09 (6)	05:09 06:22 (5)
6	07:40 15:50	07:08 16:39	06:15 17:28	07:00 (7) 07:21 (7)	06:07 08:07 (6)	05:07 06:19 (5)
7	07:39 15:52	07:07 16:41	06:13 17:29	07:01 (7) 07:20 (7)	06:05 08:04 (6)	05:05 06:20 (5)
8	07:39 15:53	07:05 16:43	06:11 17:31	07:02 (7) 07:18 (7)	06:03 07:58 (6)	05:04 06:09 (5)
9	07:39 15:54	07:03 16:45	06:08 17:33	07:05 (7) 07:16 (7)	06:00 07:23 (6)	05:02 06:11 (5)
10	07:38 15:56	07:02 16:46	06:06 17:35	07:02 (6) 07:07 (6)	05:58 06:55 (6)	05:00 06:12 (5)
11	07:38 15:57	07:00 16:48	06:04 17:36	06:55 (6) 07:12 (6)	05:56 07:15 (6)	04:59 06:08 (5)
12	07:37 15:58	06:58 16:50	06:02 17:38	06:52 (6) 07:15 (6)	05:54 07:18 (6)	04:57 06:10 (5)
13	07:36 16:00	06:57 16:52	06:00 17:39	06:49 (6) 07:18 (6)	05:52 07:20 (6)	04:56 06:12 (5)
14	07:36 16:01	06:55 16:53	05:58 17:41	06:47 (6) 07:19 (6)	05:50 06:45 (6)	04:54 06:18 (5)
15	07:35 16:03	06:53 16:55	05:55 17:43	06:45 (6) 07:20 (6)	05:48 06:43 (6)	04:53 06:20 (5)
16	07:34 16:04	06:51 16:57	05:53 17:44	06:43 (6) 07:21 (6)	05:46 06:42 (6)	04:51 06:22 (5)
17	07:33 16:06	06:49 16:59	05:51 17:46	06:42 (6) 07:22 (6)	05:43 06:41 (6)	04:50 06:19 (5)
18	07:33 16:07	06:47 17:00	05:49 17:48	06:41 (6) 07:23 (6)	05:41 06:19 (5)	04:49 06:24 (5)
19	07:32 16:09	06:45 17:02	05:47 17:49	06:41 (6) 07:23 (6)	05:39 06:19 (5)	04:47 06:24 (5)
20	07:31 16:10	06:43 17:04	05:44 17:51	06:39 (6) 07:23 (6)	05:37 06:18 (5)	04:46 06:26 (5)
21	07:30 16:12	06:42 17:06	05:42 17:53	06:38 (6) 07:23 (6)	05:35 06:19 (5)	04:45 06:27 (5)
22	07:29 16:14	06:40 17:07	05:40 17:54	06:38 (6) 07:23 (6)	05:33 06:18 (5)	04:43 06:28 (5)
23	07:28 16:15	06:38 17:09	05:38 07:09 (7)	06:38 (6) 07:24 (6)	05:31 06:19 (5)	04:42 06:28 (5)
24	07:26 16:17	06:36 17:11	05:36 07:18 (7)	06:36 (6) 07:22 (6)	05:29 06:17 (5)	04:41 06:28 (5)
25	07:25 16:18	06:34 17:13	05:33 07:03 (7)	06:36 (6) 07:22 (6)	05:27 06:16 (5)	04:40 06:28 (5)
26	07:24 16:20	06:32 17:14	05:31 07:02 (7)	06:36 (6) 07:22 (6)	05:25 06:15 (5)	04:39 06:28 (5)
27	07:23 16:22	06:30 17:16	05:29 07:01 (7)	06:36 (6) 07:22 (6)	05:23 06:14 (5)	04:38 06:29 (5)
28	07:22 16:24	06:27 17:18	05:27 07:00 (7)	06:36 (6) 07:20 (6)	05:22 06:13 (5)	04:37 06:29 (5)
29	07:20 16:25		05:24 07:00 (7)	06:36 (6) 08:20 (6)	05:20 06:11 (5)	04:36 06:28 (5)
30	07:19 16:27		05:22 07:00 (7)	06:36 (6) 08:19 (6)	05:18 06:10 (5)	04:35 06:27 (5)
31	07:17 16:29		05:20 07:00 (7)	06:36 (6) 08:18 (6)	05:16 06:09 (5)	04:34 06:27 (5)
Potential sun hours	265	281	367	413	479	491
Total, worst case		106	1100	603	100	407
Sun reduction		0,31	0,31	0,31	0,35	0,32
Oper. time red.		0,86	0,86	0,86	0,86	0,86
Wind dir. red.		0,64	0,66	0,69	0,71	0,70
Total reduction		0,17	0,18	0,18	0,21	0,19
Total, real		18	195	111	21	77

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

FW13

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor: N - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (14)****Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	04:31 20:55	05:07 (15) 20:25	05:05 19:26	05:52 19:26	06:38 18:20	07:29 (6) 16:17
2	04:32 20:55	05:08 (15) 20:24	05:54 19:24	05:54 18:17	26 07:55 (6)	16:17 16:31
3	04:32 20:54	05:09 (15) 20:22	05:08 19:22	05:55 18:15	21 07:53 (6)	16:15 16:37
4	04:33 20:54	05:09 (15) 20:20	05:10 19:20	05:57 18:13	12 07:48 (6)	16:13 16:34
5	04:34 20:53	05:10 (15) 20:19	05:11 19:18	05:58 18:11	8 07:51 (7)	16:11 16:36
6	04:35 20:53	05:11 (15) 20:17	05:13 19:15	06:00 18:09	14 07:54 (7)	16:10 16:37
7	04:35 20:52	05:11 (15) 20:14	06:23 (5) 19:13	06:00 18:07	17 07:55 (7)	16:08 16:39
8	04:36 20:52	05:13 (15) 20:14	06:19 (5) 19:13	06:01 18:07	19 07:56 (7)	16:06 16:41
9	04:37 20:51	05:13 (15) 20:12	06:18 (5) 19:11	06:03 18:06	19 07:56 (7)	16:06 16:42
10	04:38 20:51	05:19 (15) 20:10	06:32 (5) 19:09	06:04 18:07	21 07:57 (7)	16:05 16:44
11	04:39 20:50	05:17 20:08	06:14 (5) 19:07	06:06 18:04	24 07:58 (7)	16:04 16:46
12	04:40 20:49	05:21 20:07	06:33 (5) 19:04	06:07 18:03	24 07:58 (7)	16:00 16:47
13	04:41 20:48	05:23 20:05	06:13 (5) 19:02	06:09 18:02	24 07:57 (7)	15:59 16:49
14	04:42 20:47	05:25 20:03	06:13 (5) 18:58	06:10 18:01	24 07:57 (7)	15:57 16:51
15	04:43 20:47	05:26 20:01	06:12 (5) 18:55	06:12 18:00	22 07:56 (7)	15:56 16:52
16	04:44 20:46	05:28 19:59	06:36 (5) 18:53	06:13 17:58	21 07:55 (7)	15:55 16:54
17	04:46 20:45	05:29 19:57	06:11 (5) 18:51	06:15 17:47	19 07:54 (7)	15:53 16:56
18	04:47 20:44	05:31 19:55	06:11 (5) 18:49	06:16 17:45	17 07:53 (7)	15:52 16:57
19	04:48 20:43	05:32 19:53	06:35 (5) 18:46	06:18 17:43	13 07:51 (7)	15:51 16:59
20	04:49 20:41	05:34 19:51	06:11 (5) 18:44	06:19 17:41	5 07:46 (7)	15:50 16:59
21	04:50 20:40	05:35 19:49	06:12 (5) 18:42	06:21 17:39		15:49 16:57
22	04:52 20:39	05:37 19:47	06:32 (5) 18:40	06:23 (6) 17:37		15:47 16:57
23	04:53 20:38	05:38 19:45	06:13 (5) 18:38	06:24 17:35		15:46 16:58
24	04:54 20:37	05:40 19:43	06:14 (5) 18:36	06:26 17:33		15:45 16:59
25	04:56 20:35	05:41 19:41	06:29 (5) 18:35	06:27 17:31		15:44 16:59
26	04:57 20:34	05:43 19:39	06:17 (5) 18:33	06:29 17:29		15:43 16:59
27	04:58 20:33	05:44 19:37	06:30 18:31	06:19 17:27		15:42 16:59
28	05:00 20:31	05:46 19:35	06:32 (5) 18:29	06:20 17:25		15:41 16:59
29	05:01 20:30	05:47 19:33	06:33 18:26	06:22 17:23		15:40 16:59
30	05:02 20:28	05:49 19:31	06:35 18:24	06:24 17:21		15:40 16:59
31	05:04 20:27	05:50 19:28	06:36 18:22	06:25 17:19		15:40 16:59
Potential sun hours	495	450	380	334	271	251
Total, worst case	93	361	1221	354		
Sun reduction	0,36	0,39	0,34	0,37		
Oper. time red.	0,86	0,86	0,86	0,86		
Wind dir. red.	0,70	0,71	0,67	0,64		
Total reduction	0,21	0,23	0,20	0,20		
Total, real	20	84	239	71		

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** O - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (15)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:41 15:45	07:16 16:30	06:25 17:19	06:18 19:10	06:51 (7) 19:58	05:50 (8) 20:41
2	07:41 15:46	07:15 16:32	06:23 17:21	06:16 19:12	06:49 (7) 20:00	05:50 (8) 20:42
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 19:14	06:49 (7) 20:01	05:50 (8) 20:43
4	07:40 15:48	07:12 16:36	06:19 17:24	06:11 19:15	06:48 (7) 20:03	05:50 (8) 20:44
5	07:40 15:49	07:10 16:37	06:17 17:26	06:09 19:17	06:48 (7) 20:05	05:51 (8) 20:45
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	06:47 (7) 20:06	05:51 (8) 20:46
7	07:39 15:52	07:07 16:41	06:13 17:29	06:05 19:20	06:47 (7) 20:08	05:51 (8) 20:47
8	07:39 15:53	07:05 16:43	06:11 17:31	06:03 19:22	06:47 (7) 20:09	05:53 (8) 20:48
9	07:39 15:54	07:03 16:45	06:08 17:33	06:00 19:23	06:47 (7) 20:11	05:54 (8) 20:49
10	07:38 15:56	07:02 16:46	06:06 17:35	05:58 19:25	06:48 (7) 20:12	05:57 (8) 20:50
11	07:38 15:57	07:00 16:48	06:04 17:36	05:56 19:26	06:48 (7) 20:14	05:58 (8) 20:51
12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 19:28	06:50 (7) 20:15	05:59 (8) 20:52
13	07:36 16:00	06:57 16:52	06:00 17:39	05:52 19:30	06:51 (7) 20:17	05:59 (8) 20:53
14	07:36 16:01	06:55 16:53	05:58 17:41	05:50 19:31	06:55 (7) 20:18	05:59 (8) 20:54
15	07:35 16:03	06:53 16:55	05:55 17:43	05:48 19:33	06:56 (7) 20:20	05:59 (8) 20:55
16	07:34 16:04	06:51 16:57	05:53 17:44	05:46 19:34	06:57 (7) 20:21	05:59 (8) 20:56
17	07:33 16:06	06:49 16:59	05:51 17:46	05:43 19:36	06:58 (7) 20:22	05:59 (8) 20:57
18	07:33 16:07	06:47 17:00	05:49 17:48	05:41 19:38	06:59 (7) 20:24	05:59 (8) 20:58
19	07:32 16:09	06:45 17:02	05:47 17:49	05:39 19:39	07:00 (7) 20:25	05:59 (8) 20:59
20	07:31 16:10	06:43 17:04	05:44 17:51	05:37 19:41	07:01 (7) 20:27	05:59 (8) 20:59
21	07:30 16:12	06:42 17:06	05:42 17:53	05:35 19:42	07:02 (7) 20:28	05:59 (8) 20:59
22	07:29 16:14	06:40 17:07	05:40 17:54	05:33 19:44	07:03 (7) 20:29	05:59 (8) 20:59
23	07:28 16:15	06:38 17:09	05:38 17:56	05:31 19:46	07:04 (7) 20:31	05:59 (8) 20:59
24	07:26 16:17	06:36 17:11	05:36 17:57	05:29 19:47	07:05 (7) 20:32	05:59 (8) 20:59
25	07:25 16:18	06:34 17:13	05:33 17:59	05:27 19:49	07:06 (7) 20:33	05:59 (8) 20:59
26	07:24 16:20	06:32 17:14	05:31 18:01	05:25 19:50	07:07 (7) 20:34	05:59 (8) 20:59
27	07:23 16:22	06:30 17:16	05:29 18:02	05:23 19:52	07:08 (7) 20:36	05:59 (8) 20:59
28	07:22 16:24	06:27 17:18	05:27 18:04	05:22 19:54	07:09 (7) 20:37	05:59 (8) 20:59
29	07:20 16:25		06:24 19:05	05:20 19:55	07:10 (7) 20:38	05:59 (8) 20:59
30	07:19 16:27		06:22 19:07	05:18 19:57	07:11 (7) 20:39	05:59 (8) 20:59
31	07:17 16:29		06:20 19:09	05:16 19:59	07:12 (7) 20:40	05:59 (8) 20:59
Potential sun hours	265	281	367	413	479	491
Total, worst case			47	399	242	1629
Sun reduction			0,31	0,31	0,35	0,32
Oper. time red.			0,86	0,86	0,86	0,86
Wind dir. red.			0,71	0,71	0,70	0,69
Total reduction			0,19	0,19	0,21	0,19
Total, real			9	75	50	308

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** O - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (15)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	04:31 20:55	05:11 (5) 06:10 (6)	05:05 19:26	06:47 (7) 18:20	06:29 16:17	07:17 15:39
2	04:32 20:55	05:11 (5) 06:10 (6)	05:07 19:24	06:47 (7) 18:17	06:31 16:15	07:19 15:38
3	04:32 20:54	05:12 (5) 06:10 (6)	05:08 19:22	06:45 (7) 18:15	06:32 16:13	07:20 15:38
4	04:33 20:54	05:12 (5) 06:09 (6)	05:10 19:20	06:45 (7) 18:13	06:34 16:11	07:21 15:37
5	04:34 20:53	05:13 (5) 06:09 (6)	05:11 19:18	06:44 (7) 18:11	06:36 16:10	07:22 15:37
6	04:35 20:53	05:14 (5) 06:09 (6)	05:13 19:15	06:44 (7) 18:09	06:37 16:08	07:24 15:36
7	04:35 20:52	05:15 (5) 06:09 (6)	05:14 19:13	06:43 (7) 18:07	06:39 16:06	07:25 15:36
8	04:36 20:52	05:15 (5) 06:08 (6)	05:16 19:11	06:43 (7) 18:04	06:41 16:05	07:26 15:36
9	04:37 20:51	05:16 (5) 06:07 (6)	05:17 19:09	06:43 (7) 18:02	06:42 16:03	07:27 15:35
10	04:38 20:51	05:17 (5) 06:07 (6)	05:18 19:07	06:42 (7) 18:00	06:44 16:02	07:28 15:35
11	04:39 20:50	05:19 (5) 06:06 (6)	05:20 19:04	06:43 (7) 17:58	06:46 16:00	07:29 15:35
12	04:40 20:49	05:41 (6) 06:06 (6)	05:22 19:02	06:44 (7) 17:56	06:47 15:59	07:30 15:35
13	04:41 20:48	05:42 (6) 06:05 (6)	05:23 19:00	06:45 (7) 17:54	06:49 15:57	07:31 15:35
14	04:42 20:47	05:44 (6) 06:03 (6)	05:25 18:58	06:47 (7) 17:52	06:51 15:56	07:32 15:35
15	04:43 20:47	05:46 (6) 06:02 (6)	06:00 (8) 18:55	06:52 (7) 17:49	06:52 15:55	07:33 15:35
16	04:44 20:46	05:48 (6) 05:59 (6)	06:00 (8) 18:53	06:54 (7) 17:47	07:02 15:53	07:34 15:35
17	04:46 20:45	05:29 19:57	06:01 (8) 18:51	07:04 17:45	06:56 15:52	07:35 15:35
18	04:47 20:44	05:31 19:55	06:03 (8) 18:49	07:05 17:43	06:57 15:51	07:35 15:36
19	04:48 20:43	05:32 19:53	06:19 18:46	07:07 17:41	06:59 15:50	07:36 15:36
20	04:49 20:41	05:34 19:51	06:21 18:44	07:09 17:39	07:01 15:49	07:37 15:36
21	04:50 20:40	05:35 19:49	06:23 18:42	07:10 17:37	07:02 15:47	07:37 15:37
22	04:52 20:39	05:37 19:47	06:24 18:40	07:12 17:35	07:04 15:46	07:38 15:37
23	04:53 20:38	05:38 19:45	06:26 18:38	07:14 17:33	07:05 15:45	07:38 15:38
24	04:54 20:37	05:40 19:43	06:27 18:35	07:15 17:31	07:07 15:44	07:39 15:38
25	04:56 20:35	05:41 19:41	06:29 18:33	07:17 16:29	07:08 15:43	07:39 15:39
26	04:57 20:34	05:43 19:39	06:30 18:31	07:19 16:28	07:10 15:43	07:40 15:40
27	04:58 20:33	05:44 19:37	06:32 18:29	07:20 16:26	07:11 15:42	07:40 15:40
28	05:00 20:31	05:46 19:35	06:33 18:26	07:22 16:24	07:13 15:41	07:40 15:41
29	05:01 20:30	05:47 19:33	06:55 (7) 07:02 (7)	07:24 16:22	07:14 15:40	07:40 15:42
30	05:02 20:28	05:49 19:31	06:51 (7) 07:05 (7)	07:25 16:20	07:16 15:39	07:40 15:43
31	05:04 20:27	05:50 19:28	06:50 (7) 07:07 (7)	07:27 16:18	07:17 15:44	07:41 15:44
Potential sun hours	495	450	380	334	271	251
Total, worst case	607	298	318			
Sun reduction	0,36	0,39	0,34			
Oper. time red.	0,86	0,86	0,86			
Wind dir. red.	0,69	0,70	0,71			
Total reduction	0,21	0,23	0,21			
Total, real	129	69	65			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar

Shadow receptor: P - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (16)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December			
1	07:41 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	05:37 (7) 20:55	04:31 20:25	05:07 (8) 20:25	05:05 20:25	05:47 (7) 20:25	05:52 20:25	06:38 18:20	06:29 16:17	07:17 15:39
2	07:40 15:46	07:15 16:32	06:23 17:21	06:16 19:12	05:14 20:00	04:33 20:42	05:08 (8) 20:55	04:32 20:24	05:08 (8) 20:24	05:07 20:24	05:47 (7) 20:24	05:54 20:24	06:40 18:17	06:30 16:15	07:19 15:38
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 19:14	05:12 20:01	04:32 20:43	05:06 (8) 20:54	04:32 20:24	05:09 (8) 20:22	05:08 20:22	05:49 (7) 20:22	05:55 20:22	06:41 18:15	06:32 16:13	07:20 15:38
4	07:40 15:48	07:12 16:36	06:19 17:24	06:11 19:15	05:11 20:03	04:31 20:44	05:05 (8) 20:54	04:33 20:24	05:09 (8) 20:20	05:10 20:20	05:50 (7) 20:20	05:57 20:20	06:43 18:13	06:34 16:11	07:21 15:37
5	07:40 15:49	07:10 16:37	06:17 17:26	06:09 19:17	05:09 20:04	04:31 20:45	05:04 (8) 20:53	04:31 20:24	05:09 (8) 20:19	05:11 20:19	05:52 (7) 20:19	05:58 20:19	06:36 18:11	06:34 16:10	07:22 15:37
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	05:07 20:05	04:30 20:46	05:04 (8) 20:53	04:35 20:24	05:10 (8) 20:17	05:13 20:17	06:00 20:17	06:06 20:17	06:46 18:09	06:37 16:08	07:24 15:36
7	07:39 15:52	07:07 16:41	06:13 17:29	06:05 19:20	05:06 20:08	05:44 (7) 20:47	05:03 (8) 20:52	04:35 20:24	05:11 (8) 20:15	05:14 20:15	06:01 20:15	06:07 20:15	06:48 18:07	06:39 16:06	07:25 15:36
8	07:39 15:53	07:05 16:43	06:11 17:31	06:03 19:22	05:04 20:09	05:41 (7) 20:48	05:04 (8) 20:52	04:36 20:24	05:11 (8) 20:14	05:16 20:14	06:03 20:14	06:09 20:14	06:49 18:04	06:41 16:05	07:26 15:36
9	07:39 15:54	07:03 16:45	06:08 17:33	06:00 19:23	05:02 20:11	05:39 (7) 20:49	05:04 (8) 20:55	04:37 20:24	05:13 (8) 20:12	05:17 20:12	06:04 20:12	06:10 20:12	06:51 18:02	06:42 16:03	07:27 15:35
10	07:38 15:56	07:02 16:46	06:06 17:35	05:58 19:25	05:00 20:12	05:38 (7) 20:50	05:03 (8) 20:56	04:38 20:24	05:14 (8) 20:10	05:19 20:10	06:06 20:10	06:12 20:10	06:52 18:00	06:44 16:02	07:28 15:35
11	07:38 15:57	07:00 16:48	06:04 17:36	05:56 19:26	04:59 20:14	05:37 (7) 20:50	05:03 (8) 20:56	04:39 20:24	05:15 (8) 20:08	05:20 20:08	06:07 20:08	06:13 20:08	06:54 17:58	06:46 16:00	07:29 15:35
12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 19:28	05:47 20:15	05:36 (7) 20:51	05:03 (8) 20:57	04:40 20:24	05:16 (8) 20:07	05:22 20:07	06:09 20:07	06:15 20:07	06:56 17:56	06:47 16:00	07:30 15:35
13	07:36 16:00	06:57 16:52	06:00 17:39	05:52 19:30	04:56 20:17	05:36 (7) 20:47	05:04 (8) 20:55	04:41 20:24	05:17 (8) 20:05	05:23 20:05	06:10 20:05	06:16 20:05	06:57 17:54	06:49 16:00	07:31 15:35
14	07:36 16:01	06:55 16:53	05:58 17:41	05:50 19:31	04:54 20:18	05:34 (7) 20:52	05:04 (8) 20:57	04:42 20:24	05:18 (8) 20:03	05:25 20:03	06:12 20:03	06:18 20:03	06:59 17:52	06:51 16:00	07:32 15:35
15	07:35 16:03	06:53 16:55	05:55 17:43	05:48 19:33	04:53 20:20	05:34 (7) 20:53	05:04 (8) 20:54	04:43 20:24	05:19 (8) 20:01	05:26 20:01	06:13 20:01	06:19 20:01	06:59 17:49	06:52 16:00	07:33 15:35
16	07:34 16:04	06:51 16:57	05:53 17:44	05:46 19:34	04:51 20:21	05:34 (7) 20:53	05:04 (8) 20:52	04:44 20:24	05:20 (8) 19:59	05:28 19:59	06:14 19:59	06:20 19:59	06:57 17:47	06:54 16:00	07:34 15:35
17	07:33 16:06	06:49 16:59	05:51 17:46	05:43 19:36	04:50 20:22	05:33 (7) 20:54	05:04 (8) 20:52	04:46 20:24	05:21 (8) 19:57	05:29 19:57	06:15 19:57	06:21 19:57	06:58 17:45	06:56 16:00	07:35 15:35
18	07:33 16:07	06:47 17:00	05:49 17:48	05:41 19:38	04:49 20:24	05:33 (7) 20:54	05:04 (8) 20:52	04:47 20:24	05:22 (8) 19:55	05:31 19:55	06:16 19:55	06:22 19:55	06:57 17:43	06:57 16:00	07:35 15:36
19	07:32 16:09	06:45 17:02	05:47 17:49	05:39 19:39	04:47 20:25	05:33 (7) 20:54	05:04 (8) 20:52	04:48 20:24	05:23 (8) 19:53	05:32 19:53	06:17 19:53	06:23 19:53	06:59 17:41	06:59 16:00	07:36 15:36
20	07:31 16:10	06:43 17:04	05:44 17:51	05:37 19:41	04:46 20:27	05:34 (7) 20:55	05:04 (8) 20:53	04:49 20:24	05:24 (8) 19:51	05:34 19:51	06:18 19:51	06:24 19:51	06:59 17:39	06:59 16:00	07:37 15:36
21	07:30 16:12	06:42 17:06	05:42 17:53	05:35 19:42	04:45 20:28	05:34 (7) 20:55	05:04 (8) 20:53	04:50 20:24	05:25 (8) 19:49	05:35 19:49	06:19 19:49	06:25 19:49	06:59 17:37	06:59 16:00	07:38 15:37
22	07:29 16:14	06:40 17:07	05:40 17:54	05:33 19:44	04:43 20:29	05:33 (7) 20:55	05:04 (8) 20:53	04:52 20:24	05:26 (8) 19:47	05:37 19:47	06:20 19:47	06:26 19:47	06:59 17:35	06:59 16:00	07:39 15:38
23	07:28 16:15	06:38 17:09	05:38 17:56	05:31 19:46	04:42 20:31	05:33 (7) 20:55	05:05 (8) 20:53	04:53 20:24	05:27 (8) 19:45	05:38 19:45	06:21 19:45	06:27 19:45	06:59 17:33	06:59 16:00	07:40 15:38
24	07:26 16:17	06:36 17:11	05:36 17:57	05:29 19:47	04:41 20:32	05:33 (7) 20:55	05:05 (8) 20:53	04:54 20:24	05:28 (8) 19:43	05:40 19:43	06:22 19:43	06:28 19:43	06:59 17:31	06:59 16:00	07:41 15:38
25	07:25 16:19	06:34 17:13	05:33 17:59	05:27 19:49	04:40 20:33	05:34 (7) 20:55	05:05 (8) 20:53	04:56 20:24	05:29 (8) 19:41	05:41 19:41	06:23 19:41	06:29 19:41	06:59 17:29	06:59 16:00	07:42 15:39
26	07:24 16:20	06:32 17:14	05:31 18:01	05:25 19:50	04:39 20:34	05:34 (7) 20:55	05:06 (8) 20:54	04:57 20:24	05:30 (8) 19:39	05:43 19:39	06:24 19:39	06:30 19:39	06:59 17:28	06:59 16:00	07:43 15:40
27	07:23 16:22	06:30 17:16	05:29 18:02	05:23 19:52	04:38 20:36	05:35 (7) 20:55	05:06 (8) 20:55	04:58 20:24	05:31 (8) 19:37	05:44 19:37	06:25 19:37	06:31 19:37	06:59 17:26	06:59 16:00	07:44 15:40
28	07:22 16:24	06:27 17:18	05:27 18:04	05:22 19:53	04:37 20:37	05:35 (7) 20:55	05:07 (8) 20:55	05:00 20:24	05:32 (8) 19:35	05:46 19:35	06:26 19:35	06:32 19:35	06:59 17:24	06:59 16:00	07:45 15:41
29	07:20 16:25		06:24 19:05	05:20 19:55	04:36 20:38	05:36 (7) 20:55	05:07 (8) 20:55	05:01 20:24	05:33 (8) 19:33	05:47 19:33	06:27 19:33	06:33 19:33	06:59 17:22	06:59 16:00	07:46 15:42
30	07:19 16:27		06:22 19:07	05:18 19:57	04:35 20:39	05:36 (7) 20:55	05:07 (8) 20:55	05:02 20:24	05:34 (8) 19:31	05:49 19:31	06:28 19:31	06:34 19:31	06:59 17:20	06:59 16:00	07:47 15:43
31	07:17 16:29		06:20 19:09	05:17 20:40	04:34 20:41	05:36 (7) 20:55	05:08 (8) 20:55	05:04 20:24	05:35 (8) 19:28	05:50 19:28	06:29 19:28	06:35 19:28	06:59 17:18	06:59 16:00	07:48 15:44
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251			
Total, worst case					604	707	835	85							
Sun reduction					0,35	0,32	0,36	0,39							
Oper. time red.					0,86	0,86	0,86	0,86							
Wind dir. red.					0,69	0,69	0,69	0,69							
Total reduction					0,21	0,19	0,21	0,23							
Total, real					124	134	177	19							

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

FW13

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2013-06-25 16:00 / 22

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Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar

Shadow receptor: Q - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (17)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:41 15:45	07:16 16:30	06:25 17:19	06:18 19:10	07:06 (10) 2 07:08 (10)	05:16 19:58	05:51 (17) 22 06:13 (17)	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:17	07:17 15:39
2	07:40 15:46	07:15 16:32	06:23 17:21	06:16 19:12	05:14 20:00	05:51 (17) 22 06:13 (17)	04:33 20:42	04:32 20:55	05:07 20:24	05:53 19:24	06:40 18:17	06:30 16:15	07:18 15:38	
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 19:13	05:12 20:01	05:51 (17) 21 06:12 (17)	04:32 20:43	04:32 20:54	05:08 20:22	06:08 (17) 7 06:15 (17)	05:55 19:22	06:41 18:15	06:32 16:13	07:20 15:38
4	07:40 15:48	07:12 16:36	06:19 17:24	06:11 19:15	05:11 20:03	05:51 (17) 21 06:12 (17)	04:31 20:44	04:33 20:54	05:10 20:20	06:05 (17) 12 06:17 (17)	05:57 19:20	06:43 18:13	06:34 16:11	07:21 15:37
5	07:40 15:49	07:10 16:37	06:17 17:26	06:09 19:17	05:09 20:04	05:52 (17) 20 06:12 (17)	04:31 20:45	04:34 20:53	05:11 20:19	06:03 (17) 15 06:18 (17)	05:58 19:18	06:44 18:11	06:36 16:10	07:22 15:37
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	05:07 20:06	05:52 (17) 18 06:10 (17)	04:30 20:46	04:35 20:53	05:13 20:17	06:03 (17) 17 06:20 (17)	06:00 19:15	06:46 18:09	06:37 16:08	07:24 15:36
7	07:39 15:52	07:07 16:41	06:13 17:29	06:05 19:20	05:05 20:08	05:53 (17) 16 06:09 (17)	04:29 20:47	04:35 20:52	05:14 20:15	06:02 (17) 18 06:20 (17)	06:01 19:13	06:47 18:07	06:39 16:06	07:25 15:36
8	07:39 15:53	07:05 16:43	06:11 17:31	06:03 19:22	05:04 20:09	05:54 (17) 14 06:08 (17)	04:29 20:48	04:36 20:52	05:15 20:14	06:01 (17) 20 06:21 (17)	06:03 19:11	06:49 18:04	06:41 16:05	07:26 15:36
9	07:39 15:54	07:03 16:45	06:08 17:33	06:00 19:23	05:02 20:11	05:55 (17) 11 06:06 (17)	04:29 20:49	04:37 20:51	05:17 20:12	06:00 (17) 21 06:21 (17)	06:04 19:09	06:51 18:02	06:42 16:03	07:27 15:35
10	07:38 15:56	07:02 16:46	06:06 17:34	05:58 19:25	05:00 20:12	05:59 (17) 5 06:04 (17)	04:28 20:49	04:38 20:51	05:18 20:10	06:00 (17) 21 06:21 (17)	06:06 19:07	06:52 18:00	06:44 16:02	07:28 15:35
11	07:38 15:57	07:00 16:48	06:04 17:36	06:04 19:26	06:04 20:14	06:04 (17) 04:59	04:39 20:50	05:20 20:08	06:07 22 06:22 (17)	06:07 19:04	06:57 17:58	06:46 16:00	06:46 15:35	07:29 15:35
12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 19:28	04:57 20:15	04:27 20:51	04:40 20:49	05:21 20:07	05:29 22 06:21 (17)	06:09 19:02	06:59 17:56	06:47 16:04	07:30 15:59	
13	07:36 16:00	06:56 16:56	06:00 17:39	05:52 19:30	04:56 20:17	04:27 20:51	04:41 20:48	05:23 20:05	06:10 21 06:21 (17)	06:10 19:00	06:52 (10) 14 07:06 (10)	06:49 17:54	06:57 15:57	07:31 15:35
14	07:36 16:01	06:55 16:53	05:58 17:41	05:50 19:31	04:54 20:18	04:27 20:52	04:42 20:47	05:24 20:03	05:29 22 06:21 (17)	06:12 18:58	06:50 (10) 16 07:06 (10)	06:59 17:52	06:51 15:56	07:32 15:35
15	07:35 16:03	06:53 16:55	05:55 17:43	05:48 19:33	04:53 20:20	04:27 20:53	04:43 20:46	05:26 20:01	06:00 (17) 21 06:21 (17)	06:13 18:55	06:49 (10) 18 07:07 (10)	07:00 17:49	06:52 15:55	07:33 15:35
16	07:34 16:04	06:51 16:57	05:53 17:44	05:46 19:34	04:51 20:21	04:27 20:53	04:44 20:46	05:28 19:59	06:00 (17) 19 06:19 (17)	06:15 18:53	06:48 (10) 19 07:07 (10)	07:02 17:47	06:54 15:53	07:34 15:35
17	07:33 16:06	06:49 16:59	05:51 17:46	05:43 19:36	04:50 20:22	04:27 20:54	04:46 20:45	05:29 19:57	06:00 (17) 18 06:18 (17)	06:16 18:51	06:48 (10) 19 07:07 (10)	07:04 17:45	06:56 15:52	07:35 15:35
18	07:33 16:07	06:47 17:00	05:49 17:48	05:41 19:38	04:49 20:24	04:27 20:54	04:47 20:44	05:31 19:55	06:02 (17) 15 06:17 (17)	06:18 18:49	06:47 (10) 19 07:06 (10)	07:05 17:43	06:57 15:51	07:35 15:36
19	07:32 16:08	06:45 17:02	05:47 17:49	05:39 19:39	04:47 20:25	04:27 20:54	04:48 20:42	05:32 19:53	06:03 (17) 11 06:14 (17)	06:19 18:46	06:47 (10) 19 07:06 (10)	07:07 17:41	06:59 15:50	07:36 15:36
20	07:31 16:10	06:43 17:04	05:44 17:51	05:37 7 06:14 (10)	04:46 19:41	04:27 20:27	04:49 20:55	05:34 20:41	06:07 (17) 4 06:11 (17)	06:21 18:44	06:47 (10) 18 07:05 (10)	07:09 17:39	07:01 15:49	07:37 15:36
21	07:30 16:12	06:41 17:06	05:42 17:53	06:04 (10) 13 06:17 (10)	05:35 19:42	04:45 20:28	04:27 20:55	05:35 20:40	06:23 18:42	06:48 (10) 16 07:04 (10)	07:10 17:37	07:02 15:47	07:07 15:37	
22	07:29 16:14	06:40 17:07	05:40 17:54	06:02 (10) 16 06:18 (10)	05:33 19:44	04:43 20:29	04:27 20:55	05:37 20:39	06:24 18:40	06:48 (10) 14 07:02 (10)	07:12 17:35	07:04 15:46	07:38 15:37	
23	07:28 16:15	06:38 17:09	05:38 17:56	06:01 (10) 18 06:19 (10)	05:31 19:46	04:42 7 06:07 (17)	04:27 20:55	05:38 20:38	06:26 18:37	06:50 (10) 10 07:00 (10)	07:14 17:33	07:05 15:45	07:38 15:38	
24	07:26 16:17	06:36 17:11	05:35 17:57	06:00 (10) 19 06:19 (10)	05:29 19:47	05:57 (17) 12 06:09 (17)	04:41 20:32	05:40 20:55	05:40 20:37	06:27 19:43	07:15 18:35	07:07 17:31	07:39 15:44	
25	07:25 16:18	06:34 17:12	05:33 17:59	05:59 (10) 20 06:19 (10)	05:27 19:49	05:55 (17) 16 06:11 (17)	04:40 20:33	05:41 20:55	05:41 20:35	06:29 19:41	07:17 18:33	07:08 16:29	07:39 15:43	
26	07:24 16:20	06:32 17:14	05:31 18:01	05:59 (10) 20 06:19 (10)	05:25 19:50	05:54 (17) 17 06:11 (17)	04:39 20:34	05:43 20:54	06:30 19:24	06:49 18:28	07:19 17:14	07:40 15:42		
27	07:23 16:22	06:29 17:16	05:29 18:02	05:58 (10) 19 06:18 (10)	05:23 19:52	05:52 (17) 20 06:12 (17)	04:38 20:36	05:44 20:55	06:32 19:37	06:47 (10) 18:29	07:11 16:26	07:40 15:42		
28	07:21 16:24	06:27 17:18	05:27 18:04	05:59 (10) 18 06:17 (10)	05:22 19:53	05:52 (17) 21 06:13 (17)	04:37 20:37	05:46 20:55	06:46 19:35	06:33 18:26	07:13 16:22	07:40 15:41		
29	07:20 16:25	06:24 19:05	05:24 17 07:16 (10)	05:20 19:55	05:21 05:52 (17)	04:36 20:38	04:30 20:55	05:47 20:30	06:35 19:33	06:35 18:24	07:14 16:22	07:40 15:42		
30	07:19 16:27	06:22 19:07	05:19 15 07:15 (10)	05:18 19:57	05:19 05:51 (17)	04:35 20:39	04:30 20:55	05:49 20:28	06:36 19:31	06:36 18:22	07:16 16:25	07:40 15:43		
31	07:17 16:29	06:20 19:09	05:18 11 07:13 (10)	05:17 19:57	05:17 05:51 (17)	04:34 20:40	04:30 20:55	05:49 20:27	06:36 19:28	06:36 18:22	07:16 16:25	07:40 15:44		
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251		
Total, worst case			193	138	170				306	192				
Sun reduction			0.31	0.31	0.35				0.39	0.34				
Oper. time red.			0.86	0.86	0.86				0.86	0.86				
Wind dir. red.			0.70	0.70	0.70				0.70	0.70				
Total reduction			0.19	0.19	0.21				0.23	0.20				
Total, real			36	26	36				71	39				

Project:

FW13

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Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** R - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (18)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	07:40 15:45	07:16 16:30	06:25 17:19	06:18 19:10	06:47 (14) 07:08 (14)	05:16 19:58
2	07:40 15:46	07:14 16:32	06:23 17:21	06:16 19:12	06:46 (14) 07:07 (14)	05:14 20:00
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 19:13	06:47 (14) 07:06 (14)	05:12 20:01
4	07:40 15:48	07:11 16:36	06:19 17:24	06:11 19:15	06:48 (14) 07:05 (14)	05:11 20:03
5	07:40 15:49	07:10 16:37	06:17 17:26	06:09 19:17	06:49 (14) 07:04 (14)	05:09 20:04
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	06:50 (14) 07:02 (14)	05:07 20:06
7	07:39 15:52	07:07 16:41	06:13 17:29	06:05 19:20	06:54 (14) 06:58 (14)	05:05 20:08
8	07:39 15:53	07:05 16:43	06:11 17:31	06:02 19:21	05:04 20:09	05:04 20:09
9	07:39 15:54	07:03 16:45	06:08 17:33	06:00 19:23	05:02 20:11	05:02 20:09
10	07:38 15:56	07:02 16:46	06:06 17:34	05:58 19:25	05:00 20:12	05:00 20:09
11	07:38 15:57	07:00 16:48	06:04 17:36	05:56 19:26	06:28 (10) 06:38 (10)	04:59 20:14
12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 19:28	06:25 (10) 06:41 (10)	04:57 20:15
13	07:36 16:00	06:56 16:52	06:00 17:39	05:52 19:30	06:23 (10) 06:42 (10)	04:56 20:17
14	07:36 16:01	06:55 16:53	05:58 17:41	05:50 19:31	06:21 (10) 06:43 (10)	04:54 20:18
15	07:35 16:03	06:53 16:55	05:55 17:43	05:48 19:33	06:20 (10) 06:44 (10)	04:53 20:19
16	07:34 16:04	06:51 16:57	05:53 17:44	05:45 19:34	06:19 (10) 06:45 (10)	04:51 20:21
17	07:33 16:06	06:49 16:59	05:51 17:46	05:43 19:36	06:18 (10) 06:45 (10)	04:50 20:22
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20	07:31 16:10	06:43 17:04	05:44 17:51	05:37 19:41	06:16 (10) 06:45 (10)	04:46 20:27
21	07:30 16:12	06:41 17:06	05:42 17:52	05:35 19:42	06:16 (10) 06:45 (10)	04:45 20:28
22	07:29 16:14	06:40 17:07	05:40 17:54	05:33 19:44	06:16 (10) 06:45 (10)	04:43 20:29
23	07:27 16:15	06:38 17:09	05:38 17:56	05:31 19:45	06:16 (10) 06:44 (10)	04:42 20:31
24	07:26 16:17	06:36 17:11	05:35 17:57	05:29 19:47	06:16 (10) 06:43 (10)	04:41 20:32
25	07:25 16:18	06:34 17:12	05:33 17:59	05:27 19:49	06:16 (10) 06:42 (10)	04:40 20:33
26	07:24 16:20	06:31 17:14	05:31 18:01	05:25 19:50	06:16 (10) 06:41 (10)	04:39 20:34
27	07:23 16:22	06:29 17:16	05:29 18:02	05:23 19:52	06:17 (10) 06:40 (10)	04:38 20:36
28	07:21 16:24	06:27 17:18	05:27 18:04	05:22 19:53	05:47 (13) 06:39 (10)	04:37 20:37
29	07:20 16:25		06:24 19:05	05:20 20:07	05:44 (13) 06:38 (10)	04:36 20:38
30	07:19 16:27		06:22 19:07	05:18 20:08	05:42 (13) 06:35 (10)	04:35 20:39
31	07:17 16:29		06:20 19:09	05:17 20:08		04:34 20:40
Potential sun hours	265	281	367	413	479	491
Total, worst case			115	611	239	
Sun reduction			0,31	0,31	0,35	
Oper. time red.			0,86	0,86	0,86	
Wind dir. red.			0,71	0,71	0,70	
Total reduction			0,19	0,19	0,21	
Total, real			22	115	50	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** R - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (18)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	04:31	05:05	05:52 (13)	05:52	06:27 (10)	06:38
	20:55	20:25	14 06:06 (13)	19:26	10 06:37 (10)	18:20
2	04:32	05:07	05:51 (13)	05:53		16:17
	20:54	20:24	16 06:07 (13)	19:24		16:15
3	04:32	05:08	05:51 (13)	05:55		16:15
	20:54	20:22	17 06:08 (13)	19:22		16:13
4	04:33	05:10	05:50 (13)	05:57		16:13
	20:54	20:20	18 06:08 (13)	19:20		16:11
5	04:34	05:11	05:49 (13)	05:58	06:50 (14)	06:44
	20:53	20:19	19 06:08 (13)	19:18	4 06:54 (14)	18:11
6	04:35	05:13	05:49 (13)	06:00		16:10
	20:53	20:17	20 06:09 (13)	19:15	12 06:58 (14)	18:09
7	04:35	05:14	05:49 (13)	06:01		16:08
	20:52	20:15	19 06:08 (13)	19:13	15 06:59 (14)	18:06
8	04:36	05:15	05:49 (13)	06:03		16:06
	20:52	20:14	20 06:09 (13)	19:11	4 06:42 (14)	18:11
9	04:37	05:17	05:49 (13)	06:04		16:05
	20:51	20:12	19 06:08 (13)	19:09	17 06:59 (14)	18:04
10	04:38	05:18	05:49 (13)	06:06		16:05
	20:50	20:10	18 06:07 (13)	19:07	12 06:46 (14)	18:06
11	04:39	05:20	05:49 (13)	06:07		16:04
	20:50	20:08	18 06:07 (13)	19:04	20 07:00 (14)	17:58
12	04:40	05:21	05:50 (13)	06:09		16:00
	20:49	20:06	27 06:42 (10)	19:02	20 07:00 (14)	17:56
13	04:41	05:23	05:51 (13)	06:10		15:59
	20:48	20:05	29 06:44 (10)	19:00	21 06:39 (14)	17:54
14	04:42	05:24	05:52 (13)	06:12		15:57
	20:47	20:03	30 06:46 (10)	18:58	21 07:00 (14)	17:54
15	04:43	05:26	05:55 (13)	06:13		15:56
	20:46	20:01	27 06:47 (10)	18:55	19 06:58 (14)	17:52
16	04:44	05:28	06:24 (10)	06:15		15:56
	20:46	19:59	24 06:48 (10)	18:53	19 06:58 (14)	17:49
17	04:46	05:29	06:23 (10)	06:16		15:55
	20:45	19:57	25 06:48 (10)	18:51	17 06:56 (14)	17:47
18	04:47	05:31	06:23 (10)	06:18		15:53
	20:44	19:55	26 06:49 (10)	18:49	16 06:41 (14)	17:47
19	04:48	05:32	06:21 (10)	06:19		15:51
	20:42	19:53	28 06:49 (10)	18:46	8 06:51 (14)	17:43
20	04:49	05:34	06:21 (10)	06:21		15:51
	20:41	19:51	29 06:50 (10)	18:44		15:50
21	04:50	05:35	06:20 (10)	06:22		15:49
	20:40	19:49	29 06:49 (10)	18:42		15:47
22	04:52	05:37	06:21 (10)	06:24		15:47
	20:39	19:47	29 06:50 (10)	18:40		15:47
23	04:53	05:38	06:20 (10)	06:26		15:46
	20:38	19:45	29 06:49 (10)	18:37		15:46
24	04:54	05:40	06:20 (10)	06:27		15:45
	20:37	19:43	29 06:49 (10)	18:35		15:44
25	04:56	05:41	06:20 (10)	06:29		15:44
	20:35	19:41	28 06:48 (10)	18:33		15:43
26	04:57	05:43	06:20 (10)	06:30		15:43
	20:34	19:39	27 06:47 (10)	18:31		15:42
27	04:58	05:44	06:21 (10)	06:32		15:42
	20:33	19:37	26 06:47 (10)	18:29		15:42
28	05:00	05:46	06:21 (10)	06:33		15:41
	20:31	19:35	24 06:45 (10)	18:26		15:41
29	05:01	05:47	06:22 (10)	06:35		15:41
	20:30	19:33	22 06:44 (10)	18:24		15:41
30	05:02	05:55 (13)	05:49	06:36		15:40
	20:28	8 06:03 (13)	19:30	18:22		15:39
31	05:04	05:54 (13)	05:50	06:25 (10)		15:39
	20:27	11 06:05 (13)	19:28	15 06:40 (10)		15:44
Potential sun hours	495	450	380	334	271	251
Total, worst case	19	720	236			
Sun reduction	0,36	0,39	0,34			
Oper. time red.	0,86	0,86	0,86			
Wind dir. red.	0,69	0,71	0,71			
Total reduction	0,21	0,23	0,21			
Total, real	4	168	48			

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar

Shadow receptor: S - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (19)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40	07:16	06:25	06:18	05:16	04:33	05:15 (14)	04:31	05:18 (14)	05:05	05:52	06:38
	15:45	16:30	17:19	19:10	19:58	20:41	05:40 (14)	20:25	05:48 (14)	20:25	19:26	18:20
2	07:40	07:14	06:23	06:16	05:14	04:33	05:14 (14)	04:32	05:18 (14)	05:07	05:53	06:40
	15:46	16:32	17:21	19:12	20:00	20:42	05:41 (14)	20:54	05:49 (14)	20:24	19:24	18:17
3	07:40	07:13	06:21	06:13	05:12	04:32	05:13 (14)	04:32	05:18 (14)	05:08	05:55	06:41
	15:47	16:34	17:23	19:13	20:01	20:43	05:41 (14)	20:54	05:48 (14)	20:22	19:22	18:15
4	07:40	07:11	06:19	06:11	05:11	04:31	05:14 (14)	04:33	05:19 (14)	05:10	05:56	06:43
	15:48	16:36	17:24	19:15	20:03	20:44	05:42 (14)	20:54	05:49 (14)	20:20	19:20	18:13
5	07:40	07:10	06:17	06:09	05:09	04:31	05:13 (14)	04:34	05:19 (14)	05:11	05:58	06:44
	15:49	16:37	17:26	19:17	20:04	20:45	05:42 (14)	20:53	05:49 (14)	20:19	19:17	18:11
6	07:40	07:08	06:15	06:07	05:07	04:30	05:14 (14)	04:35	05:20 (14)	05:12	06:00	06:46
	15:50	16:39	17:28	19:18	20:06	20:46	05:43 (14)	20:53	05:49 (14)	20:17	19:15	18:09
7	07:39	07:07	06:13	06:05	05:05	04:29	05:13 (14)	04:35	05:20 (14)	05:14	06:01	06:47
	15:52	16:41	17:29	19:20	20:07	20:47	05:42 (14)	20:52	05:49 (14)	20:15	19:13	18:06
8	07:39	07:05	06:11	06:02	05:04	04:29	05:13 (14)	04:36	05:20 (14)	05:15	06:03	06:49
	15:53	16:43	17:31	19:21	20:09	20:48	05:43 (14)	20:52	05:48 (14)	20:14	19:11	18:04
9	07:39	07:03	06:08	06:00	05:02	04:28	05:14 (14)	04:37	05:21 (14)	05:17	06:04	06:51
	15:54	16:44	17:33	19:23	20:11	20:49	05:44 (14)	20:51	05:48 (14)	20:12	19:09	18:02
10	07:38	07:02	06:06	05:58	05:00	04:28	05:13 (14)	04:38	05:21 (14)	05:18	06:06	06:52
	15:56	16:46	17:34	19:25	20:12	20:49	05:44 (14)	20:50	05:48 (14)	20:10	19:06	18:00
11	07:38	07:00	06:04	05:56	04:59	04:28	05:13 (14)	04:39	05:22 (14)	05:20	06:07	06:54
	15:57	16:48	17:36	19:26	20:14	20:50	05:44 (14)	20:50	05:48 (14)	20:08	19:04	17:58
12	07:37	06:58	06:02	05:54	04:57	04:27	05:14 (14)	04:40	05:23 (14)	05:21	06:09	06:55
	15:58	16:50	17:38	19:28	20:15	20:51	05:45 (14)	20:49	05:48 (14)	20:06	19:02	17:56
13	07:36	06:56	06:00	05:52	04:56	04:27	05:14 (14)	04:41	05:23 (14)	05:23	06:10	06:57
	16:00	16:52	17:39	19:29	20:17	20:51	05:45 (14)	20:48	05:47 (14)	20:05	19:00	17:54
14	07:36	06:55	05:58	05:50	04:54	04:27	05:14 (14)	04:42	05:24 (14)	05:24	06:12	06:59
	16:01	16:53	17:41	19:31	20:18	20:52	05:46 (14)	20:47	05:47 (14)	20:03	18:58	17:52
15	07:35	06:53	05:55	05:48	04:53	04:27	05:15 (14)	04:43	05:25 (14)	05:26	06:13	07:00
	16:03	16:55	17:43	19:33	20:19	20:53	05:46 (14)	20:46	05:46 (14)	20:01	18:55	17:49
16	07:34	06:51	05:53	05:45	04:51	04:27	05:14 (14)	04:44	05:26 (14)	05:27	06:15	07:02
	16:04	16:57	17:44	19:34	20:21	20:53	05:45 (14)	20:45	05:45 (14)	19:59	18:53	17:47
17	07:33	06:49	05:51	05:43	04:50	04:27	05:14 (14)	04:46	05:27 (14)	05:29	06:16	07:04
	16:06	16:59	17:46	19:36	20:22	20:53	05:45 (14)	20:44	05:44 (14)	19:57	18:51	17:45
18	07:32	06:47	05:49	05:41	04:49	04:27	05:15 (14)	04:47	05:28 (14)	05:31	06:18	07:05
	16:07	17:00	17:48	19:37	20:24	20:54	05:47 (14)	20:43	05:43 (14)	19:55	18:49	17:43
19	07:32	06:45	05:47	05:39	04:47	04:27	05:15 (14)	04:48	05:30 (14)	05:32	06:19	07:07
	16:09	17:02	17:49	19:39	20:25	20:54	05:47 (14)	20:42	05:41 (14)	19:53	18:46	17:41
20	07:31	06:43	05:44	05:37	04:46	04:27	05:15 (14)	04:49	05:33 (14)	05:34	06:21	07:09
	16:10	17:04	17:51	19:41	20:26	20:55	05:47 (14)	20:41	05:39 (14)	19:51	18:44	17:39
21	07:30	06:41	05:42	05:35	04:45	04:27	05:15 (14)	04:50	05:35	06:22	07:10	07:02
	16:12	17:06	17:52	19:42	20:28	20:55	05:47 (14)	20:40	19:49	18:42	17:37	15:47
22	07:29	06:39	05:40	05:33	04:43	04:27	05:15 (14)	04:52	05:37	06:24	07:12	07:04
	16:13	17:07	17:54	19:44	20:29	20:55	05:47 (14)	20:39	19:47	18:40	17:35	15:46
23	07:27	06:37	05:38	05:31	04:42	04:27	05:15 (14)	04:53	05:38	06:26	07:14	07:05
	16:15	17:09	17:56	19:45	20:30	20:55	05:47 (14)	20:38	19:45	18:37	17:33	15:45
24	07:26	06:35	05:35	05:29	04:41	04:28	05:16 (14)	04:54	05:40	06:27	07:15	07:07
	16:17	17:11	17:57	19:47	20:32	9 05:21 (14)	05:30 (14)	20:55	19:43	18:35	17:31	15:44
25	07:25	06:33	05:33	05:27	04:40	04:28	05:16 (14)	04:56	05:41	06:29	07:17	07:08
	16:18	17:12	17:59	19:49	20:33	14 05:33 (14)	05:33 (14)	20:55	19:41	18:33	17:29	15:43
26	07:24	06:31	05:31	05:25	04:39	04:28	05:17 (14)	04:57	05:43	06:30	07:19	07:10
	16:20	17:14	18:01	19:50	20:34	16 05:34 (14)	05:34 (14)	20:55	19:39	18:31	17:27	15:42
27	07:23	06:29	05:29	05:23	04:38	04:29	05:18 (14)	04:58	05:44	06:32	07:20	07:11
	16:22	17:16	18:02	19:52	20:36	18 05:36 (14)	05:36 (14)	20:55	19:37	18:28	17:26	15:42
28	07:21	06:27	05:27	05:22	04:37	04:29	05:17 (14)	05:00	05:46	06:33	07:22	07:13
	16:24	17:18	18:04	19:53	20:37	20 05:37 (14)	05:37 (14)	20:55	19:35	18:26	17:24	15:41
29	07:20		06:24	05:20	04:36		05:16 (14)	04:30	05:47 (14)	05:01	05:47	06:35
	16:25		19:05	20:38	22 05:38 (14)	20:55	05:48 (14)	20:30	19:33	18:24	17:22	15:40
30	07:19		06:22	05:18	04:35		05:15 (14)	04:30	05:49	06:36	06:25	07:16
	16:27		19:07	19:57	20:39	24 05:39 (14)	20:55	31 05:49 (14)	19:30	18:22	16:20	15:39
31	07:17		06:20		04:34		05:14 (14)		05:50		06:27	
	16:29		19:09		20:40	25 05:39 (14)			19:28		16:18	
Potential sun hours	265	281	367	413	479	491	495		450	380	334	271
Total, worst case					148	915		478				
Sun reduction					0,35	0,32		0,36				
Oper. time red.					0,86	0,86		0,86				
Wind dir. red.					0,69	0,69		0,69				
Total reduction					0,21	0,19		0,21				
Total, real					31	173		102				

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

FW13

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** T - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (20)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:16	07:17 15:39
2	07:40 15:46	07:14 16:32	06:23 17:21	06:16 19:12	05:14 20:00	04:33 20:42	04:32 20:54	05:07 20:24	05:53 19:24	06:39 18:17	06:30 16:15	07:18 15:38
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 19:13	05:12 20:01	04:32 20:43	04:32 20:54	05:08 20:22	05:55 19:22	06:41 18:15	06:32 16:13	07:20 15:38
4	07:40 15:48	07:11 16:36	06:19 17:24	06:11 19:15	05:11 20:03	04:31 20:44	04:33 20:54	05:10 20:20	05:56 19:20	06:43 18:13	06:34 16:11	07:21 15:37
5	07:40 15:49	07:10 16:37	06:17 17:26	06:09 19:17	05:09 20:04	04:31 20:45	04:34 20:53	05:11 20:19	05:58 19:17	06:44 18:11	06:35 16:10	07:22 15:37
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	05:07 20:06	04:30 20:46	04:35 20:53	05:12 20:17	06:00 19:15	06:46 18:09	06:37 16:08	07:24 15:36
7	07:39 15:52	07:07 16:41	06:13 17:29	06:05 19:20	05:05 20:07	04:29 20:47	04:35 20:52	05:14 20:15	06:01 19:13	06:47 18:06	06:39 16:06	07:25 15:36
8	07:39 15:53	07:05 16:43	06:10 17:31	06:02 19:21	05:04 20:09	04:29 20:48	04:36 20:52	05:15 20:14	06:03 19:11	06:49 18:04	06:41 16:05	07:26 15:36
9	07:38 15:54	07:03 16:44	06:08 17:33	06:00 19:23	05:02 20:10	04:28 20:49	04:37 20:51	05:17 20:12	06:04 19:09	06:51 18:02	06:42 16:03	07:27 15:35
10	07:38 15:55	07:02 16:46	06:06 17:34	05:58 19:25	05:00 20:12	04:28 20:49	04:38 20:50	05:18 20:10	06:06 19:06	06:52 18:00	06:44 16:02	07:28 15:35
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31	07:17 16:29		06:20 19:09		04:34 20:40		05:04 20:27	05:50 19:28		06:27 16:18		07:40 15:44
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

FW13

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2013-06-25 16:00 / 27

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Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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+48 58 558 40 10

Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** U - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (21)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:16	07:17 15:39
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31	07:17 16:29		06:20 19:09		04:34 20:40		05:04 20:27	05:50 19:28		06:27 16:18		07:40 15:44
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

FW13

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Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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PL-80-280 Gdansk

+48 58 558 40 10

Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** V - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (22)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:16	07:17 15:39
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25	07:25 16:18	06:33 17:12	05:33 17:59	05:27 19:49	04:40 20:33	04:28 20:55	04:55 20:35	05:41 19:41	06:29 18:33	07:17 16:29	07:08 15:43	07:39 15:39
26	07:24 16:20	06:31 17:14	05:31 18:00	05:25 19:50	04:39 20:34	04:28 20:55	04:57 20:34	05:43 19:39	06:30 18:31	07:18 16:27	07:10 15:42	07:39 15:39
27	07:23 16:22	06:29 17:16	05:29 18:02	05:23 19:52	04:38 20:35	04:29 20:55	04:58 20:32	05:44 19:37	06:32 18:28	07:19 16:26	07:11 15:42	07:40 15:40
28	07:21 16:23	06:27 17:17	05:26 18:04	05:21 19:53	04:37 20:37	04:29 20:55	05:00 20:31	05:46 19:35	06:33 18:26	07:22 16:24	07:13 15:41	07:40 15:41
29	07:20 16:25		06:24 19:05	05:20 19:55	04:36 20:38	04:30 20:55	05:01 20:30	05:47 19:32	06:35 18:24	07:24 16:22	07:14 15:40	07:40 15:42
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31	07:17 16:29		06:20 19:09		04:34 20:40		05:04 20:27	05:50 19:28		06:27 16:18		07:40 15:44
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)

Project:

FW13

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Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** W - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (23)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:16	07:17 15:39
2	07:40 15:46	07:14 16:32	06:23 17:21	06:15 19:12	05:14 20:00	04:33 20:42	04:31 20:54	05:07 20:23	05:53 19:24	06:39 18:17	06:30 16:15	07:18 15:38
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 19:13	05:12 20:01	04:32 20:43	04:32 20:54	05:08 20:22	05:55 19:22	06:41 18:15	06:32 16:13	07:20 15:37
4	07:40 15:48	07:11 16:36	06:19 17:24	06:11 19:15	05:10 20:03	04:31 20:44	04:33 20:54	05:09 20:20	05:56 19:20	06:43 18:13	06:34 16:11	07:21 15:37
5	07:40 15:49	07:10 16:37	06:17 17:26	06:09 19:17	05:09 20:04	04:30 20:45	04:34 20:53	05:11 20:19	05:58 19:17	06:44 18:11	06:35 16:10	07:22 15:37
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	05:07 20:06	04:30 20:46	04:34 20:53	05:12 20:17	05:59 19:15	06:46 18:09	06:37 16:08	07:23 15:36
7	07:39 15:52	07:07 16:41	06:13 17:29	06:05 19:20	05:05 20:07	04:29 20:47	04:35 20:52	05:14 20:15	06:01 19:13	06:47 18:06	06:39 16:06	07:25 15:36
8	07:39 15:53	07:05 16:43	06:10 17:31	06:02 19:21	05:04 20:09	04:29 20:48	04:36 20:52	05:15 20:14	06:03 19:11	06:49 18:04	06:40 16:05	07:26 15:35
9	07:38 15:54	07:03 16:44	06:08 17:33	06:00 19:23	05:02 20:10	04:28 20:49	04:37 20:51	05:17 20:12	06:04 19:09	06:51 18:02	06:42 16:03	07:27 15:35
10	07:38 15:55	07:02 16:46	06:06 17:34	05:58 19:25	05:00 20:12	04:28 20:49	04:38 20:50	05:18 20:10	06:06 19:06	06:52 18:00	06:44 16:02	07:28 15:35
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31	07:17 16:29		06:20 19:09		04:34 20:40		05:04 20:27	05:50 19:28		06:27 16:18		07:40 15:44
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)

Project:

FW13

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Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** X - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (24)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:19	06:29 16:16	07:17 15:39
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27	07:23 16:22	06:29 17:16	05:29 18:02	05:23 19:52	04:38 20:35	04:29 20:55	04:58 20:32	05:44 19:37	06:32 18:28	06:20 16:25	07:11 15:42	07:40 15:40
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Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

FW13

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Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** Y - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (25)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:19	06:29 16:16	07:17 15:39
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9	07:38 15:54	07:03 16:44	06:08 17:33	06:00 19:23	05:02 20:10	04:28 20:48	04:37 20:51	05:17 20:12	06:04 19:09	06:50 18:02	06:42 16:03	07:27 15:35
10	07:38 15:55	07:02 16:46	06:06 17:34	05:58 19:25	05:00 20:12	04:28 20:49	04:38 20:50	05:18 20:10	06:06 19:06	06:52 18:00	06:44 16:02	07:28 15:35
11	07:37 15:57	07:00 16:48	06:04 17:36	05:56 19:26	04:59 20:13	04:28 20:50	04:39 20:50	05:20 20:08	06:07 19:04	06:54 17:58	06:45 16:00	07:29 15:35
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31	07:17 16:29		06:20 19:08		04:34 20:40		05:04 20:27	05:50 19:28		06:27 16:18		07:40 15:44
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)

Project:

FW13

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Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

Szymanowskiego 2/12

PL-80-280 Gdansk

+48 58 558 40 10

Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor: Z - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (26)****Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:40 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:16	07:17 15:39
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31	07:17 16:29		06:20 19:09		04:34 20:40		05:04 20:27	05:50 19:28		06:27 16:18		07:40 15:44
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

FW13

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Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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PL-80-280 Gdansk

+48 58 558 40 10

Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** AA - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (27)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:41 15:45	07:16 16:31	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:17	07:17 15:39
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25	07:25 16:19	06:34 17:13	05:33 17:59	05:27 19:49	04:40 20:33	04:28 20:55	04:56 20:35	05:41 19:41	06:29 18:33	06:17 16:29	07:08 15:43	07:39 15:39
26	07:24 16:20	06:32 17:14	05:31 18:01	05:25 19:50	04:39 20:34	04:28 20:55	04:57 20:34	05:43 19:39	06:30 18:31	06:19 16:28	07:10 15:43	07:40 15:40
27	07:23 16:22	06:30 17:16	05:29 18:02	05:24 19:52	04:38 20:36	04:29 20:55	04:58 20:33	05:44 19:37	06:32 18:29	06:20 16:26	07:11 15:42	07:40 15:40
28	07:22 16:24	06:27 17:18	05:27 18:04	05:22 19:54	04:37 20:37	04:29 20:55	05:00 20:31	05:46 19:35	06:33 18:26	06:22 16:24	07:13 15:41	07:40 15:41
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Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)

Project:

FW13

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2013-06-25 16:00 / 34

Licensed user:

Biuro Projektow i Wdrozen Proekologicznych PROEKO Maciej Przewozniak

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PL-80-280 Gdansk

+48 58 558 40 10

Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** AB - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (28)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:41 15:45	07:16 16:31	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:17	07:17 15:39
2	07:41 15:46	07:15 16:32	06:23 17:21	06:16 19:12	05:14 20:00	04:33 20:42	04:32 20:55	05:07 20:24	05:54 19:24	06:40 18:18	06:31 16:15	07:19 15:38
3	07:40 15:47	07:13 16:34	06:21 17:23	06:14 19:14	05:12 20:01	04:32 20:43	04:32 20:54	05:08 20:22	05:55 19:22	06:41 18:15	06:32 16:13	07:20 15:38
4	07:40 15:48	07:12 16:36	06:19 17:25	06:11 19:15	05:11 20:03	04:31 20:44	04:33 20:54	05:10 20:21	05:57 19:20	06:43 18:13	06:34 16:11	07:21 15:37
5	07:40 15:49	07:10 16:38	06:17 17:26	06:09 19:17	05:09 20:05	04:31 20:45	04:34 20:53	05:11 20:19	05:58 19:18	06:44 18:11	06:36 16:10	07:23 15:37
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7	07:40 15:52	07:07 16:41	06:13 17:30	06:05 19:20	05:06 20:08	04:30 20:47	04:35 20:52	05:14 20:16	06:01 19:13	06:48 18:07	06:39 16:07	07:25 15:36
8	07:39 15:53	07:05 16:43	06:11 17:31	06:03 19:22	05:04 20:09	04:29 20:48	04:36 20:52	05:16 20:14	06:03 19:11	06:49 18:04	06:41 16:05	07:26 15:36
9	07:39 15:54	07:04 16:45	06:09 17:33	06:00 19:23	05:02 20:11	04:29 20:49	04:37 20:51	05:17 20:12	06:04 19:09	06:51 18:02	06:42 16:03	07:27 15:35
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12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 19:28	04:57 20:15	04:28 20:51	04:40 20:49	05:22 20:07	06:09 19:02	06:56 17:56	06:48 15:59	07:30 15:35
13	07:37 16:00	06:57 16:52	06:00 17:40	05:52 19:30	04:56 20:17	04:27 20:52	04:41 20:48	05:23 20:05	06:10 19:00	06:57 17:54	06:49 15:58	07:31 15:35
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21	07:30 16:12	06:42 17:06	05:42 17:53	05:35 19:42	04:45 20:28	04:27 20:55	04:50 20:40	05:35 19:49	06:23 18:42	07:10 17:37	07:02 15:48	07:37 15:37
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23	07:28 16:15	06:38 17:09	05:38 17:56	05:31 19:46	04:42 20:31	04:28 20:55	04:53 20:38	05:38 19:45	06:26 18:38	07:14 17:33	07:05 15:45	07:39 15:38
24	07:27 16:17	06:36 17:11	05:36 17:57	05:29 19:47	04:41 20:32	04:28 20:55	04:54 20:37	05:40 19:43	06:27 18:35	07:15 17:31	07:07 15:44	07:39 15:38
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31	07:18 16:29		06:20 19:09		04:34 20:40		05:04 20:27	05:51 19:28		06:27 16:18		07:41 15:44
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)
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Project:

FW13

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2013-06-25 16:00 / 35

Licensed user:

Biuro Projektów i Wdrożeń Proekologicznych PROEKO Maciej Przewozniak

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+48 58 558 40 10

Marcin Kulik / km.proeko@proeko.gda.pl

Calculated:

2013-06-25 15:57/2.8.552

SHADOW - Calendar**Shadow receptor:** AC - Shadow Receptor: 1,0 x 1,0 Azimuth: 0,0° Slope: 90,0° (29)**Assumptions for shadow calculations**

Sunshine probability S (Average daily sunshine hours) [ZAKOPANE]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,18	3,07	3,69	4,28	5,39	5,21	5,74	5,60	4,30	3,94	2,30	1,54

Operational time

N	NE	E	SE	S	SW	W	NW	Sum
525	525	600	750	825	1 125	2 025	1 125	7 500

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:41 15:45	07:16 16:31	06:25 17:19	06:18 19:10	05:16 19:58	04:33 20:41	04:31 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:17	07:17 15:39
2	07:41 15:46	07:15 16:32	06:23 17:21	06:16 19:12	05:14 20:00	04:33 20:43	04:32 20:55	05:07 20:24	05:54 19:24	06:40 18:18	06:31 16:15	07:19 15:38
3	07:41 15:47	07:13 16:34	06:21 17:23	06:14 19:14	05:12 20:01	04:32 20:44	04:32 20:54	05:08 20:22	05:55 19:22	06:41 18:15	06:32 16:13	07:20 15:38
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Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	Sun set (hh:mm)	Minutes with flicker	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	(WTG causing flicker first time)	(WTG causing flicker last time)