

Project:

FW13

Printed/Page

2013-06-25 16:00 / 1

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 1 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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			
1	07:41	08:32-09:02/30	14:22-14:42/20		07:16	07:41-07:52/11			06:25	06:52-07:09/17			06:18	06:50-07:17/27			05:16				04:33			
	15:45	09:44-10:32/48			16:30				17:19				19:10				19:58				20:41			
2	07:41	08:33-09:03/30	14:23-14:42/19		07:15	07:40-07:55/15			06:23	06:50-07:10/20			06:16	06:49-07:17/28			05:14				04:33			
	15:46	09:45-10:32/47			16:32				17:21				19:12				20:00				20:42			
3	07:40	08:33-09:03/30	14:24-14:42/18		07:13	07:38-07:55/17			06:21	06:49-07:11/22			06:13	06:48-07:17/29			05:12				04:32			
	15:47	09:46-10:33/47			16:34				17:23				19:14				20:01				20:43			
4	07:40	08:34-09:04/30	14:26-14:42/16		07:12	07:37-07:56/19			06:19	06:48-07:12/24			06:11	06:47-07:16/29			05:11				04:31			
	15:48	09:47-10:33/46			16:36				17:24				19:15				20:03				20:44			
5	07:40	08:34-09:04/30	14:26-14:41/15		07:10	07:37-07:58/21			06:17	06:48-07:12/24			06:09	06:47-07:16/29			05:09				04:31			
	15:49	09:47-10:33/46			16:37				17:26				19:17				20:05				20:45			
6	07:40	08:35-09:04/29	14:28-14:41/13		07:08	07:36-07:58/22			06:15	06:47-07:11/24			06:07	06:47-07:16/29			05:07				04:30			
	15:50	09:48-10:33/45			16:39				17:28				19:18				20:06				20:46			
7	07:40	08:35-09:04/29	14:29-14:40/11		07:07	07:36-07:58/22			06:13	06:46-07:11/25			06:05	06:48-07:15/27			05:05				04:29			
	15:52	09:48-10:33/45			16:41				17:30				19:20				20:08				20:47			
8	07:39	08:36-09:05/29	14:31-14:40/9		07:05	07:37-07:59/22			06:11	06:47-07:11/24			06:03	06:48-07:15/27			05:04				04:29			
	15:53	09:49-10:33/44			16:43				17:31				19:22				20:09				20:48			
9	07:39	08:36-09:05/29			07:04	07:36-07:59/23			06:08	06:47-07:11/24			06:00	06:48-07:13/25			05:02				04:28			
	15:54	09:50-10:33/43			16:45				17:33				19:23				20:11				20:49			
10	07:38	08:38-09:06/28			07:02	07:37-07:58/21			06:06	06:47-07:10/23			05:58	06:48-07:11/23			05:00				04:28			
	15:56	09:51-10:34/43			16:46				17:35				19:25				20:12				20:50			
11	07:38	08:38-09:05/27			07:00	07:37-07:58/21			06:04	06:47-07:08/21			05:56	06:49-07:10/21			04:59				04:28			
	15:57	09:52-10:33/41			16:48				17:36				19:26				20:14				20:50			
12	07:37	08:39-09:05/26			06:58	07:37-07:57/20			06:02	06:48-07:07/19			05:54	06:51-07:08/17			04:57				04:27			
	15:58	09:52-10:33/41			16:50				17:38				19:28				20:15				20:51			
13	07:37	08:39-09:05/26			06:57	07:38-07:56/18			06:00	06:50-07:05/15			05:52	06:53-07:05/12			04:56				04:27			
	16:00	09:53-10:32/39			16:52				17:39				19:30				20:17				20:52			
14	07:36	08:41-09:06/25			06:55	07:40-07:56/16			05:58	06:53-07:02/9			05:50				04:54				04:27			
	16:01	09:55-10:33/38			16:53	16:23-16:26/3			17:41				19:31				20:18				20:52			
15	07:35	08:42-09:05/23			06:53	07:41-07:54/13			05:55				05:48				04:53				04:27			
	16:03	09:56-10:32/36			16:55	16:21-16:28/7			17:43				19:33				20:20				20:53			
16	07:34	08:43-09:05/22			06:51	07:44-07:51/7			05:53				05:46				04:51				04:27			
	16:04	09:57-10:31/34			16:57	16:20-16:30/10			17:44				19:34				20:21				20:53			
17	07:34	08:44-09:04/20			06:49	16:19-16:32/13			05:51				05:43				04:50				04:27			
	16:06	09:59-10:30/31			16:59				17:46				19:36				20:23				20:54			
18	07:33	08:45-09:04/19			06:47	16:19-16:34/15			05:49				05:41				04:49				04:27			
	16:07	10:00-10:30/30			17:00				17:48				19:38				20:24				20:54			
19	07:32	08:47-09:03/16			06:45	16:18-16:36/18			05:47				05:39				04:47				04:27			
	16:09	10:02-10:28/26			17:02				17:49				19:39				20:25				20:54			
20	07:31	08:49-09:01/12			06:44	16:18-16:38/20			05:44				05:37				04:46				04:27			
	16:10	10:04-10:27/23			17:04				17:51				19:41				20:27				20:55			
21	07:30	08:51-08:58/7			06:42	16:18-16:39/21			05:42				05:35				04:45				04:27			
	16:12	10:06-10:24/18			17:06				17:53				19:42				20:28				20:55			
22	07:29	10:10-10:21/11			06:40	16:18-16:39/21			05:40				05:33				04:43				04:27			
	16:14				17:07				17:54				19:44				20:29				20:55			
23	07:28				06:38	16:18-16:39/21			05:38				05:31				04:42				04:27			
	16:15				17:09				17:56				19:46				20:31				20:55			
24	07:26				06:36	16:19-16:38/19			05:36				05:29				04:41				04:28			
	16:17				17:11				17:57				19:47				20:32				20:56			
25	07:25				06:34	16:19-16:36/17			05:33				05:27				04:40				04:28			
	16:18				17:13				17:59				19:49				20:33				20:56			
26	07:24				06:32	16:20-16:35/15			05:31	06:03-06:08/5			05:25				04:39				04:28			
	16:20				17:14				18:01				19:50				20:35				20:56			
27	07:23				06:30	06:57-07:04/7			05:29	05:58-06:12/14			05:23				04:38				04:29			
	16:22				17:16	16:22-16:32/10			18:02				19:52				20:36				20:56			
28	07:22				06:27	06:53-07:07/14			05:27	05:56-06:14/18			05:22				04:37				04:29			
	16:24				17:18				18:04				19:54				20:37				20:55			
29	07:20								06:24	06:53-07:15/22			05:20				04:36				04:30			
	16:25								19:05				19:55				20:38				20:55			
30	07:19								06:22	06:52-07:16/24			05:18				04:35				04:30			
	16:27								19:07				19:57				20:39				20:55			
31	07:18	07:43-07:50/7							06:20	06:50-07:17/27							04:34							
	16:29								19:09								20:40							
Potential sun hours				265					280					367					413					491
Sum of minutes with flicker				1467					519					401					323					0

Project:

FW13

Printed/Page

2013-06-25 16:00 / 2

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 1 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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

	July	August	September	October	November	December
1	04:31 20:55	05:05 20:25	05:52 06:48-07:09/21 19:26	06:38 07:28-07:45/17 18:20	06:29 07:06-07:28/22 16:17	07:17 08:20-08:47/27 15:39 09:34-10:15/41
2	04:32 20:55	05:07 20:24	05:54 06:47-07:10/23 19:24	06:40 07:27-07:46/19 18:17	06:31 07:06-07:28/22 16:15	07:19 08:20-08:48/28 15:38 09:33-10:16/43
3	04:32 20:54	05:08 20:22	05:55 06:46-07:11/25 19:22	06:41 07:26-07:47/21 18:15	06:32 07:05-07:28/23 16:13	07:20 08:21-08:49/28 15:38 09:34-10:17/43
4	04:33 20:54	05:10 20:21	05:57 06:45-07:12/27 19:20	06:43 07:24-07:47/23 18:13	06:34 07:06-07:28/22 16:11	07:21 08:20-08:49/29 14:16-14:23/7 15:37 09:33-10:18/45
5	04:34 20:54	05:11 20:19	05:58 06:44-07:11/27 19:18	06:44 07:24-07:48/24 18:11	06:36 07:06-07:28/22 16:10	07:23 08:21-08:50/29 14:14-14:25/11 15:37 09:33-10:18/45
6	04:35 20:53	05:13 20:17	06:00 06:43-07:12/29 19:15	06:46 07:23-07:48/25 18:09	06:37 07:07-07:27/20 16:08	07:24 08:21-08:50/29 14:14-14:27/13 15:36 09:34-10:19/45
7	04:35 20:53	05:14 20:16	06:01 06:42-07:11/29 19:13	06:48 07:22-07:47/25 18:07	06:39 07:08-07:27/19 16:06	07:25 08:21-08:51/30 14:13-14:28/15 15:36 09:34-10:20/46
8	04:36 20:52	05:15 20:14	06:03 06:43-07:12/29 19:11	06:49 07:23-07:47/24 18:04	06:41 07:09-07:26/17 16:05	07:26 08:21-08:51/30 14:13-14:29/16 15:36 09:34-10:20/46
9	04:37 20:51	05:17 20:12	06:04 06:42-07:11/29 19:09	06:51 07:22-07:46/24 18:02	06:42 07:10-07:24/14 16:03	07:27 08:22-08:51/29 14:12-14:30/18 15:35 09:34-10:21/47
10	04:38 20:51	05:18 20:10	06:06 06:42-07:11/29 19:07	06:52 07:23-07:45/22 18:00	06:44 07:12-07:23/11 16:02	07:28 08:23-08:53/30 14:12-14:31/19 15:35 09:35-10:22/47
11	04:39 20:50	05:20 20:08	06:07 06:42-07:09/27 19:04	06:54 07:24-07:45/21 17:58	06:46 07:14-07:21/7 16:00	07:29 08:23-08:53/30 14:13-14:33/20 15:35 09:35-10:23/48
12	04:40 20:49	05:21 20:07	06:09 06:42-07:08/26 19:02	06:56 07:24-07:43/19 17:56	06:48 15:59	07:30 08:24-08:54/30 14:13-14:34/21 15:35 09:35-10:23/48
13	04:41 20:48	05:23 20:05	06:10 06:43-07:07/24 19:00	06:57 07:25-07:41/16 17:54	06:49 15:57	07:31 08:24-08:54/30 14:13-14:34/21 15:35 09:36-10:24/48
14	04:42 20:47	05:25 20:03	06:12 06:43-07:05/22 18:58	06:59 07:28-07:39/11 17:52	06:51 15:56	07:32 08:24-08:55/31 14:13-14:34/21 15:35 09:35-10:24/49
15	04:43 20:47	05:26 20:01	06:13 06:45-07:04/19 18:55	07:00 16:53-17:06/13 17:49	06:53 15:55	07:33 08:24-08:54/30 14:13-14:35/22 15:35 09:36-10:24/48
16	04:44 20:46	05:28 19:59	06:15 06:46-07:01/15 18:53	07:02 16:52-17:07/15 17:47	06:54 15:53	07:34 08:25-08:55/30 14:13-14:36/23 15:35 09:36-10:25/49
17	04:46 20:45	05:29 19:57	06:16 06:50-06:57/7 18:51	07:04 16:51-17:09/18 17:45	06:56 15:52	07:35 08:25-08:56/31 14:14-14:36/22 15:35 09:37-10:26/49
18	04:47 20:44	05:31 19:55	06:18 18:49	07:05 16:50-17:10/20 17:43	06:57 15:51	07:36 08:26-08:56/30 14:15-14:37/22 15:36 09:37-10:27/50
19	04:48 20:43	05:32 19:53	06:19 18:46	07:07 16:48-17:09/21 17:41	06:59 15:50	07:36 08:26-08:56/30 14:14-14:37/23 15:36 09:37-10:27/50
20	04:49 20:41	05:34 19:51	06:21 18:44	07:09 16:48-17:10/22 17:39	07:01 09:45-09:56/11 15:49	07:37 08:27-08:57/30 14:15-14:38/23 15:36 09:38-10:27/49
21	04:50 20:40	05:35 19:49	06:23 18:42	07:10 16:48-17:10/22 17:37	07:02 08:27-08:34/7 15:47	07:37 08:27-08:57/30 14:15-14:38/23 15:37 09:38-10:27/49
22	04:52 20:39	05:37 19:47	06:24 18:40	07:12 16:48-17:08/20 17:35	07:04 08:25-08:37/12 15:46	07:38 08:28-08:58/30 14:16-14:39/23 15:37 09:39-10:28/49
23	04:53 20:38	05:38 19:45	06:26 18:38	07:14 16:48-17:05/17 17:33	07:05 08:23-08:39/16 15:45	07:39 08:28-08:58/30 14:16-14:39/23 15:38 09:39-10:28/49
24	04:54 20:37	05:40 19:43	06:27 18:35	07:15 16:48-17:03/15 17:31	07:07 08:22-08:41/19 15:44	07:39 08:29-08:59/30 14:17-14:40/23 15:38 09:40-10:30/50
25	04:56 20:35	05:41 19:41	06:29 18:33	07:17 15:49-16:01/12 16:29	07:09 08:22-08:42/20 15:43	07:39 08:29-08:59/30 14:17-14:40/23 15:39 09:40-10:30/50
26	04:57 20:34	05:43 19:39	06:30 18:31	06:19 07:13-07:22/9 16:28	07:10 08:21-08:43/22 15:42	07:40 08:29-08:59/30 14:18-14:40/22 15:40 09:41-10:30/49
27	04:58 20:33	05:44 19:37	06:32 18:29	06:20 07:11-07:24/13 16:26	07:12 08:21-08:44/23 15:42	07:40 08:30-09:00/30 14:18-14:41/23 15:40 09:41-10:30/49
28	05:00 20:31	05:46 19:35	06:33 18:26	06:22 07:08-07:25/17 16:24	07:13 08:20-08:45/25 15:41	07:40 08:31-09:01/30 14:19-14:41/22 15:41 09:42-10:31/49
29	05:01 20:30	05:47 19:33	06:35 07:35-07:40/5 18:24	06:24 07:07-07:26/19 16:22	07:14 08:20-08:46/26 15:40	07:40 08:31-09:01/30 14:20-14:42/22 15:42 09:43-10:32/49
30	05:02 20:28	05:49 06:53-07:05/12 19:31	06:37 07:31-07:44/13 18:22	06:25 07:07-07:27/20 16:20	07:16 08:20-08:46/26 15:39	07:41 08:32-09:02/30 14:21-14:42/21 15:43 09:43-10:32/49
31	05:04 20:27	05:50 06:51-07:08/17 19:28		06:27 07:06-07:28/22 16:18		07:41 08:32-09:02/30 14:21-14:41/20 15:44 09:44-10:32/48
Potential sun hours	495	450	380	334	271	251
Sum of minutes with flicker	0	29	426	609	722	2959

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 3

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 2 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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	07:41 08:23-08:41/18 14:44-15:09/25 15:45 09:06-09:14/8	07:16 16:30	06:25 17:19	06:18 19:10	05:16 06:16-06:37/21 19:58	04:33 20:41
2	07:41 08:24-08:42/18 14:45-15:10/25 15:46 09:08-09:13/5	07:15 16:32	06:23 06:46-06:54/8 17:21	06:16 19:12	05:14 06:18-06:36/18 20:00	04:33 20:42
3	07:40 08:25-08:42/17 15:47 14:45-15:11/26	07:13 16:34	06:21 06:44-06:56/12 17:23	06:13 19:14	05:12 06:19-06:34/15 20:01	04:32 20:43
4	07:40 08:26-08:43/17 15:48 14:46-15:11/25	07:12 16:36	06:19 06:42-06:58/16 17:24	06:11 19:15	05:11 06:22-06:30/8 20:03	04:31 20:44
5	07:40 08:26-08:42/16 15:49 14:46-15:11/25	07:10 16:37	06:17 06:40-06:59/19 17:26	06:09 19:17	05:09 20:05	04:31 20:45
6	07:40 08:27-08:43/16 15:50 14:47-15:12/25	07:08 16:39	06:15 06:39-06:58/19 17:28	06:07 19:18	05:07 20:06	04:30 20:46
7	07:39 08:28-08:42/14 15:52 14:47-15:12/25	07:07 16:11-16:13/2 16:41	06:13 06:38-06:59/21 17:29	06:05 19:20	05:05 20:08	04:29 20:47
8	07:39 08:29-08:42/13 15:53 14:48-15:13/25	07:05 16:09-16:14/5 16:43	06:11 06:38-06:59/21 17:31	06:03 19:22	05:04 20:09	04:29 20:48
9	07:39 08:30-08:41/11 15:54 14:48-15:13/25	07:03 16:09-16:17/8 16:45	06:08 06:38-06:58/20 17:33	06:00 19:23	05:02 20:11	04:28 20:49
10	07:38 08:32-08:41/9 15:56 14:49-15:14/25	07:02 16:08-16:19/11 16:46	06:06 06:39-06:58/19 17:34	05:58 19:25	05:00 20:12	04:28 20:50
11	07:38 08:34-08:40/6 15:57 14:49-15:14/25	07:00 16:07-16:21/14 16:48	06:04 06:38-06:56/18 17:36	05:56 19:26	04:59 20:14	04:28 20:50
12	07:37 14:49-15:13/24 15:58	06:58 16:07-16:22/15 16:50	06:02 06:39-06:55/16 17:38	05:54 06:28-06:34/6 19:28	04:57 20:15	04:27 20:51
13	07:36 14:50-15:13/23 16:00	06:57 16:06-16:24/18 16:52	06:00 06:41-06:53/12 17:39	05:52 06:24-06:38/14 19:30	04:56 20:17	04:27 20:52
14	07:36 14:50-15:13/23 16:01	06:55 16:06-16:26/20 16:53	05:58 06:44-06:51/7 17:41	05:50 06:21-06:40/19 19:31	04:54 20:18	04:27 20:52
15	07:35 14:52-15:14/22 16:03	06:53 16:07-16:26/19 16:55	05:55 17:43	05:48 06:19-06:41/22 19:33	04:53 20:20	04:27 20:53
16	07:34 14:53-15:14/21 16:04	06:51 16:08-16:27/19 16:57	05:53 17:44	05:46 06:18-06:42/24 19:34	04:51 20:21	04:27 20:53
17	07:33 14:54-15:13/19 16:06	06:49 16:09-16:26/17 16:59	05:51 17:46	05:43 06:17-06:43/26 19:36	04:50 20:22	04:27 20:54
18	07:33 14:55-15:13/18 16:07	06:47 16:10-16:25/15 17:00	05:49 17:48	05:41 06:16-06:44/28 19:38	04:49 20:24	04:27 20:54
19	07:32 14:56-15:13/17 16:09	06:45 16:11-16:23/12 17:02	05:47 17:49	05:39 06:15-06:44/29 19:39	04:47 20:25	04:27 20:54
20	07:31 14:57-15:11/14 16:10	06:43 16:14-16:20/6 17:04	05:44 17:51	05:37 06:14-06:44/30 19:41	04:46 20:27	04:27 20:55
21	07:30 14:59-15:09/10 16:12	06:42 17:06	05:42 17:53	05:35 06:14-06:44/30 19:42	04:45 20:28	04:27 20:55
22	07:29 15:04-15:06/2 16:14	06:40 17:07	05:40 17:54	05:33 06:13-06:44/31 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 06:13-06:44/31 19:46	04:42 20:31	04:27 20:55
24	07:26 16:17	06:36 17:11	05:36 17:57	05:29 06:13-06:43/30 19:47	04:41 20:32	04:28 20:55
25	07:25 16:18	06:34 17:12	05:33 17:59	05:27 06:13-06:43/30 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 06:13-06:42/29 19:50	04:39 20:34	04:28 20:56
27	07:23 16:22	06:30 17:16	05:29 18:02	05:23 06:14-06:42/28 19:52	04:38 20:36	04:29 20:56
28	07:22 16:24	06:27 17:18	05:27 18:04	05:22 06:14-06:41/27 19:54	04:37 20:37	04:29 20:55
29	07:20 16:25		06:24 19:05	05:20 06:14-06:40/26 19:55	04:36 20:38	04:30 20:55
30	07:19 16:27		06:22 19:07	05:18 06:15-06:38/23 19:57	04:35 20:39	04:30 20:55
31	07:17 16:29		06:20 19:09		04:34 20:40	
Potential sun hours		265	280	367	413	479
Sum of minutes with flicker		637	181	208	483	62

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 4

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 2 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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

	July	August	September	October	November	December
1	04:31 20:55	05:05 20:25	05:52 19:26	06:38 07:19-07:33/14 18:20	06:29 15:38-15:48/10 16:17	07:17 08:16-08:22/6 15:39 14:31-14:56/25
2	04:32 20:55	05:07 20:24	05:53 19:24	06:40 07:18-07:35/17 18:17	06:31 15:38-15:45/7 16:15	07:19 08:14-08:23/9 15:38 14:31-14:56/25
3	04:32 20:54	05:08 20:22	05:55 19:22	06:41 07:17-07:36/19 18:15	06:32 15:39-15:44/5 16:13	07:20 08:14-08:25/11 15:38 14:32-14:57/25
4	04:33 20:54	05:10 20:21	05:57 19:20	06:43 07:15-07:35/20 18:13	06:34 15:41-15:42/1 16:11	07:21 08:13-08:26/13 15:37 14:32-14:57/25
5	04:34 20:53	05:11 20:19	05:58 19:18	06:44 07:15-07:36/21 18:11	06:36 16:10	07:22 08:14-08:28/14 15:37 14:32-14:57/25
6	04:35 20:53	05:13 20:17	06:00 19:15	06:46 07:15-07:36/21 18:09	06:37 16:08	07:24 08:13-08:29/16 15:36 14:33-14:58/25
7	04:35 20:52	05:14 20:15	06:01 19:13	06:48 07:15-07:34/19 18:07	06:39 16:06	07:25 08:13-08:29/16 15:36 14:33-14:58/25
8	04:36 20:52	05:15 20:14	06:03 19:11	06:49 07:15-07:34/19 18:04	06:41 16:05	07:26 08:13-08:30/17 15:36 14:33-14:58/25
9	04:37 20:51	05:17 06:30-06:41/11 20:12	06:04 19:09	06:51 07:15-07:32/17 18:02	06:42 16:03	07:27 08:13-08:30/17 15:35 14:33-14:59/26
10	04:38 20:51	05:18 06:27-06:43/16 20:10	06:06 19:07	06:52 07:17-07:31/14 18:00	06:44 16:02	07:28 08:14-08:32/18 14:34-14:59/25 15:35 08:58-09:03/5
11	04:39 20:50	05:20 06:26-06:45/19 20:08	06:07 19:04	06:54 07:19-07:30/11 17:58	06:46 16:00	07:29 08:14-08:32/18 14:34-14:59/25 15:35 08:57-09:05/8
12	04:40 20:49	05:21 06:24-06:46/22 20:07	06:09 19:02	06:56 07:20-07:25/5 17:56	06:47 15:59	07:30 08:14-08:33/19 14:36-15:01/25 15:35 08:56-09:06/10
13	04:41 20:48	05:23 06:23-06:47/24 20:05	06:10 19:00	06:57 17:54	06:49 15:57	07:31 08:15-08:34/19 14:35-15:00/25 15:35 08:56-09:08/12
14	04:42 20:47	05:24 06:22-06:48/26 20:03	06:12 18:58	06:59 17:52	06:51 15:56	07:32 08:15-08:34/19 14:36-15:01/25 15:35 08:55-09:08/13
15	04:43 20:47	05:26 06:21-06:49/28 20:01	06:13 18:55	07:00 17:49	06:52 15:55	07:33 08:15-08:34/19 14:36-15:01/25 15:35 08:55-09:09/14
16	04:44 20:46	05:28 06:20-06:49/29 19:59	06:15 18:53	07:02 17:47	06:54 15:53	07:34 08:15-08:35/20 14:37-15:02/25 15:35 08:55-09:10/15
17	04:46 20:45	05:29 06:19-06:49/30 19:57	06:16 18:51	07:04 17:45	06:56 15:52	07:35 08:16-08:35/19 14:38-15:02/24 15:35 08:56-09:11/15
18	04:47 20:44	05:31 06:19-06:49/30 19:55	06:18 18:49	07:05 17:43	06:57 15:51	07:36 08:17-08:36/19 14:39-15:03/24 15:36 08:56-09:12/16
19	04:48 20:43	05:32 06:18-06:49/31 19:53	06:19 18:46	07:07 17:41	06:59 15:50	07:36 08:16-08:36/20 14:38-15:02/24 15:36 08:56-09:12/16
20	04:49 20:41	05:34 06:19-06:49/30 19:51	06:21 18:44	07:09 17:39	07:01 14:39-14:41/2 15:49	07:37 08:17-08:37/20 14:39-15:03/24 15:36 08:57-09:13/16
21	04:50 20:40	05:35 06:18-06:49/31 19:49	06:23 18:42	07:10 17:37	07:02 14:36-14:45/9 15:47	07:37 08:17-08:37/20 14:39-15:03/24 15:37 08:56-09:13/17
22	04:52 20:39	05:37 06:18-06:49/31 19:47	06:24 18:40	07:12 16:43-16:51/8 17:35	07:04 14:34-14:48/14 15:46	07:38 08:18-08:38/20 14:40-15:04/24 15:37 08:57-09:14/17
23	04:53 20:38	05:38 06:18-06:48/30 19:45	06:26 18:38	07:14 16:40-16:53/13 17:33	07:05 14:33-14:49/16 15:45	07:38 08:18-08:38/20 14:40-15:04/24 15:38 08:57-09:14/17
24	04:54 20:37	05:40 06:19-06:48/29 19:43	06:27 18:35	07:15 16:39-16:54/15 17:31	07:07 14:32-14:50/18 15:44	07:39 08:19-08:39/20 14:41-15:05/24 15:38 08:59-09:15/16
25	04:56 20:35	05:41 06:19-06:46/27 19:41	06:29 18:33	06:17 15:38-15:55/17 16:29	07:08 14:32-14:51/19 15:43	07:39 08:20-08:39/19 14:41-15:06/25 15:39 08:59-09:15/16
26	04:57 20:34	05:43 06:20-06:46/26 19:39	06:30 18:31	06:19 15:37-15:56/19 16:28	07:10 14:31-14:52/21 15:42	07:40 08:20-08:39/19 14:42-15:06/24 15:40 08:59-09:15/16
27	04:58 20:33	05:44 06:20-06:44/24 19:37	06:32 18:29	06:20 15:36-15:56/20 16:26	07:11 14:31-14:53/22 15:42	07:40 08:20-08:39/19 14:42-15:07/25 15:40 09:00-09:15/15
28	05:00 20:31	05:46 06:20-06:42/22 19:35	06:33 18:26	06:22 15:36-15:55/19 16:24	07:13 14:31-14:53/22 15:41	07:40 08:22-08:41/19 14:42-15:07/25 15:41 09:02-09:16/14
29	05:01 20:30	05:47 06:22-06:41/19 19:33	06:35 07:26-07:28/2 18:24	06:24 15:36-15:53/17 16:22	07:14 14:31-14:54/23 15:40	07:40 08:22-08:41/19 14:43-15:07/24 15:42 09:02-09:16/14
30	05:02 20:28	05:49 06:24-06:38/14 19:31	06:36 07:21-07:32/11 18:22	06:25 15:36-15:52/16 16:20	07:16 14:31-14:54/23 15:39	07:40 08:23-08:41/18 14:43-15:08/25 15:43 09:03-09:16/13
31	05:04 20:27	05:50 06:28-06:33/5 19:28		06:27 15:37-15:50/13 16:18		07:41 08:23-08:42/19 14:43-15:08/25 15:44 09:05-09:15/10
Potential sun hours	495	450	380	334	271	251
Sum of minutes with flicker	0	554	13	354	212	1612

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 5

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 3 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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
1	07:41 13:54-14:25/31 15:45	07:16 07:55-08:19/24 16:30	06:25 17:19	06:18 19:10	05:16 06:02-06:16/14 19:58	04:33 20:41
2	07:41 13:55-14:25/30 15:46	07:15 07:57-08:20/23 16:32	06:23 17:21	06:16 19:12	05:14 06:04-06:15/11 20:00	04:33 20:42
3	07:40 13:56-14:26/30 15:47	07:13 07:57-08:19/22 16:34	06:21 17:23	06:13 19:13	05:12 06:06-06:12/6 20:01	04:32 20:43
4	07:40 13:57-14:26/29 15:48	07:12 07:57-08:18/21 16:36	06:19 17:24	06:11 19:15	05:11 20:03	04:31 20:44
5	07:40 13:57-14:26/29 15:49	07:10 07:59-08:18/19 16:37	06:17 17:26	06:09 19:17	05:09 20:05	04:31 20:45
6	07:40 13:58-14:26/28 15:50	07:08 08:00-08:16/16 16:39	06:15 17:28	06:07 19:18	05:07 20:06	04:30 20:46
7	07:39 13:58-14:26/28 15:52	07:07 08:02-08:14/12 16:41	06:13 17:29	06:05 19:20	05:05 20:08	04:29 20:47
8	07:39 14:00-14:26/26 15:53	07:05 08:04-08:11/7 16:43	06:11 17:31	06:02 19:22	05:04 20:09	04:29 20:48
9	07:39 14:01-14:25/24 15:54	07:03 15:55-16:17/22 16:44	06:08 17:33	06:00 19:23	05:02 20:11	04:28 20:49
10	07:38 14:02-14:26/24 15:55	07:02 15:54-16:18/24 16:46	06:06 17:34	05:58 19:25	05:00 20:12	04:28 20:50
11	07:38 14:03-14:25/22 15:57	07:00 15:53-16:19/26 16:48	06:04 17:36	05:56 19:26	04:59 20:14	04:28 20:50
12	07:37 14:05-14:24/19 15:58	06:58 15:53-16:19/26 16:50	06:02 17:38	05:54 19:28	04:57 20:15	04:27 20:51
13	07:36 14:06-14:23/17 16:00	06:57 15:52-16:20/28 16:52	06:00 17:39	05:52 19:30	04:56 20:17	04:27 20:52
14	07:36 14:08-14:22/14 16:01	06:55 15:52-16:20/28 16:53	05:58 17:41	05:50 19:31	04:54 20:18	04:27 20:52
15	07:35 14:11-14:21/10 16:03	06:53 15:52-16:20/28 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 15:53-16:20/27 16:57	05:53 17:44	05:45 19:34	04:51 20:21	04:27 20:53
17	07:33 16:06	06:49 15:53-16:20/27 16:59	05:51 17:46	05:43 06:11-06:13/2 19:36	04:50 20:22	04:27 20:54
18	07:33 08:01-08:08/7 16:07	06:47 15:53-16:19/26 17:00	05:49 17:48	05:41 06:07-06:18/11 19:38	04:49 20:24	04:27 20:54
19	07:32 07:59-08:10/11 16:09	06:45 15:54-16:19/25 17:02	05:47 17:49	05:39 06:04-06:19/15 19:39	04:47 20:25	04:27 20:54
20	07:31 07:58-08:12/14 16:10	06:43 15:55-16:18/23 17:04	05:44 17:51	05:37 06:03-06:20/17 19:41	04:46 20:27	04:27 20:55
21	07:30 07:56-08:13/17 16:12	06:42 15:56-16:17/21 17:06	05:42 17:53	05:35 06:02-06:21/19 19:42	04:45 20:28	04:27 20:55
22	07:29 07:56-08:14/18 16:13	06:40 15:57-16:15/18 17:07	05:40 17:54	05:33 06:01-06:21/20 19:44	04:43 20:29	04:27 20:55
23	07:28 07:56-08:16/20 16:15	06:38 15:59-16:13/14 17:09	05:38 17:56	05:31 06:00-06:21/21 19:46	04:42 20:31	04:27 20:55
24	07:26 07:55-08:17/22 16:17	06:36 16:02-16:08/6 17:11	05:35 17:57	05:29 06:00-06:21/21 19:47	04:41 20:32	04:28 20:55
25	07:25 07:55-08:17/22 16:18	06:34 17:12	05:33 17:59	05:27 05:59-06:21/22 19:49	04:40 20:33	04:28 20:56
26	07:24 07:55-08:18/23 16:20	06:32 17:14	05:31 18:01	05:25 05:59-06:21/22 19:50	04:39 20:34	04:28 20:56
27	07:23 07:55-08:19/24 16:22	06:30 17:16	05:29 18:02	05:23 06:00-06:21/21 19:52	04:38 20:36	04:29 20:56
28	07:22 07:54-08:19/25 16:24	06:27 17:18	05:27 18:04	05:22 06:00-06:20/20 19:54	04:37 20:37	04:29 20:55
29	07:20 07:55-08:19/24 16:25		06:24 19:05	05:20 06:00-06:19/19 19:55	04:36 20:38	04:30 20:55
30	07:19 07:55-08:19/24 16:27		06:22 19:07	05:18 06:01-06:18/17 19:57	04:35 20:39	04:30 20:55
31	07:17 07:56-08:20/24 16:29		06:20 19:09		04:34 20:40	
Potential sun hours	265	280	367	413	479	491
Sum of minutes with flicker	636	568	0	247	31	0

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 6

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 3 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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

	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 15:24-15:48/24 16:16	07:17 13:46-14:07/21 15:39
2	04:32 20:55	05:07 20:24	05:53 19:24	06:40 18:17	06:31 15:24-15:45/21 16:15	07:19 13:45-14:08/23 15:38
3	04:32 20:54	05:08 20:22	05:55 19:22	06:41 18:15	06:32 07:33-07:42/9 16:13 15:25-15:44/19	07:20 13:45-14:09/24 15:38
4	04:33 20:54	05:10 20:20	05:57 19:20	06:43 18:13	06:34 07:31-07:44/13 16:11 15:27-15:42/15	07:21 13:44-14:10/26 15:37
5	04:34 20:53	05:11 20:19	05:58 19:18	06:44 18:11	06:36 07:30-07:46/16 16:10 15:29-15:41/12	07:22 13:44-14:11/27 15:37
6	04:34 20:53	05:12 20:17	06:00 19:15	06:46 18:09	06:37 07:29-07:48/19 16:08 15:32-15:39/7	07:24 13:44-14:12/28 15:36
7	04:35 20:52	05:14 20:15	06:01 19:13	06:48 18:06	06:39 07:28-07:49/21 16:06	07:25 13:44-14:13/29 15:36
8	04:36 20:52	05:15 20:14	06:03 19:11	06:49 18:04	06:41 07:28-07:50/22 16:05	07:26 13:44-14:13/29 15:36
9	04:37 20:51	05:17 20:12	06:04 19:09	06:51 18:02	06:42 07:26-07:49/23 16:03	07:27 13:44-14:14/30 15:35
10	04:38 20:51	05:18 06:14-06:21/7 20:10	06:06 19:07	06:52 18:00	06:44 07:26-07:50/24 16:02	07:28 13:44-14:14/30 15:35
11	04:39 20:50	05:20 06:12-06:24/12 20:08	06:07 19:04	06:54 17:58	06:46 07:26-07:51/25 16:00	07:29 13:44-14:15/31 15:35
12	04:40 20:49	05:21 06:10-06:25/15 20:07	06:09 19:02	06:56 17:56	06:47 07:27-07:51/24 15:59	07:30 13:45-14:17/32 15:35
13	04:41 20:48	05:23 06:09-06:27/18 20:05	06:10 19:00	06:57 17:54	06:49 07:27-07:51/24 15:57	07:31 13:44-14:16/32 15:35
14	04:42 20:47	05:24 06:08-06:27/19 20:03	06:12 18:58	06:59 17:52	06:51 07:27-07:52/25 15:56	07:32 13:45-14:17/32 15:35
15	04:43 20:47	05:26 06:07-06:28/21 20:01	06:13 18:55	07:00 17:49	06:52 07:27-07:51/24 15:55	07:33 13:45-14:18/33 15:35
16	04:44 20:46	05:27 06:06-06:28/22 19:59	06:15 18:53	07:02 17:47	06:54 07:28-07:51/23 15:53	07:34 13:46-14:18/32 15:35
17	04:45 20:45	05:29 06:06-06:27/21 19:57	06:16 18:51	07:04 17:45	06:56 07:28-07:51/23 15:52	07:35 13:46-14:19/33 15:35
18	04:47 20:44	05:31 06:06-06:28/22 19:55	06:18 18:49	07:05 16:33-16:42/9 17:43	06:57 07:29-07:51/22 15:51	07:35 13:47-14:20/33 15:36
19	04:48 20:43	05:32 06:05-06:27/22 19:53	06:19 18:46	07:07 16:29-16:44/15 17:41	06:59 07:30-07:50/20 15:50	07:36 13:47-14:20/33 15:36
20	04:49 20:41	05:34 06:06-06:27/21 19:51	06:21 18:44	07:09 16:27-16:46/19 17:39	07:01 07:31-07:49/18 15:48	07:37 13:48-14:21/33 15:36
21	04:50 20:40	05:35 06:06-06:26/20 19:49	06:23 18:42	07:10 16:26-16:48/22 17:37	07:02 07:32-07:49/17 15:47	07:37 13:48-14:21/33 15:37
22	04:52 20:39	05:37 06:07-06:25/18 19:47	06:24 18:40	07:12 16:25-16:49/24 17:35	07:04 07:34-07:48/14 15:46	07:38 13:48-14:22/34 15:37
23	04:53 20:38	05:38 06:07-06:24/17 19:45	06:26 18:37	07:14 16:23-16:48/25 17:33	07:05 07:35-07:47/12 15:45	07:38 13:49-14:22/33 15:38
24	04:54 20:37	05:40 06:08-06:23/15 19:43	06:27 18:35	07:15 16:23-16:49/26 17:31	07:07 07:38-07:45/7 15:44	07:39 13:50-14:23/33 15:38
25	04:56 20:35	05:41 06:10-06:20/10 19:41	06:29 18:33	06:17 15:22-15:50/28 16:29	07:08 15:43	07:39 13:50-14:23/33 15:39
26	04:57 20:34	05:43 19:39	06:30 18:31	06:19 15:22-15:50/28 16:27	07:10 15:42	07:40 13:50-14:23/33 15:40
27	04:58 20:33	05:44 19:37	06:32 18:29	06:20 15:21-15:49/28 16:26	07:11 13:51-14:00/9 15:42	07:40 13:51-14:23/32 15:40
28	05:00 20:31	05:46 19:35	06:33 18:26	06:22 15:22-15:49/27 16:24	07:13 13:48-14:02/14 15:41	07:40 13:51-14:24/33 15:41
29	05:01 20:30	05:47 19:33	06:35 18:24	06:24 15:22-15:49/27 16:22	07:14 13:47-14:04/17 15:40	07:40 13:52-14:24/32 15:42
30	05:02 20:28	05:49 19:31	06:36 18:22	06:25 15:22-15:49/27 16:20	07:16 13:46-14:05/19 15:39	07:40 13:52-14:24/32 15:43
31	05:04 20:27	05:50 19:28	 16:18	06:27 15:23-15:48/25 16:18	 15:44	07:41 13:53-14:25/32 15:44
Potential sun hours	495	450	380	334	271	251
Sum of minutes with flicker	0	280	0	330	582	951

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 7

Licensed user:

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 per WTG**WTG: 4 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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
1	07:41 08:24-08:43/19	07:16 06:25	06:18 07:02-07:16/14	05:16 05:50-06:14/24	04:33	
	15:45 14:44-15:08/24	16:30 17:19	19:10	19:58	20:41	
2	07:41 08:24-08:43/19	07:15 06:23	06:16 07:03-07:13/10	05:14 05:50-06:16/26	04:33	
	15:46 14:44-15:09/25	16:32 17:21	19:12	20:00	20:42	
3	07:40 08:25-08:44/19	07:13 06:21	06:13	05:12 05:49-06:16/27	04:32	
	15:47 14:45-15:09/24	16:34 17:23	19:13	20:01	20:43	
4	07:40 08:26-08:44/18	07:12 06:19	06:11	05:11 05:48-06:16/28	04:31	
	15:48 14:46-15:10/24	16:36 17:24	19:15	20:03	20:44	
5	07:40 08:26-08:44/18	07:10 06:17	06:09	05:09 05:48-06:16/28	04:31	
	15:49 14:45-15:10/25	16:37 17:26	19:17	20:04	20:45	
6	07:40 08:28-08:44/16	07:08 06:15	06:07	05:07 05:48-06:16/28	04:30	
	15:50 14:46-15:11/25	16:39 17:28	19:18	20:06	20:46	
7	07:39 08:28-08:44/16	07:07 06:13	06:05	05:05 05:47-06:15/28	04:29	
	15:52 14:46-15:11/25	16:41 17:29	19:20	20:08	20:47	
8	07:39 08:29-08:44/15	07:05 06:11	06:02	05:04 05:48-06:16/28	04:29	
	15:53 14:47-15:12/25	16:43 17:31	19:22	20:09	20:48	
9	07:39 08:30-08:44/14	07:03 06:08	06:00	05:02 05:47-06:15/28	04:28	
	15:54 14:47-15:12/25	16:44 17:33	19:23	20:11	20:49	
10	07:38 08:32-08:44/12	07:02 06:06	05:58	05:00 05:48-06:15/27	04:28	
	15:55 14:48-15:13/25	16:46 17:34	19:25	20:12	20:50	
11	07:38 08:33-08:43/10	07:00 06:04	05:56	04:59 05:48-06:14/26	04:28	
	15:57 14:48-15:13/25	16:48 17:36	19:26	20:14	20:50	
12	07:37 08:34-08:42/8	06:58 06:02	05:54	04:57 05:49-06:14/25	04:27	
	15:58 14:49-15:13/24	16:50 17:38	19:28	20:15	20:51	
13	07:36 14:49-15:12/23	06:57 06:00	05:52	04:56 05:50-06:14/24	04:27	
	16:00	16:52 17:39	19:30	20:17	20:52	
14	07:36 14:50-15:12/22	06:55 05:58	05:50	04:54 05:50-06:13/23	04:27	
	16:01	16:53 17:41	19:31	20:18	20:52	
15	07:35 14:51-15:13/22	06:53 05:55	05:48	04:53 05:51-06:12/21	04:27	
	16:03	16:55 17:43	19:33	20:20	20:53	
16	07:34 14:52-15:13/21	06:51 05:53	05:45	04:51 05:52-06:12/20	04:27	
	16:04	16:57 17:44	19:34	20:21	20:53	
17	07:33 14:53-15:13/20	06:49 05:51	05:43	04:50 05:52-06:10/18	04:27	
	16:06	16:59 17:46	19:36	20:22	20:54	
18	07:33 14:54-15:13/19	06:47 05:49	05:41	04:49 05:54-06:09/15	04:27	
	16:07	17:00 17:48	19:38	20:24	20:54	
19	07:32 14:55-15:12/17	06:45 05:47	05:39	04:47 05:56-06:07/11	04:27	
	16:09	17:02 17:49	19:39	20:25	20:54	
20	07:31 14:56-15:11/15	06:43 05:44	05:37	04:46 05:58-06:05/7	04:27	
	16:10	17:04 17:51	19:41	20:27	20:55	
21	07:30 14:57-15:10/13	06:42 05:42 06:08-06:16/8	05:35	04:45	04:27	
	16:12	17:06 17:53	19:42	20:28	20:55	
22	07:29 15:00-15:08/8	06:40 05:40 06:05-06:19/14	05:33	04:43	04:27	
	16:13	17:07 17:54	19:44	20:29	20:55	
23	07:28	06:38 05:38 06:04-06:20/16	05:31	04:42	04:27	
	16:15	17:09 17:56	19:46	20:31	20:55	
24	07:26	06:36 05:35 06:01-06:20/19	05:29	04:41	04:28	
	16:17	17:11 17:57	19:47	20:32	20:55	
25	07:25	06:34 05:33 06:01-06:21/20	05:27	04:40	04:28	
	16:18	17:12 17:59	19:49	20:33	20:55	
26	07:24	06:32 05:31 06:00-06:21/21	05:25 05:58-06:08/10	04:39	04:28	
	16:20	17:14 18:01	19:50	20:34	20:56	
27	07:23	06:29 05:29 06:00-06:21/21	05:23 05:56-06:11/15	04:38	04:29	
	16:22	17:16 18:02	19:52	20:36	20:55	
28	07:22	06:27 05:27 06:00-06:21/21	05:22 05:54-06:12/18	04:37	04:29	
	16:24	18:04	19:53	20:37	20:55	
29	07:20	06:24 05:59-07:19/20	05:20 05:52-06:13/21	04:36	04:30	
	16:25	19:05	19:55	20:38	20:55	
30	07:19	06:22 07:00-07:19/19	05:18 05:51-06:14/23	04:35	04:30	
	16:27	19:07	19:57	20:39	20:55	
31	07:17	06:20 07:01-07:17/16		04:34		
	16:29	19:09		20:40		
Potential sun hours	265	280	367	413	479	491
Sum of minutes with flicker	660	0	195	111	462	0

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-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 8

Licensed user:

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 per WTG**WTG: 4 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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

	July	August	September	October	November	December
1	04:31 20:55	05:05 05:59-06:25/26 20:25	05:52 19:26	06:38 18:20	06:29 16:17	07:17 08:15-08:25/10 15:39 14:30-14:55/25
2	04:32 20:55	05:07 05:58-06:25/27 20:24	05:53 19:24	06:40 18:17	06:30 16:15	07:19 08:14-08:26/12 15:38 14:30-14:55/25
3	04:32 20:54	05:08 05:58-06:26/28 20:22	05:55 19:22	06:41 18:15	06:32 16:13	07:20 08:14-08:28/14 15:38 14:31-14:56/25
4	04:33 20:54	05:10 05:58-06:26/28 20:20	05:57 19:20	06:43 18:13	06:34 16:11	07:21 08:13-08:28/15 15:37 14:31-14:56/25
5	04:34 20:53	05:11 05:57-06:25/28 20:19	05:58 19:18	06:44 18:11	06:36 16:10	07:22 08:13-08:29/16 15:37 14:31-14:56/25
6	04:34 20:53	05:12 05:58-06:26/28 20:17	06:00 19:15	06:46 18:09	06:37 16:08	07:24 08:14-08:30/16 15:36 14:32-14:57/25
7	04:35 20:52	05:14 05:57-06:25/28 20:15	06:01 19:13	06:48 18:06	06:39 16:06	07:25 08:13-08:31/18 15:36 14:32-14:57/25
8	04:36 20:52	05:15 05:58-06:26/28 20:14	06:03 19:11	06:49 18:04	06:41 16:05	07:26 08:13-08:31/18 15:36 14:33-14:57/24
9	04:37 20:51	05:17 05:58-06:25/27 20:12	06:04 19:09	06:51 18:02	06:42 16:03	07:27 08:13-08:32/19 15:35 14:33-14:57/24
10	04:38 20:51	05:18 05:57-06:24/27 20:10	06:06 06:57-07:07/10 19:07	06:52 18:00	06:44 16:02	07:28 08:15-08:33/18 15:35 14:33-14:58/25
11	04:39 20:50	05:20 05:58-06:24/26 20:08	06:07 06:54-07:08/14 19:04	06:54 17:58	06:46 16:00	07:29 08:15-08:34/19 15:35 14:34-14:58/24
12	04:40 20:49	05:21 05:58-06:23/25 20:07	06:09 06:52-07:09/17 19:02	06:56 17:56	06:47 15:59	07:30 08:15-08:34/19 15:35 14:34-14:58/24
13	04:41 20:48	05:23 06:00-06:22/22 20:05	06:10 06:51-07:10/19 19:00	06:57 17:54	06:49 15:57	07:31 08:15-08:35/20 15:35 14:35-14:59/24
14	04:42 20:47	05:24 06:00-06:21/21 20:03	06:12 06:50-07:10/20 18:58	06:59 17:52	06:51 15:56	07:32 08:15-08:35/20 15:35 14:35-14:59/24
15	04:43 20:47	05:26 06:02-06:20/18 20:01	06:13 06:49-07:10/21 18:55	07:00 17:49	06:52 15:55	07:33 08:15-08:35/20 15:35 14:36-15:00/24
16	04:44 20:46	05:28 06:03-06:17/14 19:59	06:15 06:48-07:09/21 18:53	07:02 17:47	06:54 15:53	07:34 08:16-08:36/20 15:35 14:37-15:00/23
17	04:45 20:45	05:29 06:06-06:13/7 19:57	06:16 06:49-07:09/20 18:51	07:04 17:45	06:56 15:52	07:35 08:17-08:37/20 15:35 14:38-15:01/23
18	04:47 20:44	05:31 19:55	06:18 06:48-07:08/20 18:49	07:05 17:43	06:57 15:51	07:35 08:17-08:37/20 15:36 14:38-15:02/24
19	04:48 20:43	05:32 19:53	06:19 06:49-07:08/19 18:46	07:07 17:41	06:59 15:50	07:36 08:17-08:37/20 15:36 14:38-15:01/23
20	04:49 20:41	05:34 19:51	06:21 06:49-07:06/17 18:44	07:09 17:39	07:01 14:35-14:43/8 15:48	07:37 08:18-08:38/20 15:36 14:39-15:02/23
21	04:50 20:40	05:35 19:49	06:23 06:50-07:05/15 18:42	07:10 17:37	07:02 14:33-14:46/13 15:47	07:37 08:18-08:38/20 15:37 14:39-15:02/23
22	04:52 20:39	05:37 19:47	06:24 06:51-07:02/11 18:40	07:12 17:35	07:04 14:32-14:47/15 15:46	07:38 08:19-08:39/20 15:37 14:40-15:03/23
23	04:53 20:38	05:38 19:45	06:26 18:37	07:14 17:33	07:05 14:31-14:48/17 15:45	07:38 08:19-08:39/20 15:38 14:40-15:03/23
24	04:54 06:07-06:17/10 20:37	05:40 19:43	06:27 18:35	07:15 17:31	07:07 14:31-14:50/19 15:44	07:39 08:20-08:40/20 15:38 14:41-15:04/23
25	04:56 06:05-06:19/14 20:35	05:41 19:41	06:29 18:33	06:17 16:29	07:08 14:30-14:50/20 15:43	07:39 08:20-08:40/20 15:39 14:41-15:04/23
26	04:57 06:04-06:20/16 20:34	05:43 19:39	06:30 18:31	06:19 16:27	07:10 14:30-14:51/21 15:42	07:40 08:21-08:41/20 15:40 14:41-15:05/24
27	04:58 06:02-06:21/19 20:33	05:44 19:37	06:32 18:29	06:20 16:26	07:11 14:30-14:52/22 15:42	07:40 08:21-08:41/20 15:40 14:42-15:05/23
28	05:00 06:02-06:23/21 20:31	05:46 19:35	06:33 18:26	06:22 16:24	07:13 14:30-14:52/22 15:41	07:40 08:22-08:42/20 15:41 14:42-15:05/23
29	05:01 06:01-06:23/22 20:30	05:47 19:33	06:35 18:24	06:24 16:22	07:14 14:30-14:54/24 15:40	07:40 08:23-08:42/19 15:42 14:42-15:06/24
30	05:02 06:00-06:23/23 20:28	05:49 19:31	06:36 18:22	06:25 16:20	07:16 08:15-08:23/8 15:39	07:40 08:23-08:43/20 15:43 14:43-15:06/23
31	05:04 06:00-06:25/25 20:27	05:50 19:28	06:37 18:21	06:27 16:18	07:18 14:30-14:54/24 15:38	07:41 08:24-08:43/19 15:44 14:43-15:07/24
Potential sun hours	495	450	380	334	271	251
Sum of minutes with flicker	150	408	224	0	213	1312

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 9

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 5 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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	07:16 16:30	06:25 17:19	06:18 19:10		05:16 19:58	06:04-06:26/22	04:33 20:41	05:13-05:17/4	04:31 20:55	05:11-05:29/18	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	07:15 16:32	06:23 17:21	06:16 19:12		05:14 20:00	06:05-06:26/21	04:33 20:42	05:10-05:18/8	04:32 20:55	05:11-05:30/19	05:07 20:24		05:53 19:24	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 19:13		05:12 20:01	06:06-06:25/19	04:32 20:43	05:09-05:19/10	04:32 20:54	05:12-05:30/18	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	06:07-06:23/16	04:31 20:44	05:09-05:21/12	04:33 20:54	05:12-05:29/17	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	06:09-06:22/13	04:31 20:45	05:08-05:22/14	04:34 20:53	05:13-05:29/16	05:11 20:19		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	06:10-06:19/9	04:30 20:46	05:08-05:23/15	04:34 20:53	05:14-05:29/15	05:12 20:17	06:23-06:27/4	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		04:29 20:47	05:07-05:23/16	04:35 20:52	05:15-05:29/14	05:14 20:15	06:19-06:30/11	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	06:11 17:31	06:02 19:21		05:04 20:09		04:29 20:48	05:07-05:24/17	04:36 20:52	05:15-05:28/13	05:15 20:14	06:18-06:32/14	06:03 19:11	06:49 18:04	06:41 16:05	07:26 15:36
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	05:07-05:25/18	04:37 20:51	05:16-05:27/11	05:17 20:12	06:16-06:33/17	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	05:06-05:25/19	04:38 20:51	05:17-05:26/9	05:18 20:10	06:14-06:34/20	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	05:06-05:25/19	04:39 20:50	05:19-05:25/6	05:20 20:08	06:14-06:35/21	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 20:50	05:07-05:26/19	04:40 20:07		05:21 20:07	06:13-06:35/22	06:09 19:02	06:55 17:56	06:47 15:57	07:30 15:35
13	07:36 16:00	06:56 16:52	06:00 17:39	05:52 19:30		04:56 20:17		04:27 20:52	05:07-05:26/19	04:41 20:48		05:23 20:05	06:13-06:36/23	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	05:07-05:27/20	04:42 20:47		05:24 20:03	06:12-06:36/24	06:12 18:58	06:59 17:52	07:32 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	05:07-05:27/20	04:43 20:46		05:26 20:01	06:12-06:36/24	06:13 18:55	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	05:45 19:34		04:51 20:21		04:27 20:53	05:07-05:28/21	04:44 20:46		05:27 19:59	06:11-06:36/25	06:15 18:53	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	05:07-05:28/21	04:45 20:45		05:29 19:57	06:11-06:35/24	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	06:18-06:19/1	04:49 20:24		04:27 20:54	05:07-05:28/21	04:47 20:44		05:31 19:55	06:11-06:35/24	06:18 18:49	07:05 17:43	06:57 15:51	07:35 15:36
19	07:32 16:09	06:45 17:02	05:47 17:49	05:39 19:39	06:12-06:24/12	04:47 20:25		04:27 20:54	05:08-05:28/20	04:48 20:42		05:32 19:53	06:11-06:34/23	06:19 18:46	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 19:41	06:10-06:26/16	04:46 20:27		04:27 20:55	05:08-05:28/20	04:49 20:41		05:34 19:51	06:12-06:34/22	06:21 18:44	07:09 17:39	07:01 15:48	07:37 15:36
21	07:30 16:12	06:41 17:06	05:42 17:52	05:35 19:42	06:08-06:27/19	04:45 20:28		04:27 20:55	05:08-05:28/20	04:50 20:40		05:35 19:49	06:12-06:32/20	06:22 18:42	07:10 17:37	07:02 15:47	07:37 15:37
22	07:29 16:13	06:40 17:07	05:40 17:54	05:33 19:44	06:07-06:28/21	04:43 20:29		04:27 20:55	05:08-05:28/20	04:52 20:39		05:37 19:47	06:13-06:31/18	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	06:06-06:28/22	04:42 20:31		04:27 20:55	05:09-05:29/20	04:53 20:38		05:38 19:45	06:14-06:29/15	06:26 18:37	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	05:29 19:47	06:05-06:28/23	04:41 20:32		04:28 20:55	05:09-05:29/20	04:54 20:37		05:40 19:43	06:17-06:27/10	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	06:04-06:28/24	04:40 20:33		04:28 20:55	05:08-05:29/21	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	06:32 17:14	05:31 18:01	05:25 19:50	06:04-06:28/24	04:39 20:34		04:28 20:55	05:09-05:30/21	04:57 20:34		05:43 19:39		06:30 18:31	06:19 16:27	07:10 15:42	07:40 15:40
27	07:23 16:22	06:29 17:16	05:29 18:02	05:23 19:52	06:05-06:29/24	04:38 20:36		04:29 20:55	05:09-05:29/20	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	07:21 16:23	06:27 17:18	05:27 18:04	05:21 19:53	06:04-06:29/25	04:37 20:37		04:29 20:55	05:10-05:30/20	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	06:26 17:19	05:26 18:05	05:20 19:55	06:04-06:28/24	04:36 20:38		04:30 20:55	05:10-05:30/20	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	06:25 17:18	05:25 18:06	05:18 19:57	06:04-06:27/23	04:35 20:39		04:30 20:55	05:11-05:30/19	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 17:19	05:20 18:09	05:17 19:09		04:34 20:40		04:30 20:40		05:04 20:27		05:50 19:28		06:27 16:18			07:40 15:44
Potential sun hours	265	280	367	413		479		491		495		450		380	334	271	251
Sum of minutes with flicker	0	0	0	258		100		534		156		361		0	0	0	0

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 10

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 6 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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
1	07:41 15:45	07:16 16:30	06:25 07:10-07:20/10 17:19	06:18 07:37-08:17/40 19:10	05:16 19:58	04:33 05:33-05:59/26 20:41
2	07:40 15:46	07:15 16:32	06:23 17:21	06:16 07:37-08:14/37 19:12	05:14 20:00	04:33 05:32-05:59/27 20:42
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 07:38-08:13/35 19:13	05:12 20:01	04:32 05:31-06:00/29 20:43
4	07:40 15:48	07:12 16:36	06:19 17:24	06:11 07:40-08:11/31 19:15	05:11 20:03	04:31 05:31-06:01/30 20:44
5	07:40 15:49	07:10 16:37	06:17 17:26	06:09 07:41-08:09/28 19:17	05:09 20:04	04:31 05:30-06:02/32 20:45
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 07:43-08:07/24 19:18	05:07 20:06	04:30 05:30-06:03/33 20:46
7	07:39 15:52	07:07 16:41	06:13 17:29	06:05 07:45-08:04/19 19:20	05:05 20:08	04:29 05:29-06:03/34 20:47
8	07:39 15:53	07:05 16:43	06:11 17:31	06:03 07:49-07:58/9 19:22	05:04 20:09	04:29 05:29-06:04/35 20:48
9	07:39 15:54	07:03 16:45	06:08 17:33	06:00 19:23	05:02 20:11	04:28 05:29-06:05/36 20:49
10	07:38 15:56	07:02 16:46	06:06 07:02-07:07/5 17:34	05:58 19:25	05:00 20:12	04:28 05:28-06:05/37 20:50
11	07:38 15:57	07:00 16:48	06:04 06:35-06:44/9 17:36 06:55-07:12/17	05:56 19:26	04:59 20:14	04:28 05:29-06:05/36 20:50
12	07:37 15:58	06:58 16:50	06:02 06:32-06:47/15 17:38 06:52-07:15/23	05:54 19:28	04:57 20:15	04:27 05:29-06:06/37 20:51
13	07:36 16:00	06:56 16:52	06:00 06:30-07:18/48 17:39	05:52 19:30	04:56 20:17	04:27 05:29-06:07/38 20:52
14	07:36 16:01	06:55 16:53	05:58 06:29-07:19/50 17:41	05:50 19:31	04:54 20:18	04:27 05:29-06:07/38 20:52
15	07:35 16:03	06:53 16:55	05:55 06:26-07:20/54 17:43	05:48 19:33	04:53 20:20	04:27 05:29-06:08/39 20:53
16	07:34 16:04	06:51 16:57	05:53 06:26-07:21/55 17:44	05:45 19:34	04:51 20:21	04:27 05:29-06:08/39 20:53
17	07:33 16:06	06:49 07:16-07:18/2 16:59	05:51 06:25-07:22/57 17:46	05:43 19:36	04:50 20:22	04:27 05:29-06:08/39 20:54
18	07:33 16:07	06:47 07:12-07:22/10 17:00	05:49 06:25-07:23/58 17:48	05:41 19:38	04:49 20:24	04:27 05:29-06:09/40 20:54
19	07:32 16:09	06:45 07:10-07:24/14 17:02	05:47 06:25-07:23/58 17:49	05:39 19:39	04:47 20:25	04:27 05:29-06:09/40 20:54
20	07:31 16:10	06:43 07:09-07:25/16 17:04	05:44 06:23-07:23/60 17:51	05:37 19:41	04:46 20:27	04:27 05:29-06:09/40 20:55
21	07:30 16:12	06:42 07:08-07:25/17 17:06	05:42 06:24-07:23/59 17:53	05:35 19:42	04:45 20:28	04:27 05:29-06:09/40 20:55
22	07:29 16:14	06:40 07:07-07:26/19 17:07	05:40 06:24-07:23/59 17:54	05:33 19:44	04:43 20:29	04:27 05:29-06:09/40 20:55
23	07:28 16:15	06:38 07:07-07:26/19 17:09	05:38 06:25-07:24/59 17:56	05:31 19:46	04:42 20:31	04:27 05:30-06:10/40 20:55
24	07:26 16:17	06:36 07:07-07:26/19 17:11	05:35 06:24-07:22/58 17:57	05:29 19:47	04:41 20:32	04:28 05:30-06:10/40 20:55
25	07:25 16:18	06:34 07:07-07:26/19 17:12	05:33 06:26-07:22/56 17:59	05:27 19:49	04:40 20:33	04:28 05:30-06:09/39 20:55
26	07:24 16:20	06:32 07:06-07:24/18 17:14	05:31 06:27-07:22/55 18:01	05:25 19:50	04:39 20:34	04:28 05:31-06:10/39 20:55
27	07:23 16:22	06:29 07:07-07:23/16 17:16	05:29 06:30-07:22/52 18:02	05:23 19:52	04:38 05:42-05:49/7 20:36	04:29 05:31-06:10/39 20:55
28	07:22 16:24	06:27 07:08-07:22/14 17:18	05:27 06:36-07:20/44 18:04	05:22 19:53	04:37 05:38-05:52/14 20:37	04:29 05:32-06:10/38 20:55
29	07:20 16:25		06:24 07:36-08:20/44 19:05	05:20 19:55	04:36 05:36-05:54/18 20:38	04:30 05:32-06:10/38 20:55
30	07:19 16:27		06:22 07:36-08:19/43 19:07	05:18 19:57	04:35 05:35-05:55/20 20:39	04:30 05:33-06:10/37 20:55
31	07:17 16:29		06:20 07:37-08:18/41 19:09		04:34 05:33-05:57/24 20:40	
Potential sun hours	265	281	367	413	479	491
Sum of minutes with flicker	0	183	1089	223	83	1095

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 11

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 6 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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

	July	August	September	October	November	December
1	04:31 05:33-06:10/37	05:05	05:52	06:38 07:10-07:27/17	06:29	07:17
	20:55	20:25	19:26	18:20 07:29-07:55/26	16:17	15:39
2	04:32 05:34-06:10/36	05:07	05:53	06:40 07:12-07:25/13	06:30	07:19
	20:55	20:24	19:24	18:17 07:32-07:53/21	16:15	15:38
3	04:32 05:34-06:10/36	05:08	05:55	06:41 07:36-07:48/12	06:32	07:20
	20:54	20:22	19:22	18:15	16:13	15:38
4	04:33 05:34-06:09/35	05:10	05:57 07:47-07:56/9	06:43	06:34	07:21
	20:54	20:20	19:20	18:13	16:11	15:37
5	04:34 05:35-06:09/34	05:11	05:58 07:42-08:00/18	06:44	06:36	07:22
	20:53	20:19	19:18	18:11	16:10	15:37
6	04:35 05:36-06:09/33	05:13	06:00 07:39-08:03/24	06:46	06:37	07:24
	20:53	20:17	19:15	18:09	16:08	15:36
7	04:35 05:37-06:09/32	05:14	06:01 07:36-08:04/28	06:47	06:39	07:25
	20:52	20:15	19:13	18:06	16:06	15:36
8	04:36 05:37-06:08/31	05:15	06:03 07:35-08:06/31	06:49	06:41	07:26
	20:52	20:14	19:11	18:04	16:05	15:36
9	04:37 05:38-06:07/29	05:17	06:04 07:33-08:07/34	06:51	06:42	07:27
	20:51	20:12	19:09	18:02	16:03	15:35
10	04:38 05:39-06:07/28	05:18	06:06 07:31-08:08/37	06:52	06:44	07:28
	20:51	20:10	19:07	18:00	16:02	15:35
11	04:39 05:40-06:06/26	05:20	06:07 07:30-08:09/39	06:54	06:46	07:29
	20:50	20:08	19:04	17:58	16:00	15:35
12	04:40 05:41-06:06/25	05:21	06:09 07:28-08:09/41	06:56 07:45-07:52/7	06:47	07:30
	20:49	20:07	19:02	17:56	15:59	15:35
13	04:41 05:42-06:05/23	05:23	06:10 07:28-08:10/42	06:57 07:42-07:54/12	06:49	07:31
	20:48	20:05	19:00	17:54	15:57	15:35
14	04:42 05:44-06:03/19	05:24	06:12 07:26-08:10/44	06:59 07:41-07:56/15	06:51	07:32
	20:47	20:03	18:58	17:52	15:56	15:35
15	04:43 05:46-06:02/16	05:26	06:13 07:26-08:10/44	07:00 07:39-07:56/17	06:52	07:33
	20:47	20:01	18:55	17:49	15:55	15:35
16	04:44 05:48-05:59/11	05:28	06:15 07:19-08:10/51	07:02 07:38-07:57/19	06:54	07:34
	20:46	19:59	18:53	17:47	15:53	15:35
17	04:46	05:29	06:16 07:16-08:10/54	07:04 07:38-07:57/19	06:56	07:35
	20:45	19:57	18:51	17:45	15:52	15:35
18	04:47	05:31	06:18 07:13-08:10/57	07:05 07:38-07:57/19	06:57	07:35
	20:44	19:55	18:49	17:43	15:51	15:36
19	04:48	05:32	06:19 07:12-08:10/58	07:07 07:37-07:56/19	06:59	07:36
	20:42	19:53	18:46	17:41	15:50	15:36
20	04:49	05:34	06:21 07:10-08:09/59	07:09 07:38-07:56/18	07:01	07:37
	20:41	19:51	18:44	17:39	15:49	15:36
21	04:50	05:35	06:23 07:10-08:09/59	07:10 07:38-07:56/18	07:02	07:37
	20:40	19:49	18:42	17:37	15:47	15:37
22	04:52	05:37	06:24 07:08-08:08/60	07:12 07:39-07:55/16	07:04	07:38
	20:39	19:47	18:40	17:35	15:46	15:37
23	04:53	05:38	06:26 07:08-08:08/60	07:14 07:40-07:53/13	07:05	07:38
	20:38	19:45	18:37	17:33	15:45	15:38
24	04:54	05:40	06:27 07:08-08:06/58	07:15 07:42-07:51/9	07:07	07:39
	20:37	19:43	18:35	17:31	15:44	15:38
25	04:56	05:41	06:29 07:07-08:06/59	06:17	07:08	07:39
	20:35	19:41	18:33	16:29	15:43	15:39
26	04:57	05:43	06:30 07:08-08:05/57	06:19	07:10	07:40
	20:34	19:39	18:31	16:27	15:42	15:40
27	04:58	05:44	06:32 07:07-08:03/56	06:20	07:11	07:40
	20:33	19:37	18:29	16:26	15:42	15:40
28	05:00	05:46	06:33 07:08-08:02/54	06:22	07:13	07:40
	20:31	19:35	18:26	16:24	15:41	15:41
29	05:01	05:47	06:35 07:08-08:00/52	06:24	07:14	07:40
	20:30	19:33	18:24	16:22	15:40	15:42
30	05:02	05:49	06:36 07:09-07:58/49	06:25	07:16	07:40
	20:28	19:31	18:22	16:20	15:39	15:43
31	05:04	05:50		06:27		07:40
	20:27	19:28		16:18		15:44
Potential sun hours	495	450	380	334	271	251
Sum of minutes with flicker	451	0	1234	290	0	0

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 12

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 7 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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
1	07:41 15:45	07:16 16:30	06:25 07:00-07:24/24 17:19	06:18 06:51-07:13/22 19:10	05:16 19:58	04:33 05:37-06:00/23 20:41
2	07:40 15:46	07:15 16:32	06:23 07:00-07:24/24 17:21	06:16 06:49-07:13/24 19:12	05:14 20:00	04:33 05:38-05:59/21 20:42
3	07:40 15:47	07:13 16:34	06:21 07:00-07:24/24 17:23	06:13 06:49-07:13/24 19:13	05:12 20:01	04:32 05:38-05:59/21 20:43
4	07:40 15:48	07:11 16:36	06:19 07:00-07:23/23 17:24	06:11 06:48-07:14/26 19:15	05:11 20:03	04:31 05:39-05:59/20 20:44
5	07:40 15:49	07:10 16:37	06:17 06:59-07:22/23 17:26	06:09 06:48-07:14/26 19:17	05:09 20:04	04:31 05:39-05:58/19 20:45
6	07:40 15:50	07:08 16:39	06:15 07:00-07:21/21 17:28	06:07 06:47-07:14/27 19:18	05:07 20:06	04:30 05:41-05:58/17 20:46
7	07:39 15:52	07:07 16:41	06:13 07:01-07:20/19 17:29	06:05 06:47-07:13/26 19:20	05:05 05:44-05:50/6 20:08	04:29 05:41-05:57/16 20:47
8	07:39 15:53	07:05 16:43	06:11 07:02-07:18/16 17:31	06:02 06:47-07:12/25 19:21	05:04 05:41-05:54/13 20:09	04:29 05:42-05:57/15 20:48
9	07:39 15:54	07:03 16:44	06:08 07:05-07:16/11 17:33	06:00 06:47-07:11/24 19:23	05:02 05:39-05:55/16 20:11	04:28 05:43-05:57/14 20:49
10	07:38 15:55	07:02 16:46	06:06 17:34	05:58 06:48-07:10/22 19:25	05:00 05:38-05:57/19 20:12	04:28 05:43-05:56/13 20:49
11	07:38 15:57	07:00 16:48	06:04 17:36	05:56 06:48-07:09/21 19:26	05:36 05:57/21 20:14	04:28 05:44-05:55/11 20:50
12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 06:50-07:07/17 19:28	04:57 05:36-05:59/23 20:15	04:27 05:45-05:55/10 20:51
13	07:36 16:00	06:56 16:52	06:00 17:39	05:52 06:51-07:05/14 19:30	04:56 05:36-06:00/24 20:17	04:27 05:46-05:55/9 20:51
14	07:36 16:01	06:55 16:53	05:58 17:41	05:50 06:55-07:01/6 19:31	04:54 05:34-06:00/26 20:18	04:27 05:48-05:54/6 20:52
15	07:35 16:03	06:53 16:55	05:55 17:43	05:48 19:33	04:53 05:34-06:00/26 20:20	04:27 05:49-05:54/5 20:53
16	07:34 16:04	06:51 16:57	05:53 17:44	05:45 19:34	04:51 05:34-06:01/27 20:21	04:27 05:51-05:52/1 20:53
17	07:33 16:06	06:49 16:59	05:51 17:46	05:43 19:36	04:50 05:33-06:01/28 20:22	04:27 20:54
18	07:33 16:07	06:47 17:00	05:49 17:48	05:41 19:38	04:49 05:33-06:01/28 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 05:33-06:01/28 20:25	04:27 20:54
20	07:31 16:10	06:43 17:04	05:44 17:51	05:37 19:41	04:46 05:34-06:02/28 20:27	04:27 20:55
21	07:30 16:12	06:41 17:06	05:42 17:52	05:35 19:42	04:45 05:34-06:02/28 20:28	04:27 20:55
22	07:29 16:13	06:40 17:07	05:40 17:54	05:33 19:44	04:43 05:33-06:01/28 20:29	04:27 20:55
23	07:28 16:15	06:38 07:09-07:18/9 17:09	05:38 17:56	05:31 19:45	04:42 05:33-06:01/28 20:31	04:27 20:55
24	07:26 16:17	06:36 07:06-07:20/14 17:11	05:35 17:57	05:29 19:47	04:41 05:33-06:01/28 20:32	04:28 20:55
25	07:25 16:18	06:34 07:03-07:21/18 17:12	05:33 17:59	05:27 19:49	04:40 05:34-06:01/27 20:33	04:28 20:55
26	07:24 16:20	06:31 07:02-07:22/20 17:14	05:31 18:01	05:25 19:50	04:39 05:34-06:01/27 20:34	04:28 20:55
27	07:23 16:22	06:29 07:01-07:23/22 17:16	05:29 18:02	05:23 19:52	04:38 05:35-06:01/26 20:36	04:29 05:51-05:55/4 20:55
28	07:21 16:24	06:27 07:00-07:23/23 17:18	05:27 18:04	05:22 19:53	04:37 05:35-06:01/26 20:37	04:29 05:51-05:57/6 20:55
29	07:20 16:25		06:24 06:57-07:08/11 19:05	05:20 19:55	04:36 05:36-06:01/25 20:38	04:30 05:50-05:58/8 20:55
30	07:19 16:27		06:22 06:54-07:11/17 19:07	05:18 19:57	04:35 05:36-06:00/24 20:39	04:30 05:50-05:59/9 20:55
31	07:17 16:29		06:20 06:53-07:12/19 19:09		04:34 05:36-06:00/24 20:40	
Potential sun hours	265	281	367	413	479	491
Sum of minutes with flicker	0	106	232	304	604	248

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-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 13

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 7 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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

	July	August	September	October	November	December
1	04:31 05:49-05:59/10 20:55	05:05 05:47-06:09/22 20:25	05:52 06:47-07:08/21 19:26	06:38 18:20	06:29 16:16	07:17 15:39
2	04:32 05:49-06:01/12 20:55	05:07 05:47-06:07/20 20:24	05:53 06:47-07:09/22 19:24	06:40 18:17	06:30 16:15	07:18 15:38
3	04:32 05:49-06:02/13 20:54	05:08 05:49-06:07/18 20:22	05:55 06:45-07:09/24 19:22	06:41 18:15	06:32 16:13	07:20 15:38
4	04:33 05:47-06:02/15 20:54	05:10 05:50-06:05/15 20:20	05:57 06:45-07:10/25 19:20	06:43 07:43-07:51/8 18:13	06:34 16:11	07:21 15:37
5	04:34 05:47-06:03/16 20:53	05:11 05:52-06:02/10 20:19	05:58 06:44-07:09/25 19:18	06:44 07:40-07:54/14 18:11	06:36 16:10	07:22 15:37
6	04:34 05:47-06:04/17 20:53	05:12 20:17	06:00 06:44-07:10/26 19:15	06:46 07:38-07:55/17 18:09	06:37 16:08	07:24 15:36
7	04:35 05:47-06:05/18 20:52	05:14 20:15	06:01 06:43-07:09/26 19:13	06:47 07:37-07:56/19 18:06	06:39 16:06	07:25 15:36
8	04:36 05:46-06:05/19 20:52	05:15 20:14	06:03 06:43-07:09/26 19:11	06:49 07:36-07:57/21 18:04	06:41 16:05	07:26 15:36
9	04:37 05:45-06:06/21 20:51	05:17 20:12	06:04 06:43-07:08/25 19:09	06:51 07:34-07:57/23 18:02	06:42 16:03	07:27 15:35
10	04:38 05:45-06:06/21 20:51	05:18 20:10	06:06 06:42-07:06/24 19:07	06:52 07:34-07:58/24 18:00	06:44 16:02	07:28 15:35
11	04:39 05:45-06:07/22 20:50	05:20 20:08	06:07 06:43-07:06/23 19:04	06:54 07:34-07:58/24 17:58	06:46 16:00	07:29 15:35
12	04:40 05:45-06:08/23 20:49	05:21 20:06	06:09 06:44-07:04/20 19:02	06:55 07:33-07:57/24 17:56	06:47 15:59	07:30 15:35
13	04:41 05:45-06:08/23 20:48	05:23 20:05	06:10 06:45-07:02/17 19:00	06:57 07:33-07:57/24 17:54	06:49 15:57	07:31 15:35
14	04:42 05:44-06:09/25 20:47	05:24 20:03	06:12 06:47-06:59/12 18:58	06:59 07:34-07:56/22 17:52	06:51 15:56	07:32 15:35
15	04:43 05:44-06:09/25 20:46	05:26 20:01	06:13 06:52-06:54/2 18:55	07:00 07:34-07:55/21 17:49	06:52 15:55	07:33 15:35
16	04:44 05:44-06:10/26 20:46	05:27 19:59	06:15 18:53	07:02 07:35-07:54/19 17:47	06:54 15:53	07:34 15:35
17	04:45 05:43-06:10/27 20:45	05:29 19:57	06:16 18:51	07:04 07:36-07:53/17 17:45	06:56 15:52	07:35 15:35
18	04:47 05:43-06:10/27 20:44	05:31 19:55	06:18 18:49	07:05 07:38-07:51/13 17:43	06:57 15:51	07:35 15:36
19	04:48 05:44-06:11/27 20:42	05:32 19:53	06:19 18:46	07:07 07:41-07:46/5 17:41	06:59 15:50	07:36 15:36
20	04:49 05:44-06:11/27 20:41	05:34 19:51	06:21 18:44	07:09 17:39	07:01 15:48	07:37 15:36
21	04:50 05:44-06:12/28 20:40	05:35 19:49	06:22 18:42	07:10 17:37	07:02 15:47	07:37 15:37
22	04:52 05:43-06:11/28 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 05:43-06:11/28 20:38	05:38 19:45	06:26 18:37	07:14 17:33	07:05 15:45	07:38 15:38
24	04:54 05:44-06:12/28 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 05:44-06:12/28 20:35	05:41 19:41	06:29 18:33	06:17 16:29	07:08 15:43	07:39 15:39
26	04:57 05:44-06:11/27 20:34	05:43 19:39	06:30 18:31	06:19 16:27	07:10 15:42	07:40 15:40
27	04:58 05:44-06:11/27 20:33	05:44 19:37	06:32 18:29	06:20 16:26	07:11 15:42	07:40 15:40
28	05:00 05:45-06:11/26 20:31	05:46 19:35	06:33 18:26	06:22 16:24	07:13 15:41	07:40 15:41
29	05:01 05:45-06:11/26 20:30	05:47 06:55-07:02/7 19:33	06:35 18:24	06:24 16:22	07:14 15:40	07:40 15:42
30	05:02 05:45-06:10/25 20:28	05:49 06:51-07:05/14 19:30	06:36 18:22	06:25 16:20	07:16 15:39	07:40 15:43
31	05:04 05:46-06:10/24 20:27	05:50 06:50-07:07/17 19:28		06:27 16:18		07:40 15:44
Potential sun hours	495	450	380	334	271	251
Sum of minutes with flicker	709	123	318	295	0	0

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 14

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 8 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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
1	07:41 15:45	07:16 16:30	06:25 17:19	06:18 19:10	06:50-07:10/20 19:58	05:16 20:41
2	07:40 15:46	07:14 16:32	06:23 17:21	06:16 19:12	06:49-07:08/19 20:00	05:14 20:42
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 19:13	06:49-07:08/19 20:01	05:12 20:43
4	07:40 15:48	07:11 16:36	06:19 17:24	06:11 19:15	06:49-07:07/18 20:03	05:11 20:44
5	07:40 15:49	07:10 16:37	06:17 17:26	06:09 19:17	06:50-07:07/17 20:04	05:09 20:45
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	06:51-07:05/14 20:06	05:07 20:46
7	07:39 15:52	07:07 16:41	06:13 17:29	06:05 19:20	06:52-07:03/11 20:08	05:05 20:47
8	07:39 15:53	07:05 16:43	06:11 17:31	06:02 19:21	06:55-06:58/3 20:09	05:04 20:48
9	07:39 15:54	07:03 16:44	06:08 17:33	06:00 19:23	05:54-06:04/10 20:11	05:04 20:49
10	07:38 15:55	07:02 16:46	06:06 17:34	05:58 19:25	05:57-06:02/5 20:12	05:03 20:49
11	07:38 15:57	07:00 16:48	06:04 17:36	05:56 19:26	04:59 20:14	05:03 20:50
12	07:37 15:58	06:58 16:50	06:02 17:38	05:54 19:28	04:57 20:15	05:03 20:51
13	07:36 16:00	06:56 16:52	06:00 17:39	05:52 19:29	04:56 20:17	05:04 20:51
14	07:36 16:01	06:55 16:53	05:58 17:41	05:50 19:31	04:54 20:18	05:04 20:52
15	07:35 16:03	06:53 16:55	05:55 17:43	05:48 19:33	04:53 20:20	05:04 20:53
16	07:34 16:04	06:51 16:57	05:53 17:44	05:45 19:34	04:51 20:21	05:04 20:53
17	07:33 16:06	06:49 16:59	05:51 17:46	05:43 19:36	04:50 20:22	05:04 20:54
18	07:33 16:07	06:47 17:00	05:49 17:48	05:41 19:38	04:49 20:24	05:04 20:54
19	07:32 16:09	06:45 17:02	05:47 17:49	05:39 19:39	04:47 20:25	05:04 20:54
20	07:31 16:10	06:43 17:04	05:44 17:51	05:37 19:41	04:46 20:27	05:04 20:55
21	07:30 16:12	06:41 17:06	05:42 17:52	05:35 19:42	04:45 20:28	05:04 20:55
22	07:29 16:13	06:39 17:07	05:40 17:54	05:33 19:44	04:43 20:29	05:04 20:55
23	07:28 16:15	06:38 17:09	05:38 17:56	05:31 19:45	04:42 20:31	05:05 20:55
24	07:26 16:17	06:36 17:11	05:35 17:57	05:29 19:47	04:41 20:32	05:05 20:55
25	07:25 16:18	06:34 17:12	05:33 17:59	05:27 19:49	05:56-06:06/10 20:33	05:05 20:55
26	07:24 16:20	06:31 17:14	05:31 18:01	05:25 19:50	05:54-06:07/13 20:34	05:06 20:55
27	07:23 16:22	06:29 17:16	05:29 18:02	05:23 19:52	05:53-06:09/16 20:36	05:06 20:55
28	07:21 16:23	06:27 17:18	05:27 18:04	05:21 19:53	05:52-06:10/18 20:37	05:07 20:55
29	07:20 16:25		06:52-07:08/16 19:05	05:20 19:55	05:51-06:10/19 20:38	05:07 20:55
30	07:19 16:27		06:51-07:09/18 19:07	05:18 19:57	05:51-06:10/19 20:39	05:07 20:55
31	07:17 16:29		06:50-07:09/19 19:09		04:34 20:40	
Potential sun hours	265	281	367	413	479	491
Sum of minutes with flicker	0	0	76	216	159	458

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 15

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 8 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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

	July	August	September	October	November	December
1	04:31 05:07-05:24/17	05:05	05:52	06:38	06:29	07:17
	20:55	20:25	19:26	18:20	16:16	15:39
2	04:32 05:08-05:24/16	05:07	05:53	06:40	06:30	07:18
	20:55	20:24	19:24	18:17	16:15	15:38
3	04:32 05:09-05:24/15	05:08 06:06-06:14/8	05:55	06:41	06:32	07:20
	20:54	20:22	19:22	18:15	16:13	15:38
4	04:33 05:09-05:23/14	05:10 06:04-06:15/11	05:56 06:53-06:56/3	06:43	06:34	07:21
	20:54	20:20	19:20	18:13	16:11	15:37
5	04:34 05:09-05:23/14	05:11 06:02-06:16/14	05:58 06:48-06:59/11	06:44	06:36	07:22
	20:53	20:19	19:18	18:11	16:10	15:37
6	04:34 05:10-05:23/13	05:12 06:01-06:18/17	06:00 06:47-07:01/14	06:46	06:37	07:24
	20:53	20:17	19:15	18:09	16:08	15:36
7	04:35 05:11-05:23/12	05:14 06:00-06:18/18	06:01 06:45-07:02/17	06:47	06:39	07:25
	20:52	20:15	19:13	18:06	16:06	15:36
8	04:36 05:11-05:22/11	05:15 06:00-06:19/19	06:03 06:44-07:03/19	06:49	06:41	07:26
	20:52	20:14	19:11	18:04	16:05	15:36
9	04:37 05:13-05:21/8	05:17 05:59-06:19/20	06:04 06:43-07:02/19	06:51	06:42	07:27
	20:51	20:12	19:09	18:02	16:03	15:35
10	04:38 05:14-05:20/6	05:18 05:59-06:19/20	06:06 06:42-07:02/20	06:52	06:44	07:28
	20:51	20:10	19:06	18:00	16:02	15:35
11	04:39	05:20 05:59-06:19/20	06:07 06:42-07:02/20	06:54	06:46	07:29
	20:50	20:08	19:04	17:58	16:00	15:35
12	04:40	05:21 05:59-06:18/19	06:09 06:41-07:01/20	06:55	06:47	07:30
	20:49	20:06	19:02	17:56	15:59	15:35
13	04:41	05:23 05:59-06:19/20	06:10 06:42-07:00/18	06:57	06:49	07:31
	20:48	20:05	19:00	17:54	15:57	15:35
14	04:42	05:24 05:59-06:18/19	06:12 06:42-06:59/17	06:59	06:51	07:32
	20:47	20:03	18:58	17:52	15:56	15:35
15	04:43	05:26 06:00-06:17/17	06:13 06:43-06:58/15	07:00	06:52	07:33
	20:46	20:01	18:55	17:49	15:55	15:35
16	04:44	05:27 06:00-06:16/16	06:15 06:45-06:55/10	07:02	06:54	07:34
	20:46	19:59	18:53	17:47	15:53	15:35
17	04:45	05:29 06:01-06:14/13	06:16	07:04	06:56	07:35
	20:45	19:57	18:51	17:45	15:52	15:35
18	04:47	05:31 06:03-06:12/9	06:18	07:05	06:57	07:35
	20:44	19:55	18:49	17:43	15:51	15:36
19	04:48	05:32	06:19	07:07	06:59	07:36
	20:42	19:53	18:46	17:41	15:50	15:36
20	04:49	05:34	06:21	07:09	07:01	07:37
	20:41	19:51	18:44	17:39	15:48	15:36
21	04:50	05:35	06:22	07:10	07:02	07:37
	20:40	19:49	18:42	17:37	15:47	15:37
22	04:52	05:37	06:24	07:12	07:04	07:38
	20:39	19:47	18:40	17:35	15:46	15:37
23	04:53	05:38	06:26	07:14	07:05	07:38
	20:38	19:45	18:37	17:33	15:45	15:38
24	04:54	05:40	06:27	07:15	07:07	07:39
	20:37	19:43	18:35	17:31	15:44	15:38
25	04:55	05:41	06:29	06:17	07:08	07:39
	20:35	19:41	18:33	16:29	15:43	15:39
26	04:57	05:43	06:30	06:19	07:10	07:40
	20:34	19:39	18:31	16:27	15:42	15:39
27	04:58	05:44	06:32	06:20	07:11	07:40
	20:33	19:37	18:28	16:26	15:42	15:40
28	05:00	05:46	06:33	06:22	07:13	07:40
	20:31	19:35	18:26	16:24	15:41	15:41
29	05:01	05:47	06:35	06:24	07:14	07:40
	20:30	19:33	18:24	16:22	15:40	15:42
30	05:02	05:49	06:36	06:25	07:16	07:40
	20:28	19:30	18:22	16:20	15:39	15:43
31	05:04	05:50		06:27		07:40
	20:27	19:28		16:18		15:44
Potential sun hours	495	450	380	334	271	251
Sum of minutes with flicker	126	260	203	0	0	0

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 16

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 9 - VESTAS V90 2000 120.0 !O! hub: 125,0 m (TOT: 185,0 m) (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 09:05-09:19/14 15:45 14:58-15:07/9	07:16 15:06-15:21/15 16:30	06:25 06:18 17:19 19:10	06:18 19:10 19:58	05:16 19:58 05:14	04:33 20:41 04:33 20:25	04:31 20:55 04:31 20:25	05:05 20:25 05:07 20:53	05:52 19:26 05:53 18:20	06:38 18:20 06:40 16:16	06:29 16:16 06:30	07:17 14:38-15:01/23 15:39
2	07:40 09:06-09:19/13 15:46 14:58-15:09/11	07:14 15:08-15:18/10 16:32	06:23 06:16 17:21 19:12	06:16 19:12 20:00	05:14 20:00 05:12	04:33 20:42 04:32 20:55	04:31 20:55 04:31 20:24	05:07 20:53 05:08 20:24	05:53 19:24 05:55 18:17	06:40 16:15 06:41 16:15	06:30 16:15 06:32	07:18 14:38-15:00/22 15:38
3	07:40 09:07-09:19/12 15:47 14:57-15:10/13	07:13 16:34 07:11	06:21 06:13 17:23 19:13	06:13 19:13 20:01	05:12 20:01 20:43	04:32 20:54 04:33 20:22	04:32 20:55 04:33 20:22	05:08 20:22 05:09 19:22	05:55 18:15 05:56 16:13	06:41 16:13 06:43 16:13	06:32 16:13 06:34	07:20 14:40-15:01/21 15:37
4	07:40 09:09-09:18/9 15:48 14:56-15:11/15	07:11 16:36 07:10	06:19 06:11 17:24 19:15	06:11 05:10 20:03	05:10 20:03 20:44	04:31 05:09 20:44	04:33 05:09 20:20 19:20	05:56 06:44 05:58 18:13	06:43 06:36 06:44 16:11	06:34 16:11 06:36	06:36 16:11 06:37	07:21 14:40-15:00/20 15:37
5	07:40 09:11-09:16/5 15:49 14:56-15:12/16	07:10 16:37 07:08	06:17 06:09 17:26 19:17	06:09 05:09 20:04	05:09 20:04 20:45	04:30 04:34 04:34 20:19	04:34 05:11 05:12 19:18	05:58 06:44 06:00 18:11	06:44 06:36 06:46 16:10	06:36 16:10 06:37	06:37 16:10 06:37	07:22 14:41-15:00/19 15:37
6	07:40 14:57-15:14/17 15:50	07:08 16:39 07:07	06:15 06:07 17:28 19:18	06:07 05:07 20:06	05:07 20:06 20:46	04:30 04:34 04:34 20:53	04:34 05:12 20:17 19:15	06:00 06:46 06:01 18:09	06:46 06:37 06:47 16:08	06:37 16:08 06:39	06:39 16:08 06:41	07:24 14:43-15:00/17 15:36
7	07:39 14:56-15:14/18 15:52	07:07 16:41 07:05	06:13 06:05 17:29 19:20	06:05 05:05 20:08	05:05 20:08 20:47	04:29 04:36 04:36 20:52	05:14 06:01 20:15 19:13	06:01 06:47 06:03 18:06	06:47 06:39 06:49 16:06	06:47 06:39 06:41	06:39 16:06 06:41	07:25 08:58-09:03/5 15:36
8	07:39 14:56-15:16/20 15:53	07:05 16:43 07:03	06:11 06:02 17:31 19:21	06:02 05:04 20:09	05:04 20:09 20:48	04:29 04:36 20:52	05:15 06:03 20:14 19:11	06:03 06:49 06:04 16:05	06:49 06:41 06:05	06:41 16:05 06:05	06:41 16:05 06:05	07:26 08:56-09:05/9 15:35
9	07:39 14:56-15:17/21 15:54	07:03 16:44 07:02	06:08 06:00 17:33 19:23	06:00 05:02 20:11	05:02 20:11 20:49	04:28 04:37 20:51	05:17 06:04 20:12 19:09	06:04 06:51 18:02	06:51 16:03 06:52 06:44	06:42 14:38-14:49/11 16:03	06:42 14:38-14:49/11 16:03	07:27 08:56-09:07/11 15:35
10	07:38 14:55-15:17/22 15:55	07:02 16:46 07:00	06:06 05:58 17:34 19:25	05:58 05:00 20:12	05:00 20:12 20:49	04:38 05:18 20:51	05:18 06:06 20:10 19:06	06:06 06:52 18:00	06:44 14:36-14:52/16 16:02	06:44 14:36-14:52/16 16:02	06:44 14:36-14:52/16 16:02	07:28 08:55-09:08/13 15:35
11	07:38 14:56-15:19/23 15:57	07:00 16:48 06:58	06:04 05:56 17:36 19:26	05:56 04:59 20:14	04:59 20:14 20:50	04:39 05:20 20:50	05:20 06:07 19:04	06:07 06:54 17:58	06:46 14:35-14:54/19 16:00	06:46 14:35-14:54/19 16:00	06:46 14:35-14:54/19 16:00	07:29 08:55-09:09/14 15:35
12	07:37 14:55-15:19/24 15:58	06:58 16:50 06:56	06:02 05:54 17:38 19:28	05:54 04:57 20:15	04:57 20:15 20:51	04:40 05:21 20:49	05:21 06:09 20:06 19:02	06:09 06:55 17:56	06:47 14:34-14:55/21 15:59	06:47 14:34-14:55/21 15:59	06:47 14:34-14:55/21 15:59	07:30 08:56-09:11/15 15:35
13	07:36 14:55-15:20/25 16:00	06:56 16:51 06:55	06:00 05:52 17:39 19:29	05:52 04:56 20:17	04:56 20:17 20:51	04:41 05:23 20:48	05:23 06:10 20:05 19:00	06:10 06:57 17:54	06:49 14:33-14:56/23 15:57	06:49 14:33-14:56/23 15:57	06:49 14:33-14:56/23 15:57	07:31 08:55-09:11/16 15:35
14	07:36 14:55-15:20/25 16:01	06:55 16:53 06:53	05:58 05:50 17:41 19:31	05:50 04:54 20:18	04:54 20:18 20:52	04:27 04:42 20:47	05:24 06:12 20:03 18:58	06:12 06:59 17:51	06:59 06:51 15:56	06:51 14:32-14:56/24 15:56	06:51 14:32-14:56/24 15:56	07:32 08:55-09:12/17 15:35
15	07:35 14:56-15:22/26 16:02	06:53 16:55 06:51	05:55 05:48 17:43 19:33	05:48 04:53 20:20	04:53 20:20 20:53	04:27 04:43 20:46	05:26 06:13 20:01 18:55	06:13 07:00 17:49	06:52 14:32-14:57/25 15:55	06:52 14:32-14:57/25 15:55	06:52 14:32-14:57/25 15:55	07:33 08:55-09:13/18 15:35
16	07:34 14:56-15:23/27 16:04	06:51 16:57 06:49	05:53 05:45 17:44 19:34	05:45 04:51 20:21	04:51 20:21 20:53	04:27 04:44 20:46	05:27 06:15 19:59	06:15 07:02 18:53	06:54 14:32-14:58/26 17:47	06:54 14:32-14:58/26 17:47	06:54 14:32-14:58/26 17:47	07:34 08:55-09:13/18 15:35
17	07:33 14:56-15:23/27 16:06	06:49 16:59 06:47	05:51 05:43 17:46 19:36	05:43 04:50 20:22	04:50 20:22 20:54	04:27 04:45 20:45	05:29 06:16 19:57	06:16 07:04 18:51	06:56 14:32-14:59/27 17:45	06:56 14:32-14:59/27 17:45	06:56 14:32-14:59/27 17:45	07:35 08:56-09:14/18 15:35
18	07:33 14:56-15:24/28 16:07	06:47 17:00 06:45	05:49 05:41 17:48 19:38	05:41 04:48 20:24	04:48 20:24 20:54	04:27 04:44 20:44	05:30 06:18 19:55	06:18 07:05 18:49	06:57 14:32-15:00/28 17:43	06:57 14:32-15:00/28 17:43	06:57 14:32-15:00/28 17:43	07:35 08:57-09:15/18 15:36
19	07:32 14:56-15:24/28 16:09	06:45 17:02 06:43	05:47 05:39 17:49 19:39	05:39 04:47 20:25	04:47 20:25 20:54	04:27 04:48 20:42	05:32 06:19 19:53	06:19 07:07 18:46	06:59 14:31-14:59/28 17:41	06:59 14:31-14:59/28 17:41	06:59 14:31-14:59/28 17:41	07:36 08:56-09:15/19 15:36
20	07:31 14:56-15:24/28 16:10	06:43 17:04 06:41	05:44 05:37 17:51 19:41	05:37 04:46 20:27	04:46 20:27 20:55	04:27 04:49 20:41	05:34 06:21 19:51	06:21 07:09 18:44	07:01 14:32-15:00/28 17:39	07:01 14:32-15:00/28 17:39	07:01 14:32-15:00/28 17:39	07:37 08:57-09:16/19 15:36
21	07:30 14:56-15:24/28 16:12	06:41 17:05 06:39	05:42 05:35 17:52 19:42	05:35 04:45 20:28	04:45 20:28 20:55	04:27 04:50 20:40	05:35 06:22 19:49	06:22 07:10 18:42	07:10 07:02 17:37	07:02 14:32-15:00/28 15:47	07:02 14:32-15:00/28 15:47	07:37 08:57-09:16/19 15:37
22	07:29 14:57-15:25/28 16:13	06:39 17:07 06:38	05:40 05:33 17:54 19:44	05:33 04:43 20:29	04:43 20:29 20:55	04:27 04:53 20:39	05:37 06:24 19:47	06:24 07:12 18:40	07:12 07:04 17:35	07:04 14:32-15:00/28 15:46	07:04 14:32-15:00/28 15:46	07:38 08:58-09:17/19 15:37
23	07:28 14:57-15:25/28 16:15	06:38 17:09 06:36	05:38 05:31 17:56 19:45	05:31 04:42 20:31	04:42 20:31 20:55	04:27 04:53 20:38	05:38 06:26 19:45	06:26 07:14 18:37	07:14 07:05 17:33	07:05 14:32-15:00/28 15:45	07:05 14:32-15:00/28 15:45	07:38 08:58-09:17/19 15:38
24	07:26 14:58-15:26/28 16:17	06:36 17:11 06:34	05:35 05:29 17:57 19:47	05:29 04:41 20:32	04:41 20:32 20:55	04:28 04:54 20:37	06:45 06:27 19:43	06:27 07:15 18:35	07:15 07:07 17:31	07:07 14:33-15:01/28 15:44	07:07 14:33-15:01/28 15:44	07:39 08:59-09:18/19 15:38
25	07:25 14:58-15:25/27 16:18	06:34 17:12 06:31	05:33 05:27 17:59 19:49	05:27 04:40 20:33	04:40 20:33 20:55	04:28 04:55 20:35	06:29 06:41 18:33	06:29 06:17 16:29	06:17 07:08 15:43	14:33-15:00/27 15:43	14:33-15:00/27 15:43	07:39 08:59-09:18/19 15:39
26	07:24 14:59-15:25/26 16:20	06:31 17:14 06:29	05:31 05:25 18:01 19:50	05:25 04:38 20:34	04:38 20:34 20:55	04:28 04:57 20:34	06:41 06:30 18:31	06:30 06:19 16:27	06:19 07:10 15:42	14:34-15:01/27 15:42	14:34-15:01/27 15:42	07:40 09:00-09:18/18 15:39
27	07:23 14:59-15:24/25 16:22	06:29 17:16 06:27	05:29 05:23 18:02 19:52	05:23 04:38 20:36	04:38 20:36 20:55	04:29 04:58 20:33	06:42 06:32 19:37	06:32 06:20 18:28	06:20 07:11 16:26	14:35-15:01/26 15:42	14:35-15:01/26 15:42	07:40 09:00-09:18/18 15:40
28	07:21 15:00-15:24/24 16:23	06:27 17:18 06:24	05:27 05:21 18:04 19:53	05:21 04:37 20:37	04:37 20:37 20:55	04:29 05:00 20:31	06:46 06:33 19:35	06:33 06:22 18:26	06:22 07:13 16:24	14:35-15:01/26 15:41	14:35-15:01/26 15:41	07:40 09:01-09:19/18 15:41
29	07:20 15:02-15:24/22 16:25	06:27 17:18 06:24	05:24 05:20 19:05 19:55	05:20 04:36 20:38	04:36 20:38 20:55	04:30 05:01 20:30	06:47 06:35 19:33	06:35 06:24 18:24	06:24 07:14 16:22	14:36-15:01/25 15:40	14:36-15:01/25 15:40	07:40 09:01-09:19/18 15:42
30	07:19 15:02-15:23/21 16:27	06:27 17:18 06:24	05:22 05:18 19:07 19:57	05:18 04:35 20:39	04:35 20:39 20:55	04:30 05:02 20:28	06:48 06:36 19:30	06:36 06:25 18:22	06:25 07:16 15:39	14:36-15:00/24 15:40	14:36-15:00/24 15:40	07:43 09:02-09:19/17 15:43
31	07:17 15:04-15:23/19 16:29	06:27 17:18 06:24	05:20 05:16 19:09 19:57	05:16 04:34 20:40	04:34 20:40 20:55	04:30 05:04 20:27	06:49 06:37 19:28	06:37 06:26 18:18	06:26 07:17 15:40	14:36-15:00/24 15:40	14:36-15:00/24 15:40	07:44 09:03-09:19/16 15:44
Potential sun hours	265	280	367	413	479	491	495	450	380	334	271	251
Sum of minutes with flicker	752	25	0	0	0	0	0	0	0	0	543	616

Project:

FW13

Printed/Page

2013-06-25 16:00 / 17

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 10 - VESTAS V90 2000 120.0 IO! hub: 125,0 m (TOT: 185,0 m) (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	07:40 15:45	07:16 16:30	06:25 17:19		06:18 19:10	07:06-07:08/2 19:58	05:16 19:58	06:24-06:32/8 20:43	04:31 20:55	05:05 20:25		05:52 19:26	06:27-06:37/10 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	06:40 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		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	05:10 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	04:34 20:53	05:12 20:17		06:00 19:15	06:46 18:09	06:37 16:08	07:24 15:36	
7	07:39 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	07:39 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	06:28-06:38/10 20:14	04:59 20:50	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	06:25-06:41/16 20:15	04:57 20:51	04:27 20:42	04:40 20:49	05:21 20:06	06:31-06:42/11 19:02	06:09 17:56	06:54-07:04/10 17:56	06:55 15:59	06:47 15:35	07:30 15:31
13	07:36 16:00	06:56 16:51	06:00 17:39		05:56 19:29	06:23-06:42/19 20:17	04:56 20:51	04:27 20:51	04:41 20:48	05:23 20:05	06:29-06:44/15 19:00	06:10 17:54	06:52-07:06/14 17:54	06:57 15:57	06:49 15:35	07:31 15:35
14	07:36 16:01	06:55 16:53	05:57 17:41		05:50 19:31	06:21-06:43/22 20:18	04:54 20:52	04:27 20:52	04:42 20:47	05:24 20:03	06:27-06:46/19 18:58	06:12 17:51	06:50-07:06/16 17:51	06:59 15:56	06:51 15:35	07:32 15:35
15	07:35 16:03	06:53 16:55	05:55 17:43		05:48 19:33	06:20-06:44/24 20:19	04:53 20:53	04:27 20:53	04:43 20:46	05:26 20:01	06:26-06:47/21 18:55	06:13 17:49	06:49-07:07/18 17:49	07:00 15:55	06:52 15:35	07:33 15:35
16	07:34 16:04	06:51 16:57	05:53 17:44		05:53 19:34	06:19-06:45/26 20:21	04:51 20:53	04:27 20:53	04:44 20:45	05:27 19:59	06:24-06:48/24 18:53	06:15 17:47	06:48-07:07/19 17:47	07:02 15:53	06:54 15:35	07:34 15:35
17	07:33 16:06	06:49 16:59	05:51 17:46		05:51 19:36	06:18-06:45/27 20:22	04:50 20:53	04:27 20:53	04:45 20:44	05:29 19:57	06:23-06:48/25 18:51	06:16 17:45	06:48-07:07/19 17:45	07:04 15:52	06:56 15:35	07:35 15:35
18	07:32 16:07	06:47 17:00	05:49 17:48		05:41 19:37	06:17-06:45/28 20:24	04:49 20:54	04:27 20:54	04:47 20:43	05:30 19:55	06:23-06:49/26 18:49	06:18 17:43	06:47-07:06/19 17:43	07:05 15:51	06:57 15:36	07:35 15:36
19	07:32 16:09	06:45 17:02	05:46 17:49		05:39 19:39	06:17-06:45/28 20:25	04:47 20:54	04:27 20:42	04:48 20:49	05:32 19:53	06:21-06:49/28 18:46	06:19 17:41	06:47-07:06/19 17:41	07:07 15:50	06:59 15:36	07:36 15:36
20	07:31 16:10	06:43 17:04	05:44 17:51	06:07-06:14/7	05:37 19:41	06:16-06:45/29 20:26	04:46 20:55	04:27 20:41	04:49 20:41	05:34 19:51	06:21-06:50/29 18:44	06:21 17:39	06:47-07:05/18 17:39	07:08 15:48	07:00 15:36	07:37 15:36
21	07:30 16:12	06:41 17:05	05:42 17:52	06:04-06:17/13	05:35 19:42	06:16-06:45/29 20:28	04:45 20:55	04:27 20:40	04:50 20:49	05:35 19:49	06:20-06:49/29 18:42	06:22 17:37	06:48-07:04/16 17:37	07:10 15:47	07:02 15:37	07:37 15:37
22	07:29 16:13	06:39 17:07	05:40 17:54	06:02-06:18/16	05:33 19:44	06:16-06:45/29 20:29	04:43 20:55	04:27 20:39	04:52 20:39	05:37 19:47	06:21-06:50/29 18:40	06:24 17:35	06:48-07:02/14 17:35	07:12 15:46	07:04 15:37	07:38 15:37
23	07:27 16:15	06:37 17:09	05:38 17:56	06:01-06:19/18	05:31 19:45	06:16-06:44/28 20:30	04:42 20:55	04:27 20:38	04:53 20:38	05:38 19:45	06:20-06:49/29 18:37	06:26 17:33	06:50-07:00/10 17:33	07:13 15:45	07:05 15:38	07:38 15:38
24	07:26 16:17	06:35 17:11	05:35 17:57	06:00-06:19/19	05:29 19:47	06:16-06:43/27 20:32	04:41 20:55	04:28 20:36	04:54 20:36	05:40 19:43	06:20-06:49/29 18:35	06:27 17:31	06:48-07:02/14 17:31	07:15 15:44	07:07 15:38	07:39 15:38
25	07:25 16:18	06:33 17:12	05:33 17:59	05:59-06:19/20	05:27 19:49	06:16-06:42/26 20:33	04:40 20:55	04:28 20:35	04:55 20:35	05:41 19:41	06:20-06:48/28 18:33	06:29 17:29	06:48-07:06/19 17:29	06:17 15:43	07:08 15:39	07:39 15:39
26	07:24 16:20	06:31 17:14	05:31 18:01	05:59-06:19/20	05:25 19:50	06:16-06:41/25 20:34	04:39 20:55	04:28 20:55	04:57 20:34	05:43 19:39	06:20-06:47/27 18:31	06:30 17:27	06:48-07:06/19 17:27	06:19 15:42	07:10 15:40	07:39 15:40
27	07:23 16:22	06:29 17:16	05:29 18:02	05:59-06:18/19	05:23 19:52	06:17-06:40/23 20:36	04:38 20:55	04:29 20:55	04:58 20:32	05:44 19:37	06:21-06:47/26 18:28	06:32 17:26	06:48-07:06/19 17:26	07:00 15:42	07:40 15:40	
28	07:21 16:23	06:27 17:18	05:27 18:04	05:59-06:17/18	05:21 19:53	06:19-06:39/20 20:37	04:37 20:55	04:29 20:55	05:00 20:31	05:46 19:35	06:21-06:45/24 18:26	06:33 17:26	06:48-07:06/19 17:26	07:13 15:41	07:40 15:41	
29	07:20 16:25		06:24 19:05	06:59-07:16/17	05:20 19:55	06:20-06:38/18 20:38	04:36 20:55	04:30 20:55	05:01 20:30	05:47 19:33	06:22-06:44/22 18:24	06:35 17:24	06:48-07:06/19 17:24	07:14 15:40	07:40 15:42	
30	07:19 16:27		06:22 19:07	07:00-07:15/15	05:18 19:57	06:21-06:35/14 20:39	04:35 20:55	04:30 20:55	05:02 20:28	05:49 19:30	06:23-06:42/19 18:22	06:36 17:22	06:48-07:06/19 17:22	07:16 15:39	07:40 15:43	
31	07:17 16:29		06:20 19:09	07:02-07:13/11			04:34 20:40		05:04 20:27	05:50 19:28	06:25-06:40/15		06:27 16:18		07:40 15:44	
Potential sun hours	265	281	367		413	479	491	495	450	380	334	271	251			
Sum of minutes with flicker	0	0	193		470	8	0	0	475	202	0	0	0			

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 18

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 11 - VESTAS V90 2000 120.0 IO! hub: 125,0 m (TOT: 185,0 m) (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	07:40 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	04:32 20:42	04:31 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 15:37
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 15:36
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	06:05 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 15:35
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 16:00	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 17:54	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 18:58	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 15:55	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 20:45	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	04:27 20:53	04:45 20:44	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 17:48	05:41 19:37	04:48 20:24	04:27 20:54	04:47 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 16:09	06:45 17:02	05:46 17:49	05:39 19:39	04:47 20:25	04:27 20:54	04:48 20:42	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	06:43 17:04	05:44 17:51	05:37 19:41	04:46 20:26	04:27 20:55	04:49 20:41	05:33 19:51	06:21 18:44	07:08 17:39	07:00 15:48	07:37 15:36
21	07:30 16:12	06:41 17:05	05:42 17:52	05:35 19:42	04:45 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 15:37
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	05:37 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 20:30	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 15:38
24	07:26 16:17	06:35 17:11	05:35 17:57	05:29 19:47	04:41 20:32	04:28 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	07:39 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	05:20 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 19:30	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 15:44
Potential sun hours	265	280	367	413	479	491	495	450	380	334	271	251
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 19

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 12 - VESTAS V90 2000 120.0 IO! hub: 125,0 m (TOT: 185,0 m) (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	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	04:32 20:42	04:31 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 15:37
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 15:36
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 15:52	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 15:35
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 16:00	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 17:54	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 18:58	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 15:55	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 20:45	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	04:27 20:53	04:45 20:44	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 17:48	05:41 19:37	04:48 20:24	04:27 20:54	04:47 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 16:09	06:45 17:02	05:46 17:49	05:39 19:39	04:47 20:25	04:27 20:54	04:48 20:42	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	06:43 17:04	05:44 17:51	05:37 19:41	04:46 20:26	04:27 20:55	04:49 20:41	05:33 19:51	06:21 18:44	07:08 17:39	07:00 15:48	07:37 15:36
21	07:30 16:12	06:41 17:05	05:42 17:52	05:35 19:42	04:45 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 15:37
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	04:52 20:39	05:37 19:47	06:24 18:40	07:12 17:35	07:04 15:46	07:38 15:37
23	07:27 16:15	06:37 17:09	05:38 17:56	05:31 19:45	04:42 20:30	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 15:38
24	07:26 16:17	06:35 17:11	05:35 17:57	05:29 19:47	04:41 20:32	04:28 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	06:19 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 20:36	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
28	07:21 16:23	06:27 17:18	05:27 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	05:20 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 19:30	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 15:44
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 20

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 13 - VESTAS V90 2000 120.0 IO! hub: 125,0 m (TOT: 185,0 m) (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	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 05:41-05:58/17 19:58	04:33 20:41	04:31 20:55	05:05 05:52-06:06/14 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 05:41-05:59/18 20:00	04:33 20:42	04:31 20:54	05:07 05:51-06:07/16 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 05:40-05:59/19 20:01	04:32 20:43	04:32 20:54	05:08 05:51-06:08/17 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 05:39-05:59/20 20:03	04:31 20:44	04:33 20:54	05:09 05:50-06:08/18 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 05:40-05:59/19 20:04	04:30 20:45	04:34 20:53	05:11 05:49-06:08/19 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 05:39-05:59/20 20:06	04:30 20:46	04:34 20:53	05:12 05:49-06:09/20 20:17	05:59 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 05:39-05:58/19 20:07	04:29 20:47	04:35 20:52	05:14 05:49-06:08/19 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 05:39-05:58/19 20:09	04:29 20:48	04:36 20:52	05:15 05:49-06:09/20 20:14	06:03 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 05:39-05:57/18 20:11	04:28 20:49	04:37 20:51	05:17 05:49-06:08/19 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 05:40-05:57/17 20:12	04:28 20:49	04:38 20:50	05:18 05:49-06:07/18 20:10	06:06 19:06	06:52 18:00	06:43 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 05:41-05:56/15 20:14	04:28 20:50	04:39 20:50	05:20 05:49-06:07/18 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 05:42-05:55/13 20:15	04:27 20:51	04:40 20:49	05:21 05:50-06:06/16 20:06	06:09 19:02	06:55 17:56	06:47 15:59	07:30 15:35
13	07:36 16:00	06:56 16:51	06:00 17:39	05:52 19:29	04:56 05:44-05:54/10 20:17	04:27 20:51	04:41 20:48	05:23 05:51-06:05/14 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	05:57 17:41	05:50 19:31	04:54 05:45-05:52/7 20:18	04:27 20:52	04:42 20:47	05:24 05:52-06:03/11 20:03	06:12 18:58	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 05:55-06:01/6 20:01	06:13 18:55	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	05:45 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 16:06	06:49 16:58	05:51 17:46	05:43 19:36	04:50 20:22	04:27 20:53	04:45 20:44	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 17:48	05:41 19:37	04:48 20:24	04:27 20:54	04:47 20:43	05:30 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	05:46 17:49	05:39 19:39	04:47 20:25	04:27 20:54	04:48 20:42	05:32 19:53	06:19 18:46	07:07 17:41	06:59 15:50	07:37 15:36
20	07:31 16:10	06:43 17:04	05:44 17:51	05:37 19:41	04:46 20:26	04:27 20:55	04:49 20:41	05:34 19:51	06:21 18:44	07:08 17:39	07:00 15:48	07:38 15:36
21	07:30 16:12	06:41 17:05	05:42 17:52	05:35 19:42	04:45 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 15:37
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	04:52 20:39	05:37 19:47	06:24 18:40	07:12 17:35	07:04 15:46	07:38 15:37
23	07:27 16:15	06:37 17:09	05:38 17:56	05:31 19:45	04:42 20:30	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 15:38
24	07:26 16:17	06:35 17:11	05:35 17:57	05:29 19:47	04:41 20:32	04:28 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 18:01	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 16:27	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 20:36	04:29 20:55	04:58 20:32	05:44 19:37	06:32 18:28	06:20 16:26	07:11 15:42	07:40 15:40
28	07:21 16:23	06:27 17:18	05:27 18:04	05:21 05:47-05:54/7 19:53	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
29	07:20 16:25	06:24 17:19	05:20 05:44-05:56/12 19:05	05:23 05:42-05:57/15 19:57	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 17:07	05:18 05:42-05:57/15 19:07	05:21 05:47-05:54/7 19:57	04:35 20:39	04:30 20:55	05:02 05:55-06:03/8 19:30	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 17:09	05:17 05:42-05:57/15 19:09	05:20 05:44-05:56/12 19:57	04:34 20:40	05:04 05:54-06:05/11 20:27	05:50 19:28	05:50 19:28	06:27 18:22	06:20 16:18	07:17 15:44	07:40 15:44
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Sum of minutes with flicker	0	0	0	34	231	0	19	245	0	0	0	0

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 21

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 14 - VESTAS V90 2000 120.0 IO! hub: 125,0 m (TOT: 185,0 m) (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	07:40 15:45	07:16 16:30	06:25 17:19	06:18 19:10	06:47-07:08/21 19:58	04:33 20:41
2	07:40 15:46	07:14 16:32	06:23 17:21	06:15 19:12	06:46-07:07/21 20:00	04:33 20:42
3	07:40 15:47	07:13 16:34	06:21 17:23	06:13 19:13	06:47-07:06/19 20:01	04:32 20:43
4	07:40 15:48	07:11 16:36	06:19 17:24	06:11 19:15	06:48-07:05/17 20:03	04:31 20:44
5	07:40 15:49	07:10 16:37	06:17 17:26	06:09 19:17	06:49-07:04/15 20:04	04:30 20:45
6	07:40 15:50	07:08 16:39	06:15 17:28	06:07 19:18	06:50-07:02/12 20:06	04:30 20:46
7	07:39 15:52	07:07 16:41	06:13 17:29	06:05 19:20	06:54-06:58/4 20:07	04:29 20:47
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
9	07:38 15:54	07:03 16:44	06:08 17:33	06:00 19:23	05:02 20:11	04:28 20:49
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
11	07:37 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	07:36 16:00	06:56 16:51	06:00 17:39	05:52 19:29	04:56 20:16	04:27 20:51
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
15	07:35 16:03	06:53 16:55	05:55 17:43	05:47 19:33	04:53 20:19	04:27 20:53
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
17	07:33 16:06	06:49 16:59	05:51 17:46	05:43 19:36	04:50 20:22	04:27 20:53
18	07:32 16:07	06:47 17:00	05:49 17:48	05:41 19:37	04:48 20:24	04:27 20:54
19	07:32 16:09	06:45 17:02	05:46 17:49	05:39 19:39	04:47 20:25	04:27 20:54
20	07:31 16:10	06:43 17:04	05:44 17:51	05:37 19:41	04:46 20:26	04:27 20:55
21	07:30 16:12	06:41 17:05	05:42 17:52	05:35 19:42	04:45 20:28	04:27 20:55
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
23	07:27 16:15	06:37 17:09	05:38 17:56	05:31 19:45	04:42 20:30	04:27 20:55
24	07:26 16:17	06:35 17:11	05:35 17:57	05:29 19:47	04:41 20:32	04:28 20:55
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
26	07:24 16:20	06:31 17:14	05:31 18:01	05:25 19:50	04:39 20:34	04:28 20:55
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
28	07:21 16:23	06:27 17:18	05:27 18:04	05:21 19:53	04:37 20:37	04:29 20:55
29	07:20 16:25		06:24 19:05	05:20 19:55	04:36 20:38	04:30 20:55
30	07:19 16:27		06:22 19:07	05:18 19:57	04:35 20:39	04:30 20:55
31	07:17 16:29		06:20 19:09	06:47-07:08/21	04:34 20:40	05:18-05:49/31
Potential sun hours	265	281	367	413	479	491
Sum of minutes with flicker	0	0	115	109	148	915

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 22

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 14 - VESTAS V90 2000 120.0 IO! hub: 125,0 m (TOT: 185,0 m) (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 05:18-05:48/30	05:05	05:52	06:38	06:29	07:17
	20:55	20:25	19:26	18:20	16:16	15:39
2	04:31 05:18-05:49/31	05:07	05:53	06:39	06:30	07:18
	20:54	20:24	19:24	18:17	16:15	15:38
3	04:32 05:18-05:48/30	05:08	05:55	06:41	06:32	07:20
	20:54	20:22	19:22	18:15	16:13	15:37
4	04:33 05:19-05:49/30	05:09	05:56	06:43	06:34	07:21
	20:54	20:20	19:20	18:13	16:11	15:37
5	04:34 05:19-05:49/30	05:11	05:58 06:50-06:54/4	06:44	06:35	07:22
	20:53	20:19	19:17	18:11	16:10	15:37
6	04:34 05:20-05:49/29	05:12	05:59 06:46-06:58/12	06:46	06:37	07:24
	20:53	20:17	19:15	18:09	16:08	15:36
7	04:35 05:20-05:49/29	05:14	06:01 06:44-06:59/15	06:47	06:39	07:25
	20:52	20:15	19:13	18:06	16:06	15:36
8	04:36 05:20-05:48/28	05:15	06:03 06:42-06:59/17	06:49	06:41	07:26
	20:52	20:14	19:11	18:04	16:05	15:35
9	04:37 05:21-05:48/27	05:17	06:04 06:41-07:00/19	06:51	06:42	07:27
	20:51	20:12	19:09	18:02	16:03	15:35
10	04:38 05:21-05:48/27	05:18	06:06 06:40-07:00/20	06:52	06:44	07:28
	20:50	20:10	19:06	18:00	16:02	15:35
11	04:39 05:22-05:48/26	05:20	06:07 06:40-07:00/20	06:54	06:46	07:29
	20:50	20:08	19:04	17:58	16:00	15:35
12	04:40 05:23-05:48/25	05:21	06:09 06:39-07:00/21	06:55	06:47	07:30
	20:49	20:06	19:02	17:56	15:59	15:35
13	04:41 05:23-05:47/24	05:23	06:10 06:39-07:00/21	06:57	06:49	07:31
	20:48	20:05	19:00	17:54	15:57	15:35
14	04:42 05:24-05:47/23	05:24	06:12 06:39-06:58/19	06:59	06:51	07:32
	20:47	20:03	18:58	17:51	15:56	15:35
15	04:43 05:25-05:46/21	05:26	06:13 06:39-06:58/19	07:00	06:52	07:33
	20:46	20:01	18:55	17:49	15:55	15:35
16	04:44 05:26-05:45/19	05:27	06:15 06:39-06:56/17	07:02	06:54	07:34
	20:45	19:59	18:53	17:47	15:53	15:35
17	04:45 05:27-05:44/17	05:29	06:16 06:41-06:55/14	07:04	06:56	07:35
	20:44	19:57	18:51	17:45	15:52	15:35
18	04:47 05:28-05:43/15	05:30	06:18 06:43-06:51/8	07:05	06:57	07:35
	20:43	19:55	18:49	17:43	15:51	15:36
19	04:48 05:30-05:41/11	05:32	06:19	07:07	06:59	07:36
	20:42	19:53	18:46	17:41	15:50	15:36
20	04:49 05:33-05:39/6	05:34	06:21	07:08	07:00	07:37
	20:41	19:51	18:44	17:39	15:48	15:36
21	04:50	05:35	06:22	07:10	07:02	07:37
	20:40	19:49	18:42	17:37	15:47	15:37
22	04:52	05:37	06:24	07:12	07:04	07:38
	20:39	19:47	18:40	17:35	15:46	15:37
23	04:53	05:38	06:25	07:13	07:05	07:38
	20:38	19:45	18:37	17:33	15:45	15:38
24	04:54	05:40	06:27	07:15	07:07	07:39
	20:36	19:43	18:35	17:31	15:44	15:38
25	04:55	05:41	06:29	06:17	07:08	07:39
	20:35	19:41	18:33	16:29	15:43	15:39
26	04:57	05:43	06:30	06:18	07:10	07:39
	20:34	19:39	18:31	16:27	15:42	15:39
27	04:58	05:44	06:32	06:20	07:11	07:40
	20:32	19:37	18:28	16:26	15:42	15:40
28	05:00	05:46	06:33	06:22	07:13	07:40
	20:31	19:35	18:26	16:24	15:41	15:41
29	05:01	05:47	06:35	06:24	07:14	07:40
	20:30	19:33	18:24	16:22	15:40	15:42
30	05:02	05:49	06:36	06:25	07:16	07:40
	20:28	19:30	18:22	16:20	15:39	15:43
31	05:04	05:50		06:27		07:40
	20:27	19:28		16:18		15:44
Potential sun hours	495	450	380	334	271	251
Sum of minutes with flicker	478	0	226	0	0	0

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 23

Licensed user:

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 per WTG**WTG: 15 - VESTAS V90 2000 120.0 IO! hub: 125,0 m (TOT: 185,0 m) (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	08:44-09:00/16	12:54-13:49/55	07:16	13:13-13:53/40	06:25	16:21-16:41/20	06:18	05:16	04:33		
	15:45	10:05-10:32/27		16:30		17:19		19:10	19:58	20:41		
2	07:40	08:46-09:00/14	12:55-13:50/55	07:15	13:15-13:51/36	06:23	16:22-16:40/18	06:16	05:14	04:33		
	15:46	10:06-10:32/26		16:32		17:21		19:12	20:00	20:42		
3	07:40	08:47-09:00/13	12:55-13:51/56	07:13	13:17-13:50/33	06:21	16:23-16:38/15	06:13	05:12	04:32		
	15:47	10:07-10:32/25		16:34		17:23		19:13	20:01	20:43		
4	07:40	08:48-09:00/12	12:56-13:52/56	07:12	13:19-13:48/29	06:19	16:24-16:35/11	06:11	05:10	04:31	05:08-05:11/3	
	15:48	10:09-10:32/23		16:36		17:24		19:15	20:03	20:44		
5	07:40	08:49-08:59/10	12:56-13:52/56	07:10	13:23-13:47/24	06:17		06:09	05:09	04:30	05:06-05:13/7	
	15:49	10:09-10:31/22		16:37		17:26		19:17	20:04	20:45		
6	07:40	08:51-08:59/8	12:57-13:52/55	07:08	13:26-13:43/17	06:15		06:07	05:07	04:30	05:05-05:15/10	
	15:50	10:11-10:31/20		16:39		17:28		19:18	20:06	20:46		
7	07:39	08:53-08:57/4	12:56-13:52/56	07:07		06:13		06:05	05:05	04:29	05:04-05:15/11	
	15:52	10:12-10:30/18		16:41		17:29		19:20	20:08	20:47		
8	07:39	10:15-10:29/14		07:05		06:11		06:02	05:04	04:29	05:04-05:16/12	
	15:53	12:57-13:53/56		16:43		17:31		19:21	20:09	20:48		
9	07:39	10:17-10:27/10		07:03		06:08		06:00	05:02	04:28	05:04-05:17/13	
	15:54	12:57-13:53/56		16:44		17:33		19:23	20:11	20:49		
10	07:38	12:58-13:55/7		07:02		06:06		05:58	05:00	04:28	05:03-05:17/14	
	15:55			16:46		17:34		19:25	20:12	20:50		
11	07:38	12:58-13:55/7		07:00		06:04		05:56	04:59	04:28	05:03-05:18/15	
	15:57			16:48		17:36		19:26	20:14	20:50		
12	07:37	12:58-13:55/7		06:58		06:02		05:54	04:57	04:27	05:03-05:19/16	
	15:58			16:50		17:38		19:28	20:15	20:51		
13	07:36	12:59-13:55/6		06:56		06:00		05:52	04:56	04:27	05:03-05:19/16	
	16:00			16:52		17:39		19:30	20:17	20:52		
14	07:36	12:59-13:55/6		06:55		05:58		05:50	04:54	04:27	05:04-05:20/16	
	16:01			16:53		17:41		19:31	20:18	20:52		
15	07:35	13:00-13:56/6		06:53		05:55		05:48	04:53	04:27	05:04-05:20/16	
	16:03			16:55		17:43		19:33	20:20	20:53		
16	07:34	13:01-13:57/6		06:51		05:53		05:45	04:51	04:27	05:04-05:21/17	
	16:04			16:57		17:44		19:34	20:21	20:53		
17	07:33	13:01-13:57/6		06:49		05:51		05:43	04:50	04:27	05:04-05:21/17	
	16:06			16:59		17:46		19:36	20:22	20:54		
18	07:33	13:02-13:57/55		06:47	16:30-16:34/4	05:49		05:41	04:48	04:27	05:04-05:21/17	
	16:07			17:00		17:48		19:38	20:24	20:54		
19	07:32	13:02-13:57/55		06:45	16:26-16:36/10	05:47		05:39	04:47	04:27	05:04-05:22/18	
	16:09			17:02		17:49		19:39	20:25	20:54		
20	07:31	13:02-13:56/54		06:43	16:24-16:38/14	05:44		05:37	04:46	04:27	05:04-05:22/18	
	16:10			17:04		17:51		19:41	20:27	20:55		
21	07:30	13:03-13:57/54		06:41	16:23-16:40/17	05:42		05:35	04:45	04:27	05:04-05:22/18	
	16:12			17:06		17:52		19:42	20:28	20:55		
22	07:29	13:03-13:57/54		06:40	16:22-16:42/20	05:40		05:33	04:43	04:27	05:04-05:22/18	
	16:13			17:07		17:54		19:44	20:29	20:55		
23	07:28	13:04-13:57/53		06:38	16:20-16:42/22	05:38		05:31	04:42	04:27	05:05-05:23/18	
	16:15			17:09		17:56		19:46	20:31	20:55		
24	07:26	13:05-13:57/52		06:36	16:20-16:42/22	05:35		05:29	04:41	04:28	05:05-05:22/17	
	16:17			17:11		17:57		19:47	20:32	20:55		
25	07:25	13:05-13:56/51		06:34	16:20-16:42/22	05:33		05:27	04:40	04:28	05:05-05:22/17	
	16:18			17:12		17:59		19:49	20:33	20:55		
26	07:24	13:07-13:56/49		06:32	16:20-16:42/22	05:31		05:25	04:39	04:28	05:06-05:23/17	
	16:20			17:14		18:01		19:50	20:34	20:55		
27	07:23	13:08-13:57/49		06:29	16:20-16:42/22	05:29		05:23	04:38	04:29	05:06-05:23/17	
	16:22			17:16		18:02		19:52	20:36	20:55		
28	07:21	13:08-13:56/48		06:27	16:20-16:42/22	05:27		05:21	04:37	04:29	05:07-05:23/16	
	16:23			17:18		18:04		19:53	20:37	20:55		
29	07:20	13:10-13:55/45				06:24		05:20	04:36	04:30	05:06-05:23/17	
	16:25					19:05		19:55	20:38	20:55		
30	07:19	13:10-13:54/44				06:22		05:18	04:35	04:30	05:07-05:23/16	
	16:27					19:07		19:57	20:39	20:55		
31	07:17	13:12-13:54/42				06:20			04:34			
	16:29					19:09			20:40			
Potential sun hours	265			280		367		413	479	491		
Sum of minutes with flicker	1919			376		64		0	0	407		

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 24

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 15 - VESTAS V90 2000 120.0 IO! hub: 125,0 m (TOT: 185,0 m) (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 05:07-05:22/15 20:55	05:05 20:25	05:52 19:26	06:38 18:20	06:29 16:16	07:17 12:40-13:37/57 15:39
2	04:31 05:08-05:23/15 20:55	05:07 20:24	05:53 19:24	06:40 18:17	06:30 16:15	07:19 12:40-13:37/57 15:38
3	04:32 05:09-05:23/14 20:54	05:08 20:22	05:55 19:22	06:41 18:15	06:32 16:13	07:20 10:01-10:11/10 15:37 12:41-13:38/57
4	04:33 05:09-05:22/13 20:54	05:10 20:20	05:56 19:20	06:43 18:13	06:34 13:01-13:07/6 16:11	07:21 09:59-10:13/14 15:37 12:41-13:38/57
5	04:34 05:10-05:22/12 20:53	05:11 20:19	05:58 19:18	06:44 18:11	06:36 12:55-13:13/18 16:10	07:22 08:39-08:41/2 12:41-13:38/57 15:37 09:57-10:15/18
6	04:34 05:11-05:21/10 20:53	05:12 20:17	06:00 19:15	06:46 18:09	06:37 12:52-13:17/25 16:08	07:24 08:37-08:45/8 12:43-13:39/56 15:36 09:57-10:17/20
7	04:35 05:13-05:21/8 20:52	05:14 20:15	06:01 19:13	06:47 18:06	06:39 12:50-13:19/29 16:06	07:25 08:36-08:46/10 12:43-13:39/56 15:36 09:57-10:18/21
8	04:36 05:13-05:19/6 20:52	05:15 20:14	06:03 19:11	06:49 18:04	06:41 12:47-13:20/33 16:05	07:26 08:35-08:47/12 12:43-13:39/56 15:35 09:56-10:19/23
9	04:37 20:51	05:17 20:12	06:04 19:09	06:51 17:01-17:08/7 18:02	06:42 12:45-13:22/37 16:03	07:27 08:35-08:48/13 12:43-13:39/56 15:35 09:56-10:20/24
10	04:38 20:51	05:18 20:10	06:06 19:07	06:52 16:58-17:11/13 18:00	06:44 12:44-13:24/40 16:02	07:28 08:35-08:49/14 12:44-13:39/55 15:35 09:55-10:21/26
11	04:39 20:50	05:20 20:08	06:07 19:04	06:54 16:57-17:13/16 17:58	06:46 12:43-13:25/42 16:00	07:29 08:36-08:51/15 12:44-13:39/55 15:35 09:55-10:22/27
12	04:40 20:49	05:21 20:07	06:09 19:02	06:55 16:54-17:13/19 17:56	06:47 12:42-13:26/44 15:59	07:30 08:36-08:52/16 12:45-13:40/55 15:35 09:56-10:24/28
13	04:41 20:48	05:23 20:05	06:10 19:00	06:57 16:54-17:14/20 17:54	06:49 12:42-13:27/45 15:57	07:31 08:36-08:53/17 12:45-13:40/55 15:35 09:55-10:24/29
14	04:42 20:47	05:24 20:03	06:12 18:58	06:59 16:53-17:15/22 17:52	06:51 12:40-13:27/47 15:56	07:32 08:35-08:53/18 12:46-13:41/55 15:35 09:56-10:24/28
15	04:43 20:47	05:26 20:01	06:13 18:55	07:00 16:52-17:14/22 17:49	06:52 12:40-13:28/48 15:55	07:33 08:35-08:53/18 12:47-13:41/54 15:35 09:56-10:25/29
16	04:44 20:46	05:27 19:59	06:15 18:53	07:02 16:52-17:15/23 17:47	06:54 12:39-13:29/50 15:53	07:34 08:36-08:54/18 12:47-13:42/55 15:35 09:56-10:26/30
17	04:45 20:45	05:29 19:57	06:16 18:51	07:04 16:52-17:15/23 17:45	06:56 12:39-13:30/51 15:52	07:35 08:36-08:55/19 12:48-13:42/54 15:35 09:57-10:27/30
18	04:47 20:44	05:30 19:55	06:18 18:49	07:05 16:51-17:13/22 17:43	06:57 12:39-13:31/52 15:51	07:35 08:37-08:56/19 12:49-13:43/54 15:36 09:57-10:28/31
19	04:48 20:42	05:32 19:53	06:19 18:46	07:07 16:52-17:13/21 17:41	06:59 12:38-13:31/53 15:50	07:36 08:37-08:56/19 12:49-13:43/54 15:36 09:57-10:28/31
20	04:49 20:41	05:34 19:51	06:21 18:44	07:09 16:53-17:11/18 17:39	07:01 12:38-13:32/54 15:48	07:37 08:38-08:57/19 12:49-13:44/55 15:36 09:58-10:29/31
21	04:50 20:40	05:35 19:49	06:22 18:42	07:10 16:54-17:10/16 17:37	07:02 12:39-13:33/54 15:47	07:37 08:37-08:57/20 12:49-13:44/55 15:37 09:58-10:29/31
22	04:52 20:39	05:37 19:47	06:24 18:40	07:12 16:54-17:07/13 17:35	07:04 12:38-13:32/54 15:46	07:38 08:38-08:58/20 12:50-13:45/55 15:37 09:59-10:30/31
23	04:53 20:38	05:38 19:45	06:26 18:37	07:14 16:57-17:05/8 17:33	07:05 12:38-13:33/55 15:45	07:38 08:39-08:58/19 12:50-13:45/55 15:38 09:59-10:30/31
24	04:54 20:37	05:40 19:43	06:27 18:35	07:15 17:31	07:07 12:39-13:34/55 15:44	07:39 08:40-08:59/19 12:52-13:46/54 15:38 10:00-10:31/31
25	04:55 20:35	05:41 19:41	06:29 18:33	06:17 16:29	07:08 12:38-13:34/56 15:43	07:39 08:40-08:59/19 12:52-13:46/54 15:39 10:00-10:31/31
26	04:57 20:34	05:43 19:39	06:30 18:31	06:19 16:27	07:10 12:39-13:35/56 15:42	07:40 08:40-08:59/19 12:52-13:46/54 15:39 10:01-10:31/30
27	04:58 20:33	05:44 19:37	06:32 18:29	06:20 16:26	07:11 12:39-13:35/56 15:42	07:40 08:41-08:59/18 12:52-13:47/55 15:40 10:01-10:31/30
28	05:00 20:31	05:46 19:35	06:33 18:26	06:22 16:24	07:13 12:39-13:35/56 15:41	07:40 08:41-08:59/18 12:52-13:47/55 15:41 10:02-10:31/29
29	05:01 20:30	05:47 19:33	06:35 18:24	06:24 16:22	07:14 12:40-13:36/56 15:40	07:40 08:43-09:00/17 12:53-13:47/54 15:42 10:02-10:31/29
30	05:02 20:28	05:49 19:30	06:36 18:22	06:25 16:20	07:16 12:40-13:36/56 15:39	07:40 08:43-09:01/18 12:53-13:48/55 15:43 10:03-10:32/29
31	05:04 20:27	05:50 19:28	06:37 16:18	06:27 16:18	15:44	07:40 08:43-09:00/17 12:54-13:49/55 15:44 10:04-10:32/28
Potential sun hours	495	450	380	334	271	251
Sum of minutes with flicker	93	0	0	263	1228	2932

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 25

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 16 - VESTAS V90 2000 120.0 IO! hub: 125,0 m (TOT: 185,0 m) (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	07:40 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	04:31 20:54	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	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	06:36 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	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	07:39 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	06:11 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 15:35
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 16:00	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 17:54	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 18:58	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	05:48 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 15:55	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 20:45	05:27 19:59	06:15 18:53	07:02 17:47	06:54 15:53	07:34 15:35
17	07:33 16:06	06:49 16:59	05:51 17:46	05:43 19:36	04:50 20:22	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	07:32 16:07	06:47 17:00	05:49 17:48	05:41 19:37	04:48 20:24	04:27 20:54	04:47 20:43	05:30 19:55	06:18 18:49	07:05 17:43	06:57 15:51	07:35 15:36
19	07:32 16:09	06:45 17:02	05:46 17:49	05:39 19:39	04:47 20:25	04:27 20:54	04:48 20:42	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	06:43 17:04	05:44 17:51	05:37 19:41	04:46 20:27	04:27 20:55	04:49 20:41	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	06:41 17:05	05:42 17:52	05:35 19:42	04:45 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 15:37
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	04:52 20:39	05:37 19:47	06:24 18:40	07:12 17:35	07:04 15:46	07:38 15:37
23	07:27 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	07:14 17:33	07:05 15:45	07:38 15:38
24	07:26 16:17	06:35 17:11	05:35 17:57	05:29 19:47	04:41 20:32	04:28 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 18:01	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 16:27	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 16:26	07:11 15:42	07:40 15:40
28	07:21 16:23	06:27 17:18	05:27 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	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 19:30	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 15:44
Potential sun hours												
Sum of minutes with flicker												

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker

Project:

FW13

Printed/Page

2013-06-25 16:00 / 26

Licensed user:

Biuro Projektow i Wdrozen 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 per WTG**WTG: 17 - VESTAS V90 2000 120.0 IO! hub: 125,0 m (TOT: 185,0 m) (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	07:40 15:45	07:16 16:30	06:25 17:19	06:18 19:10	05:16 05:51-06:13/22 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 05:51-06:13/22 20:00	04:33 20:42	04:31 20:54	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 05:51-06:12/21 20:01	04:32 20:43	04:32 20:54	05:08 06:08-06:15/7 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 05:51-06:12/21 20:03	04:31 20:44	04:33 20:54	05:10 06:05-06:17/12 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 05:52-06:12/20 20:04	04:30 20:45	04:34 20:53	05:11 06:03-06:18/15 20:19	05:58 19:17	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 05:52-06:10/18 20:06	04:30 20:46	04:34 20:53	05:12 06:03-06:20/17 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 05:53-06:09/16 20:07	04:29 20:47	04:35 20:52	05:14 06:02-06:20/18 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	06:11 17:31	06:02 19:21	05:04 05:54-06:08/14 20:09	04:29 20:48	04:36 20:52	05:15 06:01-06:21/20 20:14	06:03 19:11	06:49 18:04	06:41 16:05	07:26 15:36
9	07:39 15:54	07:03 16:44	06:08 17:33	06:00 19:23	05:02 05:55-06:06/11 20:11	04:28 20:49	04:37 20:51	05:17 06:00-06:21/21 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 05:59-06:04/5 20:12	04:28 20:49	04:38 20:50	05:18 06:00-06:21/21 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 06:00-06:22/22 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 05:59-06:21/22 20:06	06:09 19:02	06:55 17:56	06:47 15:59	07:30 15:35
13	07:36 16:00	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 06:00-06:21/21 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	05:57 17:41	05:50 19:31	04:54 20:18	04:27 20:52	04:42 20:47	05:24 05:59-06:21/22 20:03	06:12 18:58	06:59 17:51	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 20:19	04:27 20:53	04:43 20:46	05:26 06:00-06:21/21 20:01	06:13 18:55	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	05:45 19:34	04:51 20:21	04:27 20:53	04:44 20:45	05:27 06:00-06:19/19 19:59	06:15 18:53	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	04:45 20:45	05:29 06:00-06:18/18 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 17:48	05:41 19:37	04:48 20:24	04:27 20:54	04:47 20:43	05:30 06:02-06:17/15 19:55	06:18 18:49	07:05 17:43	06:57 15:51	07:35 15:36
19	07:32 16:09	06:45 17:02	05:46 17:49	05:39 19:39	04:47 20:25	04:27 20:54	04:48 20:42	05:32 06:03-06:14/11 19:53	06:19 18:46	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 19:41	04:46 20:27	04:27 20:55	04:49 20:41	05:34 06:07-06:11/4 19:51	06:21 18:44	07:09 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	04:45 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 15:37
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	04:52 20:39	05:37 19:47	06:24 18:40	07:12 17:35	07:04 15:46	07:38 15:37
23	07:27 16:15	06:37 17:09	05:38 17:56	05:31 06:00-06:07/7 19:45	04:42 20:31	04:27 20:55	04:53 20:38	05:38 19:45	06:26 18:37	07:14 17:33	07:05 15:45	07:38 15:38
24	07:26 16:17	06:35 17:11	05:35 17:57	05:29 05:57-06:09/12 19:47	04:41 20:32	04:28 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 05:55-06:11/16 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 18:01	05:25 05:54-06:11/17 19:50	04:39 20:34	04:28 20:55	04:57 20:34	05:43 19:39	06:30 18:31	06:19 16:27	07:10 15:42	07:40 15:39
27	07:23 16:22	06:29 17:16	05:29 18:02	05:23 05:52-06:12/20 19:52	04:38 20:36	04:29 20:55	04:58 20:32	05:44 19:37	06:32 18:28	06:20 16:26	07:11 15:42	07:40 15:40
28	07:21 16:23	06:27 17:18	05:27 18:04	05:21 05:52-06:13/21 19:53	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
29	07:20 16:25		06:24 19:05	05:20 05:52-06:13/21 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 05:51-06:13/22 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 15:44
Potential sun hours	265	281	367	413	479	491	495	450	380	334	271	251
Sum of minutes with flicker	0	0	0	136	170	0	0	306	0	0	0	0

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	Last time (hh:mm) with flicker	Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker	Last time (hh:mm) with flicker	Minutes with flicker