

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 1

Licensed user:

ENVO

ul.Sikorskiego 25/20

PL-62 030 Lubon

0048 662 643 300

ENVO / envno-i.nowicki@wp.pl

Calculated:

2015-03-07 11:38/2.9.285

SHADOW - Main Result

Calculation: Analiza migotania cienia - wariant alternatywny

Assumptions for shadow calculations

Maximum distance for influence

Calculate only when more than 20 % of sun is covered by the blade

Please look in WTG table

Minimum sun height over horizon for influence 3 °

Day step for calculation 1 days

Time step for calculation 1 minutes

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker

calculation so non visible WTG do not contribute to calculated flicker

values. A WTG will be visible if it is visible from any part of the receiver

window. The ZVI calculation is based on the following assumptions:

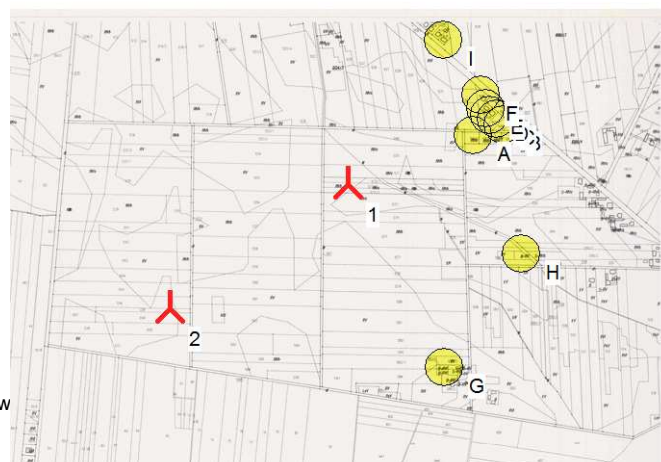
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_0.w

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10,0 m

Topographic shadow included in calculation



Scale 1:20 000

Y New WTG

● Shadow receptor

WTGs

Geo [deg,min,sec]-WGS84	Longitude	Latitude	Z	Row data/Description	WTG type				Shadow data			
					Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM [RPM]
1	18°15'49,48" East	51°20'08,14" North	162,0	E1	No	ENERCON	E-58/10.58-1 000	1 000	58,0	67,0	1 347	24,0
2	18°15'25,27" East	51°19'57,30" North	164,6	E2	No	ENERCON	E-58/10.58-1 000	1 000	60,0	89,0	1 346	24,0

Shadow receptor-Input

No.	Name	Geo [deg,min,sec]-WGS84		Z	Width [m]	Height [m]	Height a.g.l. [m]	Degrees from south cw [°]	Slope of window [°]	Direction mode
		Longitude	Latitude							
A	SH1	18°16'06,63" East	51°20'12,37" North	163,0	1,0	1,0	1,0	0,0	90,0	"Green house mode"
B	SH2	18°16'10,73" East	51°20'13,37" North	163,4	1,0	1,0	1,0	0,0	90,0	"Green house mode"
C	SH3	18°16'09,72" East	51°20'13,85" North	163,1	1,0	1,0	1,0	0,0	90,0	"Green house mode"
D	SH4	18°16'08,88" East	51°20'14,17" North	163,0	1,0	1,0	1,0	0,0	90,0	"Green house mode"
E	SH5	18°16'08,29" East	51°20'14,73" North	163,0	1,0	1,0	1,0	0,0	90,0	"Green house mode"
F	SH6	18°16'07,64" East	51°20'15,84" North	164,4	1,0	1,0	1,0	0,0	90,0	"Green house mode"
G	Sh7	18°16'02,95" East	51°19'52,55" North	163,7	1,0	1,0	1,0	0,0	90,0	"Green house mode"
H	SH8	18°16'13,43" East	51°20'02,27" North	162,0	1,0	1,0	1,0	0,0	90,0	"Green house mode"
I	SH9	18°16'02,48" East	51°20'20,54" North	166,5	1,0	1,0	1,0	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case

No.	Name	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	SH1	28:10	71	0:37
B	SH2	19:49	61	0:31
C	SH3	21:02	62	0:31
D	SH4	22:33	67	0:32
E	SH5	23:05	63	0:33
F	SH6	22:12	56	0:33
G	Sh7	7:09	28	0:20
H	SH8	27:10	84	0:29
I	SH9	33:09	58	0:42

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 2

Licensed user:

ENVO

ul.Sikorskiego 25/20

PL-62 030 Lubon

0048 662 643 300

ENVO / envo-i.nowicki@wp.pl

Calculated:

2015-03-07 11:38/2.9.285

SHADOW - Main Result**Calculation:** Analiza migotania cienia - wariant alternatywny

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]	Expected [h/year]
1	E1	106:59	
2	E2	35:00	

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 3

Licensed user:

ENVO
ul.Sikorskiego 25/20
PL-62 030 Lubon
0048 662 643 300
ENVO / envo-i.nowicki@wp.pl
Calculated:
2015-03-07 11:38/2.9.285

SHADOW - Calendar

Calculation: Analiza migotania cienia - wariant alternatywny **Shadow receptor:** A - SH1

Assumptions for shadow calculations

Reference year for calendar

2015

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:51	07:26	06:34	16:12 (1) 06:25	05:21	04:36	04:32	05:07	05:56	06:43	16:47 (1) 06:36	15:32 (2) 07:26		
2	15:47	16:33	17:23	29 16:41 (1) 19:16	20:06	20:51	21:05	20:36	19:35	18:27	33 17:20 (1) 16:22	15 15:47 (2) 15:42		
3	07:51	07:24	06:32	16:11 (1) 06:23	05:19	04:35	04:33	05:09	05:57	06:45	16:45 (1) 06:37	15:33 (2) 07:27		
4	15:48	16:35	17:25	31 16:42 (1) 19:18	20:07	20:52	21:05	20:34	19:33	18:25	35 17:20 (1) 16:20	14 15:47 (2) 15:41		
5	07:50	07:23	06:30	16:10 (1) 06:20	05:17	04:35	04:34	05:10	05:59	06:47	16:45 (1) 06:39	13 15:33 (2) 07:29		
6	15:49	16:36	17:27	33 16:43 (1) 19:19	20:09	20:53	21:05	20:32	19:31	18:23	35 17:20 (1) 16:18	13 15:46 (2) 15:41		
7	07:50	07:21	06:28	16:08 (1) 06:18	05:16	04:34	04:34	05:12	06:00	06:48	16:44 (1) 06:41	10 15:35 (2) 07:30		
8	15:50	16:38	17:28	35 16:43 (1) 19:21	20:11	20:54	21:04	20:31	19:29	18:20	37 17:21 (1) 16:17	10 15:45 (2) 15:40		
9	07:50	07:20	06:26	16:07 (1) 06:16	05:14	04:33	04:35	05:13	06:02	06:50	16:43 (1) 06:43	7 15:36 (2) 07:31		
10	15:51	16:40	17:30	36 16:43 (1) 19:23	20:12	20:55	21:04	20:29	19:26	18:18	37 17:20 (1) 16:15	7 15:43 (2) 15:39		
11	07:50	07:18	06:23	16:07 (1) 06:14	05:12	04:33	04:36	05:15	06:04	06:52	16:43 (1) 06:44	07:33		
12	15:52	16:42	17:32	37 16:44 (1) 19:24	20:14	20:56	21:04	20:27	19:24	18:16	37 17:20 (1) 16:13	15:39		
13	07:49	07:16	16:07 (2) 06:21	16:07 (1) 06:11	05:10	04:32	04:37	05:16	06:05	06:53	16:43 (1) 06:46	07:34		
14	15:53	16:44	5 16:12 (2) 17:34	37 16:44 (1) 19:26	20:15	20:57	21:03	20:26	19:22	18:14	37 17:20 (1) 16:11	15:39		
15	07:49	07:15	16:05 (2) 06:19	16:06 (1) 06:09	05:08	04:31	04:38	05:18	06:07	06:55	16:43 (1) 06:48	07:35		
16	15:54	16:45	10 16:15 (2) 17:35	37 16:43 (1) 19:28	20:17	20:58	21:03	20:24	19:20	18:11	37 17:20 (1) 16:10	15:38		
17	07:49	07:13	16:04 (2) 06:17	16:06 (1) 06:07	05:07	04:31	04:39	05:19	06:08	06:56	16:42 (1) 06:50	07:36		
18	15:56	16:47	12 16:16 (2) 17:37	37 16:43 (1) 19:29	20:19	20:59	21:02	20:22	19:17	18:09	37 17:19 (1) 16:08	15:38		
19	07:48	07:11	16:03 (2) 06:15	16:06 (1) 06:05	05:05	04:30	04:40	05:21	06:10	06:58	16:42 (1) 06:51	07:37		
20	15:57	16:49	14 16:17 (2) 17:39	37 16:43 (1) 19:31	20:20	20:59	21:01	20:20	19:15	18:07	36 17:18 (1) 16:07	15:38		
21	07:48	07:09	16:03 (2) 06:12	16:06 (1) 06:03	05:03	04:30	04:41	05:23	06:12	07:00	16:43 (1) 06:53	07:38		
22	15:58	16:51	15 16:18 (2) 17:41	37 16:43 (1) 19:33	20:22	21:00	21:01	20:18	19:13	18:05	35 17:18 (1) 16:05	15:38		
23	07:47	07:08	16:02 (2) 06:10	16:06 (1) 06:00	05:02	04:30	04:42	05:24	06:13	07:01	16:43 (1) 06:55	07:40		
24	16:00	16:53	16 16:18 (2) 17:42	36 16:42 (1) 19:34	20:23	21:01	21:00	20:16	19:11	18:03	33 17:16 (1) 16:03	15:37		
25	07:47	07:06	16:02 (2) 06:08	16:07 (1) 05:58	05:00	04:29	04:43	05:26	06:15	07:03	16:44 (1) 06:57	07:41		
26	16:01	16:54	16 16:18 (2) 17:44	34 16:41 (1) 19:36	20:25	21:01	20:59	20:15	19:08	18:00	31 17:15 (1) 16:02	15:37		
27	07:46	07:04	16:02 (2) 06:06	16:07 (1) 05:56	04:58	04:29	04:44	05:27	06:16	07:05	16:45 (1) 06:58	07:42		
28	16:03	16:56	15 16:17 (2) 17:46	33 16:40 (1) 19:38	20:26	21:02	20:58	20:13	19:06	17:58	29 17:14 (1) 16:01	15:37		
29	07:45	07:02	16:03 (2) 06:03	16:08 (1) 05:54	04:57	04:29	04:45	05:29	06:18	07:06	16:46 (1) 07:00	07:42		
30	16:04	16:58	14 16:17 (2) 17:47	31 16:39 (1) 19:39	20:28	21:03	20:57	20:11	19:04	17:56	27 17:13 (1) 15:59	15:37		
31	07:44	07:00	16:04 (2) 06:01	16:09 (1) 05:52	04:55	04:29	04:46	05:30	06:19	07:08	16:47 (1) 07:02	07:43		
32	16:06	17:00	12 16:16 (2) 17:49	28 16:37 (1) 19:41	20:29	21:03	20:56	20:09	19:01	17:54	23 17:10 (1) 15:58	15:37		
33	07:43	06:58	16:05 (2) 05:59	16:10 (1) 05:50	04:54	04:29	04:47	05:32	06:21	07:10	16:49 (1) 07:04	07:44		
34	16:07	17:02	9 16:14 (2) 17:51	26 16:36 (1) 19:43	20:31	21:04	20:55	20:07	18:59	17:52	19 17:08 (1) 15:56	15:38		
35	07:43	06:56	16:09 (2) 05:57	16:12 (1) 05:47	04:53	04:29	04:48	05:34	06:23	07:12	16:52 (1) 07:05	07:45		
36	16:09	17:04	2 16:11 (2) 17:53	22 16:34 (1) 19:44	20:32	21:04	20:54	20:05	18:57	17:50	13 17:05 (1) 15:55	15:38		
37	07:42	06:55	16:14 (1) 05:45	04:51	04:29	04:50	05:35	06:24	07:13	07:06	16:47 (1) 07:02	07:46		
38	16:10	17:05	16 16:30 (1) 19:46	20:34	21:05	20:53	20:03	18:55	17:48	16:40	15:54	15:38		
39	07:41	06:53	05:52	16:18 (1) 05:43	04:50	04:29	04:51	05:37	06:26	07:15	16:48	07:46		
40	16:12	17:07	17:56	8 16:26 (1) 19:48	20:35	21:05	20:52	20:01	18:52	17:46	16:49	15:38		
41	07:40	06:51	05:50	05:41	04:48	04:29	04:52	05:38	06:27	07:17	16:49	07:47		
42	16:14	17:09	17:58	19:49	20:37	21:05	20:51	19:59	18:50	17:43	16:51	15:39		
43	07:39	06:49	05:48	05:39	04:47	04:29	04:53	05:40	06:29	07:18	16:49	07:48		
44	16:15	17:11	17:59	19:51	20:38	21:06	20:50	19:57	18:48	17:41	16:50	15:39		
45	07:38	06:47	05:45	05:37	04:46	04:29	04:55	05:41	06:31	07:20	16:49	07:48		
46	16:17	17:13	18:01	19:53	20:39	21:06	20:48	19:55	18:45	17:39	16:50	15:40		
47	07:36	06:45	05:43	05:35	04:45	04:29	04:56	05:43	06:32	07:22	16:49	07:49		
48	16:19	17:14	18:03	19:54	20:41	21:06	20:47	19:53	18:43	17:37	16:50	15:40		
49	07:35	06:42	16:21 (1) 05:41	05:33	04:43	04:30	04:57	05:45	06:34	17:00 (1) 06:24	16:49 (1) 07:04	07:49		
50	16:20	17:16	13 16:34 (1) 18:04	19:56	20:42	21:06	20:46	19:50	18:41	17:11 (1) 06:35	16:49 (1) 07:04	15:41		
51	07:34	06:40	16:17 (1) 05:39	05:31	04:42	04:30	04:59	05:46	06:35	16:57 (1) 06:25	16:49 (1) 07:04	15:41		
52	16:22	17:18	19 16:36 (1) 18:06	19:57	20:43	21:06	20:44	19:48	18:39	17:15 (1) 06:33	8 15:44 (2) 15:46	15:41		
53	07:33	06:38	16:15 (1) 05:36	05:29	04:41	04:30	05:00	05:48	06:37	16:53 (1) 06:27	16:49 (1) 07:04	15:41		
54	16:24	17:20	23 16:38 (1) 18:08	19:59	20:45	21:06	20:43	19:46	18:36	23 17:16 (1) 06:31	12 15:45 (2) 15:45	15:42		
55	07:31	06:36	16:13 (1) 05:34	05:27	04:40	04:31	05:02	05:49	06:39	16:51 (1) 06:29	16:49 (1) 07:04	15:42		
56	16:26	17:21	27 16:40 (1) 18:09	20:01	20:46	21:06	20:42	19:44	18:34	27 17:18 (1) 06:29	14 15:46 (2) 15:44	15:43		
57	07:30		06:32	05:25	04:39	04:31	05:03	05:51	06:40	16:50 (1) 06:30	16:49 (1) 07:04	15:43		
58	16:27		19:11	20:02	20:47	21:06	20:40	19:42	18:32	29 17:19 (1) 06:28	15 15:47 (2) 15:43	15:44		
59	07:29		06:29	05:23	04:38	04:32	05:04	05:53	06:42	16:48 (1) 06:32	16:49 (1) 07:04	15:44		
60	16:29		19:13	20:04	20:48	21:06	20:39	19:40	18:29	31 17:19 (1) 06:26	15 15:47 (2) 15:43	15:44		
61	07:27		06:27		04:37		05:06	05:54		06:34	16:49 (1) 07:04	15:44		
62	16:31		19:14		20:50		20:37	19:37		16:24	15 15:47 (2) 15:45	15:45		
63	Potential sun hours	261	278	366	413	482	495	500	453	382	139	650	59	247
64	Total, worst case		222		620									

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

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

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 4

Licensed user:

ENVO
 ul.Sikorskiego 25/20
 PL-62 030 Lubon
 0048 662 643 300
 ENVO / envoo-i.nowicki@wp.pl
 Calculated:
 2015-03-07 11:38/2.9.285

SHADOW - Calendar

Calculation: Analiza migotania cienia - wariant alternatywny **Shadow receptor:** B - SH2

Assumptions for shadow calculations

Reference year for calendar

2015

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:51 15:47	07:26 16:33	06:34 17:23	16:17 (1) 19:16	06:25 20:06	05:21 20:51	04:36 21:05	05:07 20:36	05:56 19:35	06:43 18:27	17:05 (1) 16:22	06:36 14	15:36 (2) 15:42
2	07:50 15:48	07:24 16:35	06:32 17:25	16:17 (1) 19:18	06:23 20:07	05:19 20:52	04:35 21:05	05:09 20:34	05:57 19:33	06:45 18:25	17:00 (1) 16:20	06:37 13	15:37 (2) 15:41
3	07:50 15:49	07:23 16:36	06:30 17:27	16:16 (1) 19:19	06:20 20:09	05:17 20:53	04:35 21:05	05:10 20:32	05:59 19:31	06:47 18:23	16:58 (1) 16:18	06:39 11	15:38 (2) 15:41
4	07:50 15:50	07:21 16:38	06:28 17:28	16:15 (1) 19:21	06:18 20:11	05:16 20:54	04:34 21:04	05:12 20:31	06:00 19:29	06:48 18:20	16:56 (1) 16:17	06:41 9	15:39 (2) 15:40
5	07:50 15:51	07:20 16:40	06:26 17:30	16:15 (1) 19:23	06:16 20:12	05:14 20:55	04:33 21:04	05:13 20:29	06:02 19:26	06:50 18:18	16:54 (1) 16:15	06:43 3	15:42 (2) 15:39
6	07:50 15:52	07:18 16:42	06:23 17:32	16:15 (1) 19:24	06:14 20:14	05:12 20:56	04:33 21:04	05:15 20:27	06:04 19:24	06:52 18:16	16:53 (1) 16:13	06:44 27	15:40 15:39
7	07:49 15:53	07:16 16:44	06:21 17:34	16:16 (1) 19:26	06:11 20:15	05:10 20:57	04:32 21:03	05:16 20:26	06:05 19:22	06:53 18:14	16:52 (1) 16:11	06:46 29	15:41 15:39
8	07:49 15:54	07:15 16:45	16:10 (2) 17:35	16:15 (1) 19:28	06:09 20:17	05:08 20:58	04:31 21:03	05:18 20:24	06:07 19:20	06:55 18:11	16:52 (1) 16:10	06:48 29	15:42 15:38
9	07:49 15:56	07:13 16:47	16:08 (2) 17:37	16:16 (1) 19:29	06:07 20:19	05:07 20:59	04:31 21:02	05:19 20:22	06:08 19:17	06:56 18:09	16:50 (1) 16:08	06:50 30	15:43 15:38
10	07:48 15:57	07:11 16:49	16:08 (2) 17:39	16:17 (1) 19:29	06:05 20:20	05:05 20:59	04:30 21:01	05:21 20:22	06:10 19:15	06:58 18:07	16:50 (1) 16:07	06:51 31	15:44 15:38
11	07:48 15:58	07:09 16:51	16:07 (2) 17:41	16:19 (1) 19:33	06:03 20:22	05:03 21:00	04:30 21:01	05:23 20:18	06:12 19:13	07:00 18:05	16:50 (1) 16:05	06:53 31	15:45 15:37
12	07:47 16:00	07:08 16:53	16:07 (2) 17:42	16:19 (1) 19:34	06:00 20:23	05:02 21:01	04:30 21:00	05:24 20:16	06:13 19:11	07:01 18:03	16:49 (1) 16:03	06:55 31	15:46 15:37
13	07:46 16:01	07:06 16:54	16:07 (2) 17:44	16:22 (1) 19:36	05:58 20:25	05:00 21:01	04:29 21:01	05:26 20:15	06:15 19:08	07:03 18:00	16:50 (1) 16:02	06:57 29	15:47 15:37
14	07:46 16:03	07:04 16:56	16:07 (2) 17:46	16:27 (1) 19:38	05:56 20:26	05:04 21:02	04:29 20:58	05:27 20:13	06:16 19:06	07:05 17:58	16:50 (1) 16:01	06:58 29	15:48 15:37
15	07:45 16:04	07:02 16:58	16:07 (2) 17:47	16:31 (1) 19:39	05:54 20:28	05:04 21:03	04:29 21:03	05:29 20:11	06:18 19:04	07:06 17:56	16:51 (1) 16:00	06:59 27	15:49 15:37
16	07:44 16:06	07:00 17:00	16:08 (2) 17:49	16:32 (1) 19:41	05:52 20:29	05:04 21:03	04:29 21:03	05:30 20:09	06:19 19:01	07:08 17:54	16:51 (1) 16:02	07:00 25	15:50 15:37
17	07:43 16:07	06:58 17:02	16:10 (2) 17:51	16:33 (1) 19:43	05:59 20:31	05:04 21:04	04:29 21:04	05:32 20:07	06:21 18:59	07:10 17:52	16:52 (1) 16:04	07:04 23	15:51 15:38
18	07:43 16:09	06:56 17:04	16:17 (2) 17:53	16:34 (1) 19:44	05:57 20:32	05:04 21:04	04:29 21:04	05:33 20:05	06:23 18:57	07:12 17:50	16:53 (1) 16:05	07:05 21	15:52 15:38
19	07:42 16:10	06:55 17:05	16:18 (2) 17:54	16:35 (1) 19:46	05:55 20:34	05:04 21:05	04:29 21:05	05:34 20:03	06:24 18:55	07:13 17:48	16:55 (1) 16:07	07:07 17	15:53 15:38
20	07:41 16:12	06:53 17:07	16:19 (2) 17:56	16:36 (1) 19:48	05:54 20:35	05:04 21:05	04:29 21:05	05:35 20:01	06:25 18:52	07:14 17:46	16:56 (1) 16:09	07:09 11	15:54 15:38
21	07:40 16:14	06:51 17:09	16:20 (2) 17:58	16:37 (1) 19:49	05:53 20:37	05:04 21:05	04:29 21:05	05:36 20:51	06:26 18:50	07:15 17:43	16:57 (1) 16:10	07:10 10	15:55 15:39
22	07:39 16:15	06:49 17:11	16:21 (2) 17:59	16:38 (1) 19:51	05:59 20:38	05:04 21:06	04:29 21:06	05:37 20:50	06:27 18:48	07:17 17:41	16:58 (1) 16:11	07:11 10	15:56 15:39
23	07:38 16:17	06:47 17:13	16:22 (1) 18:01	16:39 (1) 19:53	05:58 20:39	05:04 21:06	04:29 21:06	05:38 20:48	06:28 18:45	07:18 17:39	16:59 (1) 16:12	07:12 10	15:57 15:40
24	07:36 16:19	06:45 17:14	16:23 (1) 18:03	16:40 (1) 19:54	05:56 20:41	05:04 21:06	04:29 21:06	05:39 20:47	06:29 18:43	07:19 17:37	17:00 (1) 16:13	07:13 10	15:58 15:40
25	07:35 16:20	06:42 17:16	16:24 (1) 18:04	16:41 (1) 19:56	05:54 20:42	05:04 21:06	04:29 21:06	05:40 20:46	06:30 18:41	07:20 17:35	17:01 (1) 16:14	07:14 10	15:59 15:41
26	07:34 16:22	06:40 17:18	16:25 (1) 18:06	16:42 (1) 19:57	05:53 20:43	05:04 21:06	04:29 21:06	05:41 20:44	06:31 18:39	07:21 17:33	17:02 (1) 16:15	07:15 6	15:59 15:41
27	07:33 16:24	06:38 17:20	16:19 (1) 18:08	16:43 (1) 19:59	05:52 20:45	05:04 21:06	04:30 21:06	05:42 20:43	06:32 18:36	07:22 17:31	17:03 (1) 16:16	07:16 10	15:59 15:42
28	07:31 16:26	06:36 17:21	16:18 (1) 18:09	16:44 (1) 19:59	05:51 20:46	05:04 21:06	04:31 21:06	05:43 20:42	06:33 18:34	07:23 17:29	17:04 (1) 16:17	07:17 12	15:59 15:43
29	07:30 16:27	06:34 17:22	16:17 (1) 18:10	16:45 (1) 20:01	05:50 20:46	05:04 21:06	04:31 21:06	05:44 20:41	06:34 18:32	07:24 17:28	17:05 (1) 16:18	07:18 14	15:59 15:44
30	07:29 16:29	06:32 17:23	16:16 (1) 18:11	16:46 (1) 20:02	05:49 20:47	05:04 21:06	04:31 21:06	05:45 20:40	06:35 18:32	07:25 17:27	17:06 (1) 16:19	07:19 14	15:59 15:44
31	07:27 16:31	06:29 17:24	16:15 (1) 18:12	16:47 (1) 20:03	05:48 20:48	05:04 21:06	04:31 21:06	05:46 20:39	06:36 18:29	07:26 17:26	17:07 (1) 16:20	07:20 14	15:59 15:45
Potential sun hours	261	278	366	413	482	495	500	453	382	334	270	50	247
Total, worst case		239	351								549	80	

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

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

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 5

Licensed user:

ENVO
ul.Sikorskiego 25/20
PL-62 030 Lubon
0048 662 643 300
ENVO / envo-i.nowicki@wp.pl
Calculated:
2015-03-07 11:38/2.9.285

SHADOW - Calendar

Calculation: Analiza migotania cienia - wariant alternatywny Shadow receptor: C - SH3

Assumptions for shadow calculations

Reference year for calendar

2015

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December
1	07:51 15:47	07:26 16:33	06:34 17:23	16:06 (1) 19:16	06:25 20:06	04:36 20:51	04:32 21:05	05:07 20:36	05:56 19:35	06:43 18:27	06:36 16:22	15:32 (2) 15:46 (2)
2	07:51 15:48	07:24 16:35	06:32 17:25	16:06 (1) 19:18	06:23 20:07	04:35 20:52	04:33 21:05	05:09 20:34	05:57 19:33	06:45 18:25	06:37 16:20	15:32 (2) 15:46 (2)
3	07:50 15:49	07:23 16:36	06:30 17:27	16:06 (1) 19:19	06:20 20:09	04:35 20:53	04:34 21:05	05:10 20:32	05:59 19:31	06:47 18:23	06:39 16:18	15:32 (2) 15:46 (2)
4	07:50 15:50	07:21 16:38	06:28 17:28	16:06 (1) 19:21	06:18 20:11	04:34 20:54	04:34 21:04	05:12 20:31	06:00 19:29	06:48 18:20	06:41 16:17	15:32 (2) 15:46 (2)
5	07:50 15:51	07:20 16:40	06:26 17:30	16:06 (1) 19:23	06:16 20:12	04:33 20:55	04:35 21:04	05:13 20:29	06:02 19:26	06:50 18:18	16:50 (1) 17:04 (1)	06:43 16:15
6	07:50 15:52	07:18 16:42	16:05 (2) 17:32	16:07 (1) 19:24	06:14 20:14	04:33 20:56	04:36 21:04	05:15 20:27	06:04 19:24	06:52 18:16	17:06 (1) 16:13	15:33 (2) 15:43 (2)
7	07:49 15:53	07:16 16:44	16:03 (2) 17:34	16:09 (1) 19:26	06:11 20:15	04:32 20:57	04:37 21:03	05:16 20:28	06:05 19:22	06:53 18:14	16:46 (1) 17:08 (1)	06:46 16:11
8	07:49 15:54	07:15 16:45	16:03 (2) 17:35	16:09 (1) 19:28	06:09 20:17	04:31 20:58	04:38 21:03	05:18 20:24	06:07 19:20	06:55 18:11	16:44 (1) 17:09 (1)	06:48 16:10
9	07:49 15:56	07:13 16:47	16:02 (2) 17:37	16:11 (1) 19:29	06:07 20:19	04:31 20:59	04:39 21:02	05:19 20:22	06:08 19:17	06:56 18:09	16:42 (1) 17:09 (1)	06:50 16:08
10	07:48 15:57	07:11 16:49	16:02 (2) 17:39	16:14 (1) 19:31	06:05 20:20	04:30 20:59	04:40 21:01	05:21 20:20	06:10 19:15	06:58 18:07	16:41 (1) 17:10 (1)	06:51 16:07
11	07:48 15:58	07:09 16:51	16:02 (2) 17:41	16:14 (1) 19:33	06:03 20:22	04:30 21:00	04:41 21:01	05:23 20:18	06:12 19:13	07:00 18:05	16:41 (1) 17:11 (1)	06:53 16:05
12	07:47 16:00	07:08 16:53	16:02 (2) 17:42	16:14 (1) 19:34	06:00 20:23	04:30 21:01	04:42 21:00	05:24 20:16	06:13 19:11	07:01 18:03	16:39 (1) 17:10 (1)	06:55 16:03
13	07:46 16:01	07:06 16:54	16:03 (2) 17:44	16:14 (1) 19:36	06:08 20:25	04:29 21:01	04:43 20:59	05:26 20:15	06:15 19:08	07:03 18:00	16:39 (1) 17:10 (1)	06:57 16:02
14	07:46 16:03	07:04 16:56	16:03 (2) 17:46	16:14 (1) 19:38	06:06 20:26	04:29 21:02	04:44 20:58	05:27 20:13	06:16 19:06	07:05 17:58	16:39 (1) 17:09 (1)	06:58 16:01
15	07:45 16:04	07:02 16:58	16:05 (2) 17:47	16:14 (1) 19:39	06:03 20:28	04:29 21:03	04:45 20:57	05:29 20:11	06:18 19:04	07:06 17:56	16:39 (1) 17:10 (1)	07:00 15:59
16	07:44 16:06	07:00 17:00	16:01 17:49	16:14 (1) 19:41	06:01 20:29	04:29 21:03	04:46 20:56	05:30 20:09	06:19 19:01	07:08 17:54	16:38 (1) 17:09 (1)	07:02 15:58
17	07:43 16:07	06:58 17:02	16:01 17:51	16:14 (1) 19:43	06:05 20:31	04:29 21:04	04:47 20:55	05:32 20:07	06:21 18:59	07:10 17:52	16:38 (1) 17:09 (1)	07:04 15:56
18	07:43 16:09	06:56 17:04	16:01 17:53	16:14 (1) 19:44	06:05 20:32	04:29 21:04	04:48 20:54	05:34 20:05	06:23 18:57	07:12 17:50	16:39 (1) 17:08 (1)	07:05 15:55
19	07:42 16:10	06:55 17:05	16:16 (1) 17:54	16:14 (1) 19:46	06:03 20:34	04:29 21:05	04:50 20:53	05:35 20:03	06:24 18:55	07:13 17:48	16:40 (1) 17:08 (1)	07:07 15:54
20	07:41 16:12	06:53 17:07	16:14 (1) 17:56	16:14 (1) 19:48	06:03 20:35	04:29 21:05	04:51 20:52	05:37 20:01	06:26 18:52	07:15 17:46	16:41 (1) 17:07 (1)	07:09 15:53
21	07:40 16:14	06:51 17:09	16:12 (1) 17:58	16:14 (1) 19:49	06:03 20:37	04:29 21:05	04:52 20:51	05:38 19:59	06:27 18:50	07:17 17:43	16:41 (1) 17:05 (1)	07:10 15:51
22	07:39 16:15	06:49 17:11	16:11 (1) 17:59	16:14 (1) 19:51	06:03 20:38	04:29 21:06	04:53 20:50	05:40 19:57	06:29 18:48	07:18 17:41	16:42 (1) 17:04 (1)	07:12 15:50
23	07:38 16:17	06:47 17:13	16:09 (1) 18:01	16:14 (1) 19:53	06:03 20:39	04:29 21:06	04:55 20:48	05:41 19:55	06:31 18:45	07:20 17:39	16:44 (1) 17:02 (1)	07:14 15:49
24	07:36 16:19	06:45 17:14	16:09 (1) 18:03	16:14 (1) 19:54	06:03 20:41	04:29 21:06	04:56 20:47	05:43 19:53	06:32 18:43	07:22 17:37	16:46 (1) 16:59 (1)	07:15 15:48
25	07:35 16:20	06:42 17:16	16:08 (1) 18:04	16:14 (1) 19:56	06:03 20:42	04:30 21:06	04:57 20:46	05:45 19:50	06:34 18:41	07:24 16:35	15:52 (1) 15:53 (1)	07:17 15:47
26	07:34 16:22	06:40 17:18	16:06 (1) 18:06	16:14 (1) 19:57	06:03 20:43	04:30 21:06	04:59 20:44	05:46 19:48	06:35 18:39	07:25 16:33	16:44 (1) 17:04 (1)	07:18 15:46
27	07:33 16:24	06:38 17:20	16:06 (1) 18:08	16:14 (1) 19:59	06:03 20:45	04:30 21:06	05:00 20:43	05:48 19:46	06:37 18:36	07:27 16:31	16:44 (1) 17:04 (1)	07:20 15:45
28	07:31 16:26	06:36 17:21	16:06 (1) 18:09	16:14 (1) 20:01	06:03 20:46	04:31 21:06	05:02 20:42	05:49 19:44	06:39 18:34	07:29 16:29	15:35 (2) 15:42 (2)	07:21 15:44
29	07:30 16:27	06:32 17:22	16:06 (1) 18:10	16:14 (1) 20:02	06:03 20:47	04:31 21:06	05:03 20:40	05:51 19:42	06:40 18:32	07:30 16:28	15:33 (2) 15:44 (2)	07:23 15:43
30	07:29 16:29	06:29 17:23	16:06 (1) 18:11	16:14 (1) 20:03	06:03 20:48	04:31 21:06	05:04 20:39	05:53 19:40	06:42 18:29	07:31 16:26	15:35 (2) 15:46 (2)	07:24 15:43
31	07:27 16:31	06:27 17:24	16:06 (1) 18:12	16:14 (1) 20:04	06:03 20:49	04:31 21:06	05:06 20:37	05:54 19:37	06:34 18:24	07:32 16:24	15:35 (2) 15:46 (2)	07:25 15:45
Potential sun hours	261	278	369	413	482	495	500	453	382	334	270	82
Total, worst case												247

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

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

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 6

Licensed user:

ENVO

ul.Sikorskiego 25/20

PL-62 030 Lubon

0048 662 643 300

ENVO / envo-i.nowicki@wp.pl

Calculated:

2015-03-07 11:38/2.9.285

SHADOW - Calendar

Calculation: Analiza migotania cienia - wariant alternatywny **Shadow receptor:** D - SH4

Assumptions for shadow calculations

Reference year for calendar

2015

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December		
1	07:51 15:47	07:26 16:33	06:34 17:23	15:59 (1) 16:30 (1)	06:25 19:16	05:21 20:06	04:36 20:51	04:32 21:05	05:07 20:36	05:56 19:35	06:43 18:27	06:36 15:29 (2)	15:42 (2) 15:42	
2	07:51 15:48	07:24 16:35	06:32 17:25	15:59 (1) 16:29 (1)	06:23 19:18	05:19 20:07	04:35 20:52	04:33 21:05	05:09 20:34	05:57 19:33	06:45 18:25	06:37 15:28 (2)	15:42 (2) 15:41	
3	07:50 15:49	07:23 16:36	06:30 17:27	16:00 (1) 16:28 (1)	06:20 19:19	05:17 20:09	04:35 20:53	04:34 21:05	05:10 20:32	05:59 19:31	06:47 18:23	06:39 15:28 (2)	15:41 15:39	
4	07:50 15:50	07:21 16:38	16:02 (2) 17:28	16:00 (1) 16:26 (1)	06:18 19:21	05:16 20:11	04:34 20:54	04:34 21:04	05:12 20:31	06:00 19:29	06:48 18:20	06:41 15:43 (2)	15:40 15:40	
5	07:50 15:51	07:20 16:40	7 16:00 (2) 17:30	16:00 (1) 16:25 (1)	06:26 19:23	06:16 20:12	05:14 20:55	04:33 21:04	05:13 20:29	06:02 19:26	06:50 18:18	06:43 15:43 (2)	15:39 15:39	
6	07:50 15:52	07:18 16:42	10 16:10 (2) 17:32	15:59 (2) 16:24 (1)	06:23 19:24	06:21 20:14	06:14 20:56	04:33 21:04	05:15 20:27	06:04 19:24	06:52 18:16	06:44 15:41 (2)	15:38 15:39	
7	07:49 15:53	07:16 16:44	12 16:11 (2) 17:34	15:58 (2) 16:22 (1)	06:21 19:26	06:11 20:15	06:11 20:57	04:32 21:03	04:37 20:26	06:05 19:22	06:53 18:14	16:44 (1) 16:55 (1)	16:46 16:11	15:37 15:39
8	07:49 15:54	07:15 16:45	14 16:12 (2) 17:35	15:59 (2) 16:13 (1)	06:19 19:28	06:19 20:17	06:09 20:58	04:31 21:03	04:38 20:24	06:07 19:20	06:55 18:11	16:44 (1) 16:58 (1)	16:48 16:10	15:37 15:38
9	07:49 15:56	07:13 16:47	14 16:13 (2) 17:37	15:59 (2) 16:13 (2)	06:17 19:37	06:17 20:19	06:07 20:59	04:31 21:02	04:39 20:22	06:08 19:17	06:56 18:09	16:38 (1) 16:59 (1)	16:50 16:08	15:36 (2) 15:38
10	07:48 15:57	07:11 16:49	14 16:13 (2) 17:39	15:59 (2) 16:13 (2)	06:15 19:39	06:15 20:20	06:05 20:59	04:30 21:01	04:40 20:20	06:10 19:15	06:58 18:07	16:36 (1) 17:00 (1)	16:51 16:07	15:37 15:38
11	07:48 15:58	07:09 16:51	14 16:13 (2) 17:41	15:59 (2) 16:13 (2)	06:12 19:41	06:12 20:22	06:03 21:00	04:30 21:01	04:41 20:18	06:12 19:13	07:00 18:05	16:35 (1) 17:01 (1)	16:53 16:05	15:37 15:40
12	07:47 16:00	07:08 16:53	12 16:12 (2) 17:42	16:00 (2) 16:12 (2)	06:10 17:42	06:10 19:34	06:00 20:23	04:30 21:01	04:42 20:16	06:13 19:11	07:01 18:03	16:33 (1) 17:01 (1)	16:55 16:03	15:37 15:41
13	07:46 16:01	07:06 16:54	10 16:11 (2) 17:44	16:01 (2) 16:11 (2)	06:08 17:44	06:08 19:36	05:58 20:25	04:29 21:01	04:43 20:15	06:15 19:08	07:03 18:00	16:32 (1) 17:02 (1)	16:57 16:02	15:37 15:42
14	07:46 16:03	07:04 16:56	5 16:08 (2) 17:46	16:03 (2) 16:13 (1)	06:06 17:46	06:06 19:38	05:58 20:26	04:29 21:02	04:44 20:13	06:16 19:06	07:05 17:58	16:32 (1) 17:03 (1)	16:58 16:01	15:37 15:42
15	07:45 16:04	07:02 16:58	4 16:17 (1) 17:47	16:13 (1) 16:17 (1)	06:03 17:47	06:03 19:39	05:54 20:28	04:29 21:03	04:45 20:11	06:18 19:04	07:06 17:56	16:31 (1) 17:03 (1)	16:59 15:59	15:37 15:42
16	07:44 16:06	07:00 17:00	14 16:08 (1) 17:49	16:08 (1) 16:01	06:01 17:49	06:01 19:41	05:52 20:29	04:29 21:03	04:46 20:09	06:19 19:01	07:08 17:54	16:30 (1) 17:02 (1)	16:57 15:58	15:37 15:44
17	07:43 16:07	06:58 17:02	18 16:06 (1) 17:51	16:06 (1) 16:24 (1)	05:59 17:51	05:50 19:43	04:54 20:31	04:29 21:04	04:47 20:07	06:21 18:59	07:10 17:52	16:30 (1) 17:02 (1)	16:54 15:56	15:38 15:45
18	07:43 16:09	06:56 17:04	22 16:04 (1) 17:53	16:04 (1) 16:26 (1)	05:57 17:53	05:47 19:44	04:53 20:32	04:29 21:04	04:48 20:05	06:23 18:57	07:12 17:50	16:30 (1) 17:02 (1)	16:55 15:55	15:38 15:46
19	07:42 16:10	06:55 17:05	24 16:03 (1) 17:54	16:03 (1) 16:27 (1)	05:54 17:54	05:45 19:46	04:51 20:34	04:29 21:05	04:50 20:03	06:24 18:55	07:13 17:48	16:30 (1) 17:02 (1)	16:54 15:54	15:38 15:46
20	07:41 16:12	06:53 17:07	26 16:02 (1) 17:56	16:02 (1) 16:28 (1)	05:52 17:56	05:43 19:48	04:50 20:35	04:29 21:05	04:51 20:01	06:26 18:52	07:15 17:46	16:31 (1) 17:02 (1)	16:53 15:53	15:38 15:46
21	07:40 16:14	06:51 17:09	28 16:01 (1) 17:58	16:01 (1) 16:29 (1)	05:50 17:58	05:41 19:49	04:48 20:37	04:29 21:05	04:52 20:51	06:27 18:50	07:17 17:43	16:30 (1) 17:00 (1)	16:51 15:51	15:39 15:47
22	07:39 16:15	06:49 17:11	30 16:00 (1) 17:59	16:00 (1) 16:30 (1)	05:48 17:59	05:39 19:51	04:47 20:38	04:29 21:06	04:53 20:50	06:29 18:48	07:18 17:41	16:31 (1) 17:00 (1)	16:50 15:50	15:39 15:48
23	07:38 16:17	06:47 17:13	32 15:59 (1) 18:01	15:59 (1) 16:31 (1)	05:45 18:01	05:37 19:53	04:46 20:39	04:29 21:06	04:55 20:48	06:31 18:45	07:20 17:39	16:32 (1) 16:59 (1)	16:49 15:49	15:40 15:48
24	07:36 16:19	06:45 17:14	32 15:59 (1) 18:03	15:59 (1) 16:31 (1)	05:43 18:03	05:35 19:54	04:45 20:41	04:29 21:06	04:56 20:47	06:32 18:43	07:22 17:37	16:33 (1) 16:58 (1)	16:48 15:48	15:40 15:48
25	07:35 16:20	06:42 17:16	32 15:59 (1) 18:04	15:59 (1) 16:31 (1)	05:41 18:04	05:33 19:56	04:43 20:42	04:30 21:06	04:57 20:46	06:34 18:41	07:24 18:35	16:34 (1) 16:59 (1)	16:47 15:47	15:41 15:49
26	07:34 16:22	06:40 17:18	32 15:58 (1) 18:06	15:58 (1) 16:30 (1)	05:39 18:06	05:31 19:57	04:42 20:43	04:30 21:06	04:59 20:44	06:35 18:39	07:25 18:33	16:35 (1) 16:55 (1)	16:46 15:46	15:41 15:49
27	07:33 16:24	06:38 17:20	32 15:58 (1) 18:08	15:58 (1) 16:30 (1)	05:36 18:08	05:29 19:59	04:41 20:45	04:30 21:06	05:00 20:43	06:37 18:36	07:27 18:31	16:36 (1) 16:52 (1)	16:45 15:45	15:42 15:50
28	07:31 16:26	06:36 17:21	32 15:58 (1) 18:09	15:58 (1) 16:30 (1)	05:34 18:09	05:27 20:01	04:40 20:46	04:31 21:06	05:02 20:42	06:39 18:34	07:29 18:29	16:37 (1) 16:53 (1)	16:44 15:44	15:42 15:50
29	07:30 16:27	06:32 17:22	32 15:57 (1) 18:10	15:57 (1) 16:31 (1)	05:32 18:10	05:25 20:02	04:39 20:47	04:31 21:06	05:03 20:40	06:40 18:32	07:30 18:28	16:38 (1) 16:54 (1)	16:43 15:43	15:44 15:52
30	07:29 16:29	06:29 17:23	32 15:56 (1) 18:11	15:56 (1) 16:32 (1)	05:30 18:11	05:23 20:03	04:38 20:48	04:32 21:06	05:04 20:39	06:42 18:29	07:31 18:27	16:39 (1) 16:55 (1)	16:42 15:42	15:44 15:52
31	07:27 16:31	06:27 17:24	32 15:55 (1) 18:12	15:55 (1) 16:33 (1)	05:29 18:12	05:21 20:04	04:37 20:49	04:31 21:06	05:06 20:37	06:43 18:27	07:32 18:26	16:40 (1) 16:56 (1)	16:41 15:41	15:45 15:53
Potential sun hours	261	278	484	186	413	482	495	500	453	382	334	579	104	247
Total, worst case														

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

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

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 8

Licensed user:

ENVO

ul.Sikorskiego 25/20

PL-62 030 Lubon

0048 662 643 300

ENVO / envo-i.nowicki@wp.pl

Calculated:

2015-03-07 11:38/2.9.285

SHADOW - Calendar

Calculation: Analiza migotania cienia - wariant alternatywny **Shadow receptor:** F - SH6

Assumptions for shadow calculations

Reference year for calendar

2015

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:51 15:47	07:26 16:33	15:47 (1) 16:01 (2)	06:34 17:23	06:25 19:16	05:21 20:06	04:36 20:51	04:32 21:05	05:07 20:36	05:56 19:35	06:43 18:27	06:36 16:22	15:04 (1) 15:35 (1)
2	07:51 15:48	07:24 16:35	15:43 (1) 16:01 (2)	06:32 17:25	06:23 19:18	05:19 20:07	04:35 20:52	04:33 21:05	05:09 20:34	05:57 19:33	06:45 18:25	06:37 16:20	15:04 (1) 15:35 (1)
3	07:50 15:49	07:23 16:36	15:40 (1) 16:01 (2)	06:30 17:27	06:20 19:19	05:17 20:09	04:35 20:53	04:34 21:05	05:10 20:32	05:59 19:31	06:47 18:23	06:39 16:18	15:05 (1) 15:35 (1)
4	07:50 15:50	07:21 16:38	15:39 (1) 16:02 (2)	06:28 17:28	06:18 19:21	05:16 20:11	04:34 20:54	04:34 21:04	05:12 20:31	06:00 19:29	06:48 18:20	06:41 16:17	15:05 (1) 15:34 (1)
5	07:50 15:51	07:20 16:40	15:38 (1) 16:01 (1)	06:26 17:30	06:16 19:23	05:14 20:12	04:33 20:55	04:35 21:04	05:13 20:29	06:02 19:26	06:50 18:18	06:43 16:15	15:06 (1) 15:34 (1)
6	07:50 15:52	07:18 16:42	15:37 (1) 16:02 (1)	06:23 17:32	06:14 19:24	05:12 20:14	04:33 20:56	04:36 21:04	05:15 20:27	06:04 19:24	06:52 18:16	06:44 16:13	15:06 (1) 15:32 (1)
7	07:49 15:53	07:16 16:44	15:36 (1) 16:03 (1)	06:21 17:34	06:11 19:26	05:10 20:15	04:32 20:57	04:37 21:03	05:16 20:26	06:05 19:22	06:53 18:14	06:46 16:11	15:07 (1) 15:31 (1)
8	07:49 15:54	07:15 16:45	15:36 (1) 16:05 (1)	06:19 17:35	06:09 19:28	05:08 20:17	04:31 20:58	04:38 21:03	05:18 20:24	06:07 19:20	06:55 18:11	06:48 16:10	15:09 (1) 15:31 (2)
9	07:49 15:56	07:13 16:47	15:35 (1) 16:05 (1)	06:17 17:37	06:07 19:29	05:07 20:19	04:31 20:59	04:39 21:02	05:19 20:22	06:08 19:17	06:56 18:09	06:50 16:08	15:10 (1) 15:32 (2)
10	07:48 15:57	07:11 16:49	15:35 (1) 16:06 (1)	06:15 17:39	06:05 19:31	05:05 20:20	04:30 20:59	04:40 21:01	05:21 20:20	06:10 19:15	06:58 18:07	06:51 16:07	15:12 (1) 15:32 (2)
11	07:48 15:58	07:09 16:51	15:34 (1) 16:06 (1)	06:12 17:41	06:03 19:33	05:03 20:22	04:30 21:00	04:41 21:01	05:23 20:18	06:12 19:13	07:00 18:05	06:53 16:05	15:16 (1) 15:32 (2)
12	07:47 16:00	07:08 16:53	15:34 (1) 16:06 (1)	06:10 17:42	06:00 19:34	05:02 20:23	04:30 21:01	04:42 21:00	05:24 20:16	06:13 19:11	07:01 18:03	06:55 16:03	15:16 (1) 15:32 (2)
13	07:47 16:01	07:06 16:54	15:34 (1) 16:06 (1)	06:08 17:44	05:58 19:36	05:00 20:25	04:29 21:02	04:43 20:59	05:26 20:15	06:15 19:08	07:03 18:00	06:57 16:02	15:19 (1) 15:31 (2)
14	07:46 16:03	07:04 16:56	15:34 (1) 16:06 (1)	06:06 17:46	05:56 19:38	04:58 20:26	04:29 21:02	04:44 20:58	05:27 20:13	06:16 19:06	07:05 17:58	06:58 16:01	15:21 (1) 15:30 (2)
15	07:45 16:04	07:02 16:58	15:34 (1) 16:06 (1)	06:03 17:47	05:54 19:39	04:57 20:28	04:29 21:03	04:45 20:57	05:29 20:11	06:18 19:04	07:06 17:56	07:00 15:59	15:22 (1) 15:29 (2)
16	07:44 16:06	07:00 17:00	15:34 (1) 16:06 (1)	06:01 17:49	05:52 19:41	04:55 20:29	04:29 21:03	04:46 20:56	05:30 20:09	06:19 19:01	07:08 17:54	07:02 15:58	15:29 (1) 15:37
17	07:43 16:07	06:58 17:02	15:34 (1) 16:05 (1)	05:59 17:51	05:50 19:43	04:54 20:31	04:29 21:04	04:47 20:55	05:32 20:07	06:21 18:59	07:10 17:52	07:04 15:56	15:38 15:38
18	07:43 16:09	06:56 17:04	15:35 (1) 16:05 (1)	05:57 17:53	05:47 19:44	04:53 20:32	04:29 21:04	04:48 20:54	05:34 20:05	06:23 18:57	07:12 17:50	07:05 15:55	15:45 15:38
19	07:42 16:10	06:55 17:05	15:36 (1) 16:04 (1)	05:54 17:54	05:45 19:46	04:51 20:34	04:29 21:05	04:50 20:53	05:35 20:03	06:24 18:55	07:13 17:48	16:16 (1) 16:27 (1)	15:54 15:38
20	07:41 16:12	06:53 17:07	15:37 (1) 16:03 (1)	05:52 17:56	05:43 19:48	04:50 20:35	04:29 21:05	04:51 20:52	05:37 20:01	06:26 18:52	07:15 17:46	16:13 (1) 16:30 (1)	15:53 15:38
21	07:40 16:14	06:51 17:09	15:38 (1) 16:02 (1)	05:50 17:58	05:41 19:49	04:48 20:37	04:29 21:05	04:52 20:51	05:38 19:59	06:27 18:50	07:17 17:43	16:10 (1) 16:31 (1)	15:47 15:51
22	07:39 16:15	06:49 17:11	15:39 (1) 16:01 (1)	05:48 17:59	05:39 19:51	04:47 20:38	04:29 21:06	04:53 20:50	05:40 19:57	06:29 18:48	07:18 17:41	16:08 (1) 16:32 (1)	15:48 15:50
23	07:38 16:17	06:47 17:13	15:42 (1) 15:59 (1)	05:45 18:01	05:37 19:53	04:46 20:39	04:29 21:06	04:55 20:48	05:41 19:55	06:31 18:45	07:20 17:39	16:07 (1) 16:33 (1)	15:49 15:40
24	07:36 16:19	06:45 17:14	15:45 (1) 15:56 (1)	05:43 18:03	05:35 19:54	04:45 20:41	04:29 21:06	04:56 20:47	05:43 19:53	06:32 18:43	07:22 17:37	16:06 (1) 16:34 (1)	15:48 15:40
25	07:35 16:20	06:42 17:16	15:46 (1) 18:04	05:41 18:04	05:33 19:56	04:43 20:42	04:30 21:06	04:57 20:46	05:45 19:50	06:34 18:41	07:24 16:35	15:05 (1) 15:35 (1)	15:47 15:41
26	07:34 16:22	06:40 17:18	15:47 (1) 18:06	05:39 18:06	05:31 19:57	04:42 20:43	04:30 21:06	04:59 20:44	05:46 19:48	06:35 18:39	07:25 16:33	15:05 (1) 15:36 (1)	15:48 15:41
27	07:33 16:24	06:38 17:20	15:48 (1) 18:08	05:36 18:08	05:29 19:59	04:41 20:45	04:30 21:06	05:00 20:43	05:48 19:46	06:37 18:36	07:26 16:31	15:03 (1) 15:35 (1)	15:49 15:42
28	07:31 16:26	15:51 (2) 06:36	17:21	05:34	05:27	04:40	04:31	05:02	05:49	06:39	06:29	15:03 (1)	15:45
29	07:30 16:27	15:56 (2) 06:38	17:21	18:09	05:25	04:40	04:31	05:03	05:51	06:40	06:30	15:03 (1)	15:44
30	07:29 16:29	15:48 (2) 06:39	17:21	19:11	05:23	04:47	04:32	05:04	05:53	06:42	06:32	15:03 (1)	15:43
31	07:27 16:31	15:47 (2) 16:00 (2)	17:21	19:13	05:24	04:48	04:37	05:06	05:54	06:43	06:34	15:03 (1)	15:42
Potential sun hours	261	278	366	413	482	495	500	453	382	334	351	270	247
Total, worst case	38	622	366	413	482	495	500	453	382	334	351	270	247

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

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

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 9

Licensed user:

ENVO
ul.Sikorskiego 25/20
PL-62 030 Lubon
0048 662 643 300
ENVO / envio-i.nowicki@wp.pl
Calculated:
2015-03-07 11:38/2.9.285

SHADOW - Calendar

Calculation: Analiza migotania cienia - wariant alternatywny Shadow receptor: G - Sh7

Assumptions for shadow calculations

Reference year for calendar 2015
The calculated times are "worst case" given by the following assumptions:
The sun is shining all the day, from sunrise to sunset
The rotor plane is always perpendicular to the line from the WTG to the sun
The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December	
1	07:51 15:47	07:26 16:33	06:34 17:23	06:25 19:16	05:21 20:06	04:36 20:51	04:33 21:05	05:07 20:36	05:56 19:35	06:43 18:27	06:36 16:22	07:26 15:42	
2	07:50 15:48	07:24 16:35	06:32 17:25	06:23 19:18	05:19 20:07	04:35 20:52	04:33 21:05	05:09 20:34	05:57 19:33	06:45 18:25	06:37 16:20	07:27 15:41	
3	07:50 15:49	07:23 16:36	06:30 17:27	06:20 19:19	05:17 20:09	04:35 20:53	04:34 21:05	05:10 20:32	05:59 19:31	06:47 18:23	06:39 16:18	07:29 15:41	
4	07:50 15:50	07:21 16:38	06:28 17:29	06:18 19:21	05:16 20:11	04:34 20:54	04:35 21:04	05:12 20:31	06:00 19:29	06:48 18:20	06:41 16:17	07:30 15:40	
5	07:50 15:51	07:20 16:40	06:26 17:30	06:16 19:23	05:14 20:12	04:33 20:55	04:35 21:04	05:13 20:29	06:02 19:26	06:50 18:18	06:43 16:15	07:31 15:40	
6	07:50 15:52	07:18 16:42	06:23 17:32	06:14 19:24	05:12 20:14	04:33 20:56	04:36 21:04	05:15 20:27	06:04 19:24	06:52 18:16	06:44 16:13	07:33 15:39	
7	07:49 15:53	07:16 16:44	06:21 17:34	06:11 19:26	05:10 20:15	04:32 20:57	04:37 21:03	05:16 20:26	06:05 19:22	06:53 18:14	06:46 16:11	07:34 15:39	
8	07:49 15:55	07:15 16:45	06:19 17:35	06:09 19:28	05:08 20:17	04:31 20:58	04:38 21:02	05:18 20:24	06:07 19:20	06:55 18:11	06:48 16:10	07:35 15:38	
9	07:49 15:56	07:13 16:47	06:17 17:37	06:07 19:29	05:07 20:19	04:31 20:58	04:39 21:02	05:19 20:22	06:08 19:17	06:56 18:09	06:50 16:08	07:36 15:38	
10	07:48 15:57	07:11 16:49	06:15 17:39	06:05 19:31	05:05 20:20	04:30 20:59	04:40 21:01	05:21 20:20	06:10 19:15	06:58 18:07	06:51 16:07	07:37 15:38	
11	07:48 15:58	07:09 16:51	06:12 17:41	06:03 19:33	05:03 20:22	04:30 21:00	04:41 21:00	05:23 20:18	06:12 19:13	07:00 18:05	06:53 16:05	07:38 15:38	
12	07:47 16:00	07:08 16:53	06:10 17:42	06:00 19:34	05:02 20:23	04:30 21:01	04:42 21:00	05:24 20:16	06:13 19:11	07:01 18:03	06:55 16:03	07:40 15:37	
13	07:46 16:01	07:06 16:55	06:08 17:44	05:58 19:36	05:00 20:25	04:29 21:01	04:43 20:59	05:26 20:15	06:15 19:08	07:03 18:00	06:57 16:02	07:41 15:37	
14	07:46 16:03	07:04 16:56	06:06 17:46	05:56 19:38	04:59 20:26	04:29 21:02	04:44 20:58	05:27 20:13	19:07 (2) 19:13 (2)	06:16 19:06	07:05 17:58	06:58 16:01	07:42 15:37
15	07:45 16:04	07:02 16:58	06:03 17:47	05:54 19:39	04:57 20:28	04:29 21:03	04:45 20:57	05:29 20:11	19:05 (2) 19:16 (2)	06:18 19:04	07:06 17:56	07:00 15:59	07:42 15:37
16	07:44 16:06	07:00 17:00	06:01 17:49	05:52 19:41	04:55 20:29	04:29 21:03	04:46 20:56	05:30 20:09	19:03 (2) 19:17 (2)	06:19 19:01	07:08 17:54	07:02 15:58	07:43 15:37
17	07:43 16:07	06:58 17:02	05:59 17:51	05:50 19:43	19:01 (2) 19:08 (2)	04:54 20:31	04:47 21:04	05:32 20:55	19:02 (2) 19:18 (2)	06:21 18:59	07:10 17:52	07:04 15:56	07:44 15:38
18	07:43 16:09	06:56 17:04	05:57 17:53	05:47 19:44	18:59 (2) 19:11 (2)	04:53 20:32	04:29 21:04	05:34 20:05	19:00 (2) 19:18 (2)	06:23 18:57	07:12 17:50	07:05 15:55	07:45 15:38
19	07:42 16:11	06:55 17:05	05:54 17:54	05:45 19:46	18:57 (2) 19:12 (2)	04:51 20:34	04:29 21:05	05:35 20:03	19:00 (2) 19:19 (2)	06:24 18:55	07:13 17:48	07:07 15:54	07:46 15:38
20	07:41 16:12	06:53 17:07	05:52 17:56	05:43 19:48	18:56 (2) 19:13 (2)	04:50 20:35	04:29 21:05	05:37 20:01	18:59 (2) 19:18 (2)	06:26 18:52	07:15 17:46	07:09 15:53	07:46 15:38
21	07:40 16:14	06:51 17:09	05:50 17:58	05:41 19:49	18:55 (2) 19:13 (2)	04:48 20:37	04:29 21:05	05:38 19:59	18:59 (2) 19:19 (2)	06:27 18:50	07:17 17:43	07:10 15:51	07:47 15:39
22	07:39 16:15	06:49 17:11	05:48 17:59	05:39 19:51	18:54 (2) 19:13 (2)	04:47 20:38	04:29 21:05	05:40 19:57	18:59 (2) 19:18 (2)	06:29 18:48	07:18 17:41	07:12 15:50	07:48 15:39
23	07:38 16:17	06:47 17:13	05:45 18:01	05:37 19:52	18:54 (2) 19:13 (2)	04:46 20:39	04:29 21:06	05:41 19:55	18:59 (2) 19:18 (2)	06:31 18:45	07:20 17:39	07:14 15:49	07:48 15:40
24	07:36 16:19	06:45 17:14	05:43 18:03	05:35 19:54	18:54 (2) 19:13 (2)	04:45 20:41	04:29 21:06	05:43 19:53	18:59 (2) 19:16 (2)	06:32 18:43	07:22 17:37	07:15 15:48	07:49 15:40
25	07:35 16:20	06:42 17:16	05:41 18:04	05:33 19:56	18:54 (2) 19:12 (2)	04:43 20:42	04:30 21:06	05:45 19:50	19:00 (2) 19:16 (2)	06:34 18:41	06:24 16:35	07:17 15:47	07:49 15:41
26	07:34 16:22	06:40 17:18	05:39 18:06	05:31 19:57	18:54 (2) 19:12 (2)	04:42 20:43	04:30 21:06	05:46 19:48	19:01 (2) 19:14 (2)	06:35 18:39	06:25 16:33	07:18 15:46	07:49 15:41
27	07:33 16:24	06:38 17:20	05:36 18:08	05:29 19:59	18:54 (2) 19:11 (2)	04:41 20:45	04:30 21:06	05:48 19:46	19:03 (2) 19:12 (2)	06:37 18:36	06:27 16:31	07:20 15:45	07:50 15:42
28	07:31 16:26	06:36 17:21	05:34 18:09	05:27 20:01	18:55 (2) 19:10 (2)	04:40 20:46	04:31 21:06	05:49 19:44	06:39 18:34	06:29 16:30	07:21 15:44	07:50 15:43	
29	07:30 16:27		06:32 19:11	05:25 20:02	18:56 (2) 19:08 (2)	04:39 20:47	04:31 21:06	05:03 19:42	06:40 18:32	06:30 16:28	07:23 15:43	07:50 15:44	
30	07:29 16:29		06:29 19:13	05:23 20:04	18:59 (2) 19:06 (2)	04:38 20:48	04:32 21:06	05:04 19:40	06:42 18:29	06:32 16:26	07:24 15:43	07:50 15:44	
31	07:27 16:31		06:27 19:14		04:37 20:50		05:06 20:37	05:54 19:37		06:34 16:24		07:50 15:45	
Potential sun hours	261	278	366	413	481	495	500	453	382	334	270	247	
Total, worst case				213				216					

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

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

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 10

Licensed user:

ENVO
 ul.Sikorskiego 25/20
 PL-62 030 Lubon
 0048 662 643 300
 ENVO / envo-i.nowicki@wp.pl
 Calculated:
 2015-03-07 11:38/2.9.285

SHADOW - Calendar

Calculation: Analiza migotania cienia - wariant alternatywny **Shadow receptor:** H - SH8

Assumptions for shadow calculations

Reference year for calendar 2015
 The calculated times are "worst case" given by the following assumptions:
 The sun is shining all the day, from sunrise to sunset
 The rotor plane is always perpendicular to the line from the WTG to the sun
 The WTG is always operating

	January	February	March	April	May	June		
1	07:51 15:47	07:26 16:33	06:34 17:23	06:25 19:16	05:21 20:06	04:36 20:51	16	19:25 (1) 19:41 (1)
2	07:50 15:48	07:24 16:35	06:32 17:25	06:23 19:18	05:19 20:07	04:35 20:52	14	19:26 (1) 19:40 (1)
3	07:50 15:49	07:23 16:36	06:30 17:27	06:20 19:19	05:17 20:09	04:35 20:53	11	19:28 (1) 19:39 (1)
4	07:50 15:50	07:21 16:38	06:28 17:28	06:18 19:21	05:16 20:11	04:34 20:54	9	19:29 (1) 19:38 (1)
5	07:50 15:51	07:20 16:40	06:26 17:30	06:16 19:23	05:14 20:12	19:27 (1) 20:55	4	19:32 (1) 19:36 (1)
6	07:50 15:52	07:18 16:42	06:23 17:32	06:14 19:24	05:12 20:14	19:24 (1) 20:56	16	04:33 20:56
7	07:49 15:53	07:16 16:44	06:21 17:34	06:11 19:26	05:10 20:15	19:22 (1) 20:57	19	04:32 20:57
8	07:49 15:54	07:15 16:45	06:19 17:35	06:09 19:28	05:08 20:17	19:21 (1) 20:58	21	04:31 20:58
9	07:49 15:56	07:13 16:47	06:17 17:37	06:07 19:29	05:07 20:19	19:20 (1) 20:58	23	04:31 20:58
10	07:48 15:57	07:11 16:49	06:15 17:39	06:05 19:31	05:05 20:20	19:20 (1) 20:59	24	04:30 20:59
11	07:48 15:58	07:09 16:51	06:12 17:41	06:03 19:33	05:03 20:22	19:19 (1) 21:00	25	04:30 21:00
12	07:47 16:00	07:08 16:53	06:10 17:42	06:00 19:34	05:02 20:23	19:19 (1) 21:01	26	04:30 21:01
13	07:46 16:01	07:06 16:54	06:08 17:44	17:11 (2) 17:17 (2)	05:58 19:36	05:00 20:25	27	04:29 21:01
14	07:46 16:03	07:04 16:56	06:06 17:46	17:09 (2) 17:19 (2)	05:56 19:38	04:58 20:26	28	04:29 21:02
15	07:45 16:04	07:02 16:58	06:03 17:47	17:07 (2) 17:20 (2)	05:54 19:39	04:57 20:28	28	04:29 21:03
16	07:44 16:06	07:00 17:00	06:01 17:49	17:06 (2) 17:20 (2)	05:52 19:41	04:55 20:29	29	04:29 21:03
17	07:43 16:07	06:58 17:02	05:59 17:51	17:05 (2) 17:20 (2)	05:50 19:43	04:54 20:31	28	04:29 21:04
18	07:43 16:09	06:56 17:04	05:57 17:53	17:05 (2) 17:20 (2)	05:47 19:44	04:53 20:32	29	04:29 21:04
19	07:42 16:10	06:55 17:05	05:54 17:54	17:05 (2) 17:19 (2)	05:45 19:46	04:51 20:34	29	04:29 21:05
20	07:41 16:12	06:53 17:07	05:52 17:56	17:06 (2) 17:18 (2)	05:43 19:48	04:50 20:35	28	04:29 21:05
21	07:40 16:14	06:51 17:09	05:50 17:58	17:07 (2) 17:16 (2)	05:41 19:49	04:48 20:37	28	04:29 21:05
22	07:39 16:15	06:49 17:11	05:48 17:59	05:39 19:51	04:47 20:38	19:19 (1) 21:05	27	04:29 21:05
23	07:38 16:17	06:47 17:13	05:45 18:01	05:37 19:52	04:46 20:39	19:18 (1) 21:06	27	04:29 21:06
24	07:36 16:19	06:45 17:14	05:43 18:03	05:35 19:54	04:45 20:41	19:19 (1) 21:06	26	04:29 21:06
25	07:35 16:20	06:42 17:16	05:41 18:04	05:33 19:56	04:43 20:42	19:20 (1) 21:06	24	04:30 21:06
26	07:34 16:22	06:40 17:18	05:39 18:06	05:31 19:57	04:42 20:43	19:20 (1) 21:06	24	04:30 21:06
27	07:33 16:24	06:38 17:20	05:36 18:08	05:29 19:59	04:41 20:45	19:21 (1) 21:06	22	04:30 21:06
28	07:31 16:26	06:36 17:21	05:34 18:09	05:27 20:01	04:40 20:46	19:21 (1) 21:06	22	04:31 21:06
29	07:30 16:27	06:32 19:11	05:32 19:11	05:25 20:02	04:39 20:47	19:23 (1) 21:06	20	04:31 21:06
30	07:29 16:29	06:29 19:13	05:29 19:13	05:23 20:04	04:38 20:48	19:24 (1) 21:06	19	04:32 21:06
31	07:27 16:31	06:27 19:14	06:27 19:14	04:37 20:50	19:24 (1) 19:42 (1)	18	19:24 (1) 19:42 (1)	
Potential sun hours	261	278	366	413	482	495		
Total, worst case			108		648		54	

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

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

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 11

Licensed user:

ENVO

ul.Sikorskiego 25/20

PL-62 030 Lubon

0048 662 643 300

ENVO / envo-i.nowicki@wp.pl

Calculated:

2015-03-07 11:38/2.9.285

SHADOW - Calendar

Calculation: Analiza migotania cienia - wariant alternatywny **Shadow receptor:** H - SH8

Assumptions for shadow calculations

Reference year for calendar 2015

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December	
1	04:32 21:05	05:07 20:36	19:29 (1) 19:56 (1)	05:56 19:35	06:43 18:27	17:48 (2) 16:22	06:36 15:42
2	04:33 21:05	05:09 20:34	19:29 (1) 19:55 (1)	05:57 19:33	06:45 18:25	17:50 (2) 16:20	06:37 15:41
3	04:34 21:05	05:10 20:32	19:29 (1) 19:54 (1)	05:59 19:31	06:47 18:23	17:55 (2) 16:18	06:39 15:41
4	04:34 21:04	05:12 20:31	19:30 (1) 19:54 (1)	06:00 19:29	06:48 18:20	16:17 16:17	07:30 15:40
5	04:35 21:04	05:13 20:29	19:30 (1) 19:53 (1)	06:02 19:26	06:50 18:18	16:15 16:15	07:31 15:39
6	04:36 21:04	05:15 20:27	19:31 (1) 19:53 (1)	06:04 19:24	06:52 18:16	16:13 16:13	07:33 15:39
7	04:37 21:03	05:16 20:26	19:32 (1) 19:51 (1)	06:05 19:22	06:53 18:14	16:11 16:11	07:34 15:39
8	04:38 21:02	05:18 20:24	19:34 (1) 19:50 (1)	06:07 19:20	06:55 18:11	16:08 16:10	07:35 15:38
9	04:39 21:02	19:39 (1) 19:44 (1)	05:19 20:22	06:08 19:17	06:56 18:09	16:08 16:08	07:36 15:38
10	04:40 21:01	19:36 (1) 19:45 (1)	05:21 20:20	06:10 19:15	06:58 18:07	16:07 16:07	07:37 15:38
11	04:41 21:00	19:35 (1) 19:46 (1)	05:23 20:18	06:12 19:13	07:00 18:05	16:05 16:05	07:38 15:38
12	04:42 21:00	19:34 (1) 19:48 (1)	05:24 20:16	06:13 19:11	07:01 18:03	16:03 16:03	07:40 15:37
13	04:43 20:59	19:33 (1) 19:49 (1)	05:26 20:15	06:15 19:08	07:03 18:00	16:02 16:02	07:41 15:37
14	04:44 20:58	19:32 (1) 19:50 (1)	05:27 20:13	06:16 19:06	07:05 17:58	16:01 16:01	07:42 15:37
15	04:45 20:57	19:32 (1) 19:50 (1)	05:29 20:11	06:18 19:04	07:06 17:56	16:00 15:59	07:42 15:37
16	04:46 20:56	19:32 (1) 19:52 (1)	05:30 20:09	06:19 19:01	07:08 17:54	16:02 15:58	07:43 15:37
17	04:47 20:55	19:31 (1) 19:53 (1)	05:32 20:07	06:21 18:59	07:10 17:52	15:56 15:56	07:44 15:38
18	04:48 20:54	19:31 (1) 19:53 (1)	05:34 20:05	06:23 18:57	07:12 17:50	15:55 15:55	07:45 15:38
19	04:50 20:53	19:30 (1) 19:54 (1)	05:35 20:03	06:24 18:55	07:13 17:48	15:54 15:54	07:46 15:38
20	04:51 20:52	19:29 (1) 19:54 (1)	05:37 20:01	06:26 18:52	07:15 17:46	15:53 15:53	07:46 15:38
21	04:52 20:51	19:29 (1) 19:54 (1)	05:38 19:59	06:27 18:50	07:17 17:43	15:51 15:51	07:47 15:39
22	04:53 20:50	19:29 (1) 19:56 (1)	05:40 19:57	06:29 18:48	07:18 17:41	15:51 15:50	07:48 15:39
23	04:55 20:48	19:29 (1) 19:56 (1)	05:41 19:55	06:31 18:45	17:54 (2) 17:58 (2)	07:20 17:39	07:48 15:40
24	04:56 20:47	19:28 (1) 19:56 (1)	05:43 19:53	06:32 18:43	17:51 (2) 18:01 (2)	07:22 17:37	07:49 15:40
25	04:57 20:46	19:28 (1) 19:56 (1)	05:45 19:50	06:34 18:41	17:49 (2) 18:01 (2)	06:24 16:35	07:17 15:41
26	04:59 20:44	19:28 (1) 19:57 (1)	05:46 19:48	06:35 18:39	17:48 (2) 18:02 (2)	06:25 16:33	07:18 15:41
27	05:00 20:43	19:28 (1) 19:57 (1)	05:48 19:46	06:37 18:36	17:47 (2) 18:02 (2)	06:27 16:31	07:20 15:42
28	05:02 20:42	19:28 (1) 19:56 (1)	05:49 19:44	06:39 18:34	17:47 (2) 18:02 (2)	06:29 16:29	07:21 15:43
29	05:03 20:40	19:28 (1) 19:57 (1)	05:51 19:42	06:40 18:32	17:47 (2) 18:01 (2)	06:30 16:28	07:23 15:44
30	05:04 20:39	19:28 (1) 19:56 (1)	05:53 19:40	06:42 18:29	17:47 (2) 18:00 (2)	06:32 16:26	07:24 15:44
31	05:06 20:37	19:28 (1) 19:56 (1)	05:54 19:37	06:34 16:24	06:34 16:24	06:34 16:24	07:50 15:45
Potential sun hours	500	453	382	334	270	247	
Total, worst case	510	198	97	15			

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

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

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 12

Licensed user:

ENVO
 ul.Sikorskiego 25/20
 PL-62 030 Lubon
 0048 662 643 300
 ENVO / envio-i.nowicki@wp.pl
 Calculated:
 2015-03-07 11:38/2.9.285

SHADOW - Calendar

Calculation: Analiza migotania cienia - wariant alternatywny Shadow receptor: I - SH9

Assumptions for shadow calculations

Reference year for calendar 2015
 The calculated times are "worst case" given by the following assumptions:
 The sun is shining all the day, from sunrise to sunset
 The rotor plane is always perpendicular to the line from the WTG to the sun
 The WTG is always operating

	January	February	March	April	May	June	July	August	September	October	November	December	
1 07:51	14:02 (1)	07:26	06:34	06:25	05:21	04:36	04:32	05:07	05:56	06:43	06:36	07:26	13:52 (1)
15:47	41 15:14 (2)	16:33	17:23	19:16	20:06	20:51	21:05	20:36	19:35	18:27	16:22	15:42	35 15:01 (2)
2 07:51	14:02 (1)	07:24	06:32	06:23	05:19	04:35	04:33	05:09	05:57	06:45	06:37	07:27	13:52 (1)
15:48	41 15:14 (2)	16:35	17:25	19:18	20:07	20:52	21:05	20:34	19:33	18:25	16:20	15:41	37 15:02 (2)
3 07:50	14:03 (1)	07:23	06:30	06:20	05:17	04:35	04:34	05:10	05:59	06:47	06:39	07:29	13:51 (1)
15:49	41 15:15 (2)	16:36	17:27	19:19	20:09	20:53	21:05	20:32	19:31	18:23	16:18	15:41	39 15:02 (2)
4 07:50	14:04 (1)	07:21	06:28	06:18	05:16	04:34	04:34	05:12	06:00	06:48	06:41	07:30	13:52 (1)
15:50	41 15:16 (2)	16:38	17:28	19:21	20:11	20:54	21:05	20:31	19:29	18:20	16:17	15:40	38 15:02 (2)
5 07:50	14:04 (1)	07:20	06:26	06:16	05:14	04:33	04:35	05:13	06:02	06:50	06:43	07:31	13:51 (1)
15:51	41 15:16 (2)	16:40	17:30	19:23	20:12	20:55	21:04	20:29	19:26	18:18	16:15	15:39	39 15:02 (2)
6 07:50	14:05 (1)	07:18	06:23	06:14	05:12	04:33	04:36	05:15	06:04	06:52	06:44	07:33	13:52 (1)
15:52	41 15:17 (2)	16:42	17:32	19:24	20:14	20:56	21:04	20:27	19:24	18:16	16:13	15:39	40 15:03 (2)
7 07:50	14:06 (1)	07:16	06:21	06:11	05:10	04:32	04:37	05:16	06:05	06:53	06:46	07:34	13:52 (1)
15:53	41 15:18 (2)	16:44	17:34	19:26	20:15	20:57	21:03	20:26	19:22	18:14	16:11	15:39	40 15:03 (2)
8 07:49	14:06 (1)	07:15	06:19	06:09	05:08	04:31	04:38	05:18	06:07	06:55	06:48	07:35	13:51 (1)
15:54	41 15:18 (2)	16:45	17:35	19:28	20:17	20:58	21:03	20:24	19:20	18:11	16:10	15:38	41 15:03 (2)
9 07:49	14:07 (1)	07:13	06:17	06:07	05:07	04:31	04:39	05:19	06:08	06:56	06:50	07:36	13:51 (1)
15:56	40 15:18 (2)	16:47	17:37	19:29	20:19	20:59	21:02	20:22	19:17	18:09	16:08	15:38	41 15:03 (2)
10 07:48	14:09 (1)	07:11	06:15	06:05	05:05	04:30	04:40	05:21	06:10	06:58	06:52	07:37	13:52 (1)
15:57	38 15:19 (2)	16:49	17:39	19:31	20:20	20:59	21:01	20:20	19:15	18:07	16:07	15:38	42 15:04 (2)
11 07:48	14:09 (1)	07:09	06:12	06:03	05:03	04:30	04:41	05:23	06:12	07:00	06:53	07:39	13:52 (1)
15:58	38 15:19 (2)	16:51	17:41	19:33	20:22	21:00	21:01	20:18	19:13	18:05	16:05	15:37	41 15:04 (2)
12 07:47	14:10 (1)	07:08	06:10	06:00	05:02	04:30	04:42	05:24	06:13	07:01	06:55	07:40	13:52 (1)
16:00	36 15:19 (2)	16:53	17:42	19:34	20:23	21:01	21:00	20:16	19:11	18:03	16:03	15:37	41 15:04 (2)
13 07:47	14:12 (1)	07:06	06:08	05:58	05:00	04:29	04:43	05:26	06:15	07:03	06:57	07:41	13:53 (1)
16:01	33 15:20 (2)	16:54	17:44	19:36	20:25	21:02	20:59	20:15	19:08	18:00	16:02	15:37	40 15:04 (2)
14 07:46	14:14 (1)	07:04	06:06	05:56	04:58	04:29	04:44	05:27	06:16	07:05	06:58	07:42	13:53 (1)
16:03	31 15:20 (2)	16:56	17:46	19:38	20:26	21:02	20:58	20:13	19:06	17:58	16:01	15:37	41 15:05 (2)
15 07:45	14:15 (1)	07:02	06:03	05:54	04:57	04:29	04:45	05:29	06:18	07:06	07:00	07:43	13:53 (1)
16:04	28 15:20 (2)	16:58	17:47	19:39	20:28	21:03	20:57	20:11	19:04	17:56	15:59	15:37	40 15:05 (2)
16 07:44	14:18 (1)	07:00	06:01	05:52	04:55	04:29	04:46	05:30	06:19	07:08	07:02	07:43	13:54 (1)
16:06	23 15:20 (2)	17:00	17:49	19:41	20:29	21:03	20:56	20:09	19:01	17:54	15:58	15:37	39 15:05 (2)
17 07:43	14:22 (1)	06:58	05:59	05:50	04:54	04:29	04:47	05:32	06:21	07:10	07:04	07:44	13:54 (1)
16:07	15 15:20 (2)	17:02	17:51	19:43	20:31	21:04	20:55	20:07	18:59	17:52	15:56	15:38	40 15:05 (2)
18 07:43	15:10 (2)	06:56	05:57	05:47	04:53	04:29	04:48	05:34	06:23	07:12	07:05	07:45	13:54 (1)
16:09	10 15:20 (2)	17:04	17:53	19:44	20:32	21:04	20:54	20:05	18:57	17:50	15:55	15:38	40 15:05 (2)
19 07:42	15:11 (2)	06:55	05:54	05:45	04:51	04:29	04:50	05:35	06:24	07:13	07:07	07:46	13:55 (1)
16:10	8 15:19 (2)	17:05	17:54	19:46	20:34	21:05	20:53	20:03	18:55	17:48	15:54	15:38	38 15:05 (2)
20 07:41	15:14 (2)	06:53	05:52	05:43	04:50	04:29	04:51	05:37	06:26	07:15	07:09	07:46	13:56 (1)
16:12	3 15:17 (2)	17:07	17:56	19:48	20:35	21:05	20:52	20:01	18:52	17:46	15:53	15:38	38 15:06 (2)
21 07:40	16:14	06:51	05:50	05:41	04:48	04:29	04:52	05:38	06:27	07:17	07:10	07:47	13:55 (1)
16:14	17:09	17:58	19:49	20:37	21:05	20:51	20:51	19:59	18:50	17:43	15:51	15:39	39 15:06 (2)
22 07:39	16:15	06:49	05:48	05:39	04:47	04:29	04:53	05:40	06:29	07:18	07:12	07:48	13:56 (1)
16:15	17:11	17:59	19:51	20:38	21:06	20:50	20:50	19:57	18:48	17:41	15:50	15:39	39 15:07 (2)
23 07:38	16:17	06:47	05:45	05:37	04:46	04:29	04:55	05:41	06:31	07:20	07:14	07:48	13:56 (1)
16:17	17:13	18:01	19:53	20:39	21:06	20:48	20:48	19:55	18:45	17:39	15:49	15:40	39 15:07 (2)
24 07:36	16:19	06:45	05:43	05:35	04:45	04:29	04:56	05:43	06:32	07:22	07:15	14:49 (2)	07:49
16:19	17:14	18:03	19:54	20:41	21:06	20:47	20:47	19:53	18:43	17:37	15:48	14:55 (2)	15:40
25 07:35	16:20	06:42	05:41	05:33	04:43	04:30	04:57	05:45	06:34	07:24	07:17	14:48 (2)	07:49
16:20	17:16	18:04	19:56	20:42	21:06	20:46	20:46	19:50	18:41	17:35	15:47	14:57 (2)	15:41
26 07:34	16:22	06:40	05:39	05:31	04:42	04:30	04:59	05:46	06:35	07:25	07:18	14:46 (2)	07:49
16:22	17:18	18:06	19:57	20:43	21:06	20:44	20:44	19:48	18:39	17:33	15:46	14:57 (2)	15:41
27 07:33	16:24	06:38	05:36	05:29	04:41	04:30	05:00	05:48	06:37	07:27	07:20	13:58 (1)	07:50
16:24	17:20	18:08	19:59	20:45	21:06	20:43	20:43	19:46	18:36	17:31	15:45	14:59 (2)	15:42
28 07:31	16:26	06:36	05:34	05:27	04:40	04:31	05:02	05:49	06:39	07:29	07:21	13:56 (1)	07:50
16:26	17:21	18:09	20:01	20:46	21:06	20:42	20:42	19:44	18:34	17:29	15:44	15:00 (2)	15:43
29 07:30	16:27	06:32	05:25	05:18	04:39	04:31	05:03	05:51	06:40	07:30	07:23	13:54 (1)	07:50
16:27	19:11	20:02	20:47	21:06	20:40	20:40	19:42	18:32	17:28	16:23	15:43	15:00 (2)	15:44
30 07:29	16:29	06:29	05:23	05:16	04:38	04:32	05:04	05:53	06:42	07:32	07:24	13:53 (1)	07:50
16:29	19:13	20:04	20:48	21:06	20:39	20:39	19:40	18:29	17:26	16:26	15:43	15:01 (2)	15:44
31 07:27	16:31	06:27	05:21	05:14	04:37	04:31	05:06	05:54	06:43	07:33	07:25	13:52 (1)	07:50
16:31	19:14	20:05	20:50	21:07	20:37	20:37	19:38	18:24	17:24	16:24	15:45	15:45	41 15:13 (2)
Potential sun hours	261	278	366	413	482	495	500	453	382	334	270	247	
Total, worst case	631										135		1223

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

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

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 13

Licensed user:

ENVO

ul.Sikorskiego 25/20

PL-62 030 Lubon

0048 662 643 300

ENVO / envo-i.nowicki@wp.pl

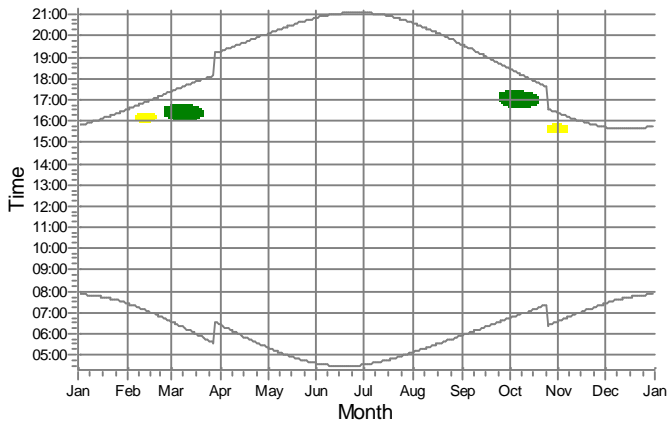
Calculated:

2015-03-07 11:38/2.9.285

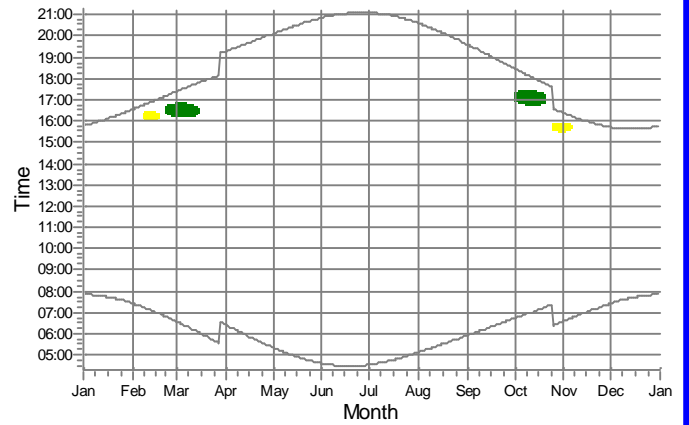
SHADOW - Calendar, graphical

Calculation: Analiza migotania cienia - wariant alternatywny

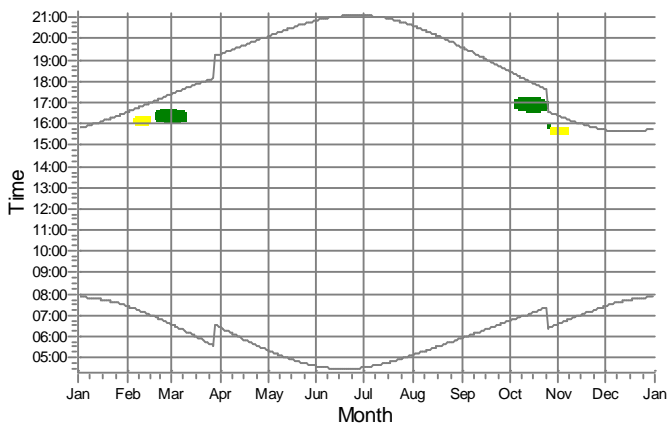
A: SH1



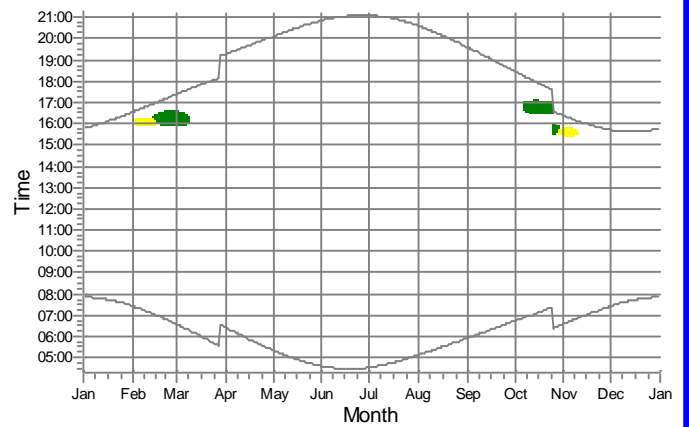
B: SH2



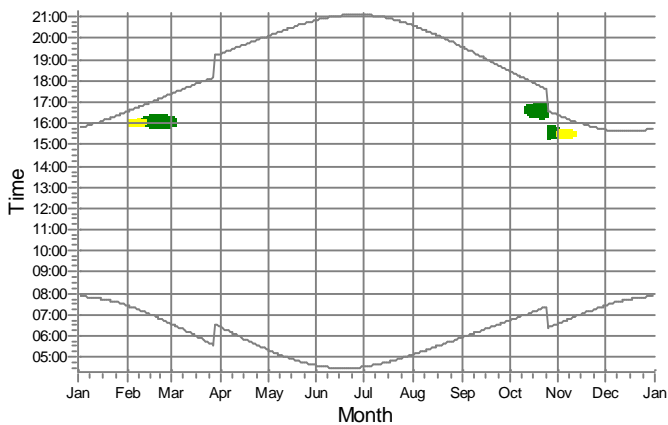
C: SH3



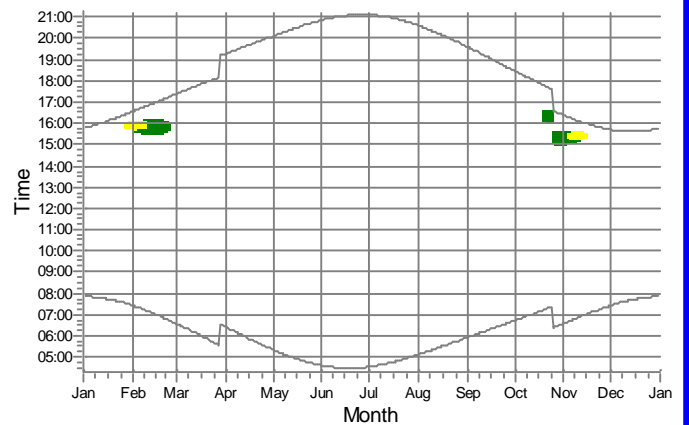
D: SH4



E: SH5



F: SH6



WTGs

 1: E1

 2: E2

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 14

Licensed user:

ENVO

ul.Sikorskiego 25/20

PL-62 030 Lubon

0048 662 643 300

ENVO / envo-i.nowicki@wp.pl

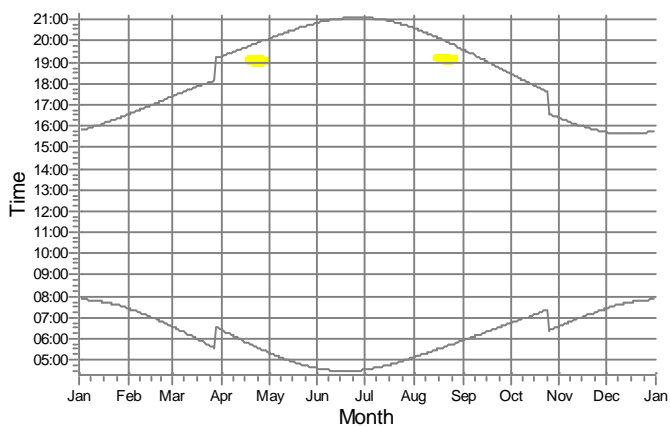
Calculated:

2015-03-07 11:38/2.9.285

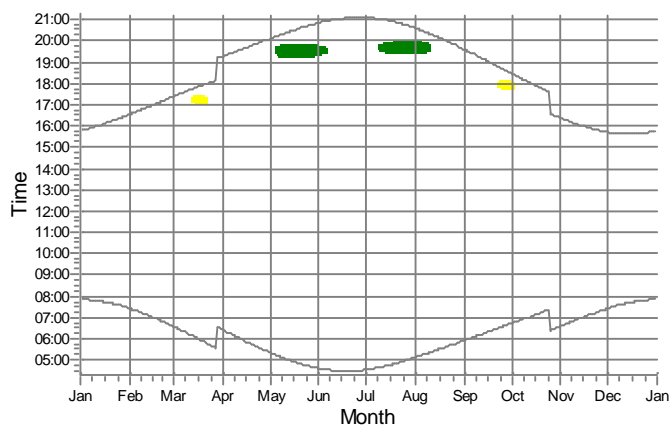
SHADOW - Calendar, graphical

Calculation: Analiza migotania cienia - wariant alternatywny

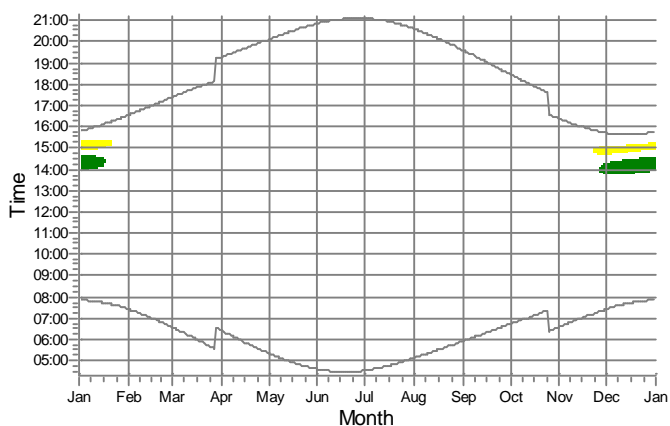
G: Sh7



H: SH8



I: SH9



WTGs

1: E1

2: E2

Project:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 15

Licensed user:

ENVO
 ul.Sikorskiego 25/20
 PL-62 030 Lubon
 0048 662 643 300
 ENVO / envio-i.nowicki@wp.pl
 Calculated:
 2015-03-07 11:38/2.9.285

SHADOW - Calendar per WTG

Calculation: Analiza migotania cienia - wariant alternatywny WTG: 1 - E1

Assumptions for shadow calculations

Reference year for calendar

2015

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June
1	07:51 14:02-14:31/29 15:47 15:48	07:26 15:47-15:52/5 16:33	06:34 15:53-16:21/28 17:23 16:18-16:46/28	06:25 05:21 19:16	05:21 20:06	04:36 19:25-19:41/16 20:51
2	07:51 14:02-14:31/29 15:48	07:24 15:43-15:55/12 16:35	06:32 15:54-16:19/25 17:25 16:16-16:46/30	06:23 05:19 19:18	05:19 20:07	04:35 19:26-19:40/14 20:52
3	07:50 14:03-14:31/28 15:49	07:23 15:40-15:58/18 16:36	06:30 15:57-16:16/19 17:27 16:14-16:47/33	06:20 05:17 19:19	05:17 20:09	04:35 19:28-19:39/11 20:53
4	07:50 14:04-14:32/28 15:50	07:21 15:39-16:00/21 16:38	06:28 15:59-16:12/13 17:29 16:10-16:46/36	06:18 05:16 19:21	05:16 20:11	04:34 19:29-19:38/9 20:54
5	07:50 14:04-14:31/27 15:51	07:20 15:38-16:01/23 16:40	06:26 16:01-16:28/27 17:30 16:26-16:46/20	06:16 05:14 19:23	05:14 19:27-19:38/11 20:12	04:33 19:32-19:36/4 20:55
6	07:50 14:05-14:32/27 15:52	07:18 15:37-16:02/25 16:42	06:23 16:03-16:27/24 17:32 16:25-16:46/21	06:14 05:12 19:24	05:12 19:24-19:40/16 20:14	04:33 20:56
7	07:50 14:06-14:33/27 15:53	07:16 15:36-16:03/27 16:44	06:21 16:05-16:25/20 17:34 16:23-16:45/22	06:11 05:10 19:26	05:10 19:22-19:41/19 20:15	04:32 20:57
8	07:49 14:06-14:32/26 15:55	07:15 15:36-16:05/29 16:45	06:19 16:06-16:20/14 17:35 16:18-16:44/26	06:09 05:08 19:28	05:08 19:21-19:42/21 20:17	04:31 20:58
9	07:49 14:07-14:32/25 15:56	07:13 15:35-16:05/30 16:47	06:17 16:06-16:31/25 17:37 16:30-16:43/13	06:07 05:07 19:29	05:07 19:20-19:43/23 20:19	04:31 20:59
10	07:48 14:09-14:32/23 15:57	07:11 15:35-16:06/31 16:49	06:15 16:06-16:28/22 17:39 16:27-16:43/16	06:05 05:05 19:31	05:05 19:20-19:44/24 20:20	04:30 20:59
11	07:48 14:09-14:32/23 15:58	07:09 15:34-16:07/33 16:51 16:07-16:11/4	06:12 16:06-16:42/36 17:41 16:42-16:43/1	06:03 05:03 19:33	05:03 19:19-19:44/25 20:22	04:30 21:00
12	07:47 14:10-14:31/21 16:00	07:08 15:34-16:07/33 16:53 16:07-16:14/7	06:10 16:06-16:39/33 17:42 16:39-16:42/3	06:00 05:02 19:34	05:02 19:19-19:45/26 20:23	04:30 21:01
13	07:47 14:12-14:31/19 16:01	07:06 15:34-16:07/33 16:55 16:07-16:16/9	06:08 16:07-16:37/30 17:44 16:37-16:41/4	05:58 05:00 19:36	05:00 19:18-19:45/27 20:25	04:29 21:02
14	07:46 14:14-14:31/17 16:03	07:04 15:34-16:07/33 16:56 16:07-16:17/10	06:06 16:07-16:32/25 17:46 16:32-16:40/8	05:56 04:59 19:38	04:59 19:18-19:46/28 20:26	04:29 21:02
15	07:45 14:15-14:30/15 16:04	07:02 15:34-16:07/33 16:58 16:07-16:19/12	06:03 16:08-16:39/31 17:47 16:37-16:41/4	05:54 04:57 19:39	04:57 19:17-19:45/28 20:28	04:29 21:03
16	07:44 14:18-14:28/10 16:06	07:00 15:34-16:07/33 17:00 16:07-16:22/15	06:01 16:09-16:37/28 17:49 16:37-16:41/4	05:52 04:55 19:41	04:55 19:17-19:46/29 20:29	04:29 21:03
17	07:43 14:22-14:25/3 16:07	06:58 15:34-16:07/33 17:02 16:06-16:24/18	05:59 16:10-16:36/26 17:51 16:37-16:41/4	05:50 04:54 19:43	04:54 19:18-19:46/28 20:31	04:29 21:04
18	07:43 16:09 16:09	06:56 15:35-16:07/32 17:04 16:06-16:26/20	05:57 16:12-16:34/22 17:53 16:37-16:41/4	05:47 04:53 19:44	04:53 19:17-19:46/29 20:32	04:29 21:04
19	07:42 16:11 16:11	06:55 15:36-16:06/30 17:05 16:05-16:28/23	05:54 16:14-16:30/16 17:54 16:37-16:41/4	05:45 04:51 19:46	04:51 19:17-19:46/29 20:34	04:29 21:05
20	07:41 16:12 16:12	06:53 15:37-16:05/28 17:07 16:04-16:31/27	05:52 16:18-16:26/8 17:56 16:37-16:41/4	05:43 04:50 19:48	04:50 19:18-19:46/28 20:35	04:29 21:05
21	07:40 16:14 16:14	06:51 15:38-16:04/26 17:09 16:03-16:33/30	05:50 04:48 17:58 16:37-16:41/4	05:41 04:48 19:49	04:48 19:18-19:46/28 20:37	04:29 21:05
22	07:39 16:15 16:15	06:49 15:39-16:03/24 17:11 16:02-16:35/33	05:48 04:47 17:59 16:37-16:41/4	05:39 04:47 19:51	04:47 19:19-19:46/27 20:38	04:29 21:06
23	07:38 16:17 16:17	06:47 15:42-16:01/19 17:13 16:00-16:38/38	05:45 04:46 18:01 16:37-16:41/4	05:37 04:46 19:53	04:46 19:18-19:45/27 20:39	04:29 21:06
24	07:36 16:19 16:19	06:45 15:45-15:57/12 17:14 15:57-16:41/44	05:43 04:45 18:03 16:37-16:41/4	05:35 04:45 19:54	04:45 19:19-19:45/26 20:41	04:29 21:06
25	07:35 16:20 16:20	06:42 15:50-16:25/35 17:16 16:22-16:42/20	05:41 04:43 18:04 16:37-16:41/4	05:33 04:43 19:56	04:43 19:20-19:44/24 20:42	04:30 21:06
26	07:34 16:22 16:22	06:40 15:50-16:24/34 17:18 16:21-16:43/22	05:39 04:42 18:06 16:37-16:41/4	05:31 04:42 19:57	04:42 19:20-19:44/24 20:43	04:30 21:06
27	07:33 16:24 16:24	06:38 15:50-16:23/33 17:20 16:20-16:44/24	05:36 04:41 18:08 16:37-16:41/4	05:29 04:41 19:59	04:41 19:21-19:43/22 20:45	04:30 21:06
28	07:31 16:26 16:26	06:36 15:51-16:22/31 17:21 16:19-16:45/26	05:34 04:40 18:09 16:37-16:41/4	05:27 04:40 20:01	04:40 19:21-19:43/22 20:46	04:31 21:06
29	07:30 16:27 16:27		06:32 04:39 19:11 16:37-16:41/4	05:25 04:39 20:02	04:39 19:23-19:43/20 20:47	04:31 21:06
30	07:29 16:29 16:29		06:29 04:38 19:13 16:37-16:41/4	05:23 04:38 20:04	04:38 19:24-19:43/19 20:48	04:32 21:06
31	07:27 16:31 16:31		06:27 04:37 19:14 16:37-16:41/4	06:27 04:37 20:50	04:37 19:24-19:42/18 20:50	
Potential sun hours	261	278	366	413	482	495
Sum of minutes with flicker	377	1119	715	0	648	54

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:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 16

Licensed user:

ENVO
 ul.Sikorskiego 25/20
 PL-62 030 Lubon
 0048 662 643 300
 ENVO / envo-i.nowicki@wp.pl
 Calculated:
 2015-03-07 11:38/2.9.285

SHADOW - Calendar per WTG

Calculation: Analiza migotania cienia - wariant alternatywny WTG: 1 - E1

Assumptions for shadow calculations

Reference year for calendar

2015

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December
1	04:33 21:05	05:07 19:29-19:56/27 20:36	05:56 19:35	06:43 16:47-17:13/26 18:27 17:13-17:20/7	06:36 15:04-15:36/32 16:22 15:36-15:42/6	07:26 13:52-14:12/20 15:42
2	04:33 21:05	05:09 19:29-19:55/26 20:34	05:57 19:33	06:45 16:45-17:16/31 18:25 17:16-17:20/4	06:37 15:04-15:36/32 16:20 15:36-15:37/1	07:27 13:52-14:14/22 15:41
3	04:34 21:05	05:10 19:29-19:54/25 20:32	05:59 19:31	06:47 16:45-17:18/33 18:23 17:18-17:20/2	06:39 15:05-15:35/30 16:18	07:29 13:51-14:15/24 15:41
4	04:35 21:05	05:12 19:30-19:54/24 20:31	06:00 19:29	06:48 16:44-17:20/36 18:20 17:20-17:21/1	06:41 15:05-15:34/29 16:17	07:30 13:52-14:16/24 15:40
5	04:35 21:04	05:13 19:30-19:53/23 20:29	06:02 19:26	06:50 16:43-17:06/23 18:18 17:05-17:20/15	06:43 15:06-15:34/28 16:15	07:31 13:51-14:16/25 15:40
6	04:36 21:04	05:15 19:31-19:53/22 20:27	06:04 19:24	06:52 16:43-17:08/25 18:16 17:07-17:20/13	06:44 15:06-15:32/26 16:13	07:33 13:52-14:18/26 15:39
7	04:37 21:03	05:16 19:32-19:51/19 20:26	06:05 19:22	06:53 16:43-16:58/15 18:14 16:56-17:21/25	06:46 15:07-15:31/24 16:11	07:34 13:52-14:18/26 15:39
8	04:38 21:03	05:18 19:34-19:50/16 20:24	06:07 19:20	06:55 16:41-17:01/20 18:11 16:59-17:21/22	06:48 15:09-15:30/21 16:10	07:35 13:51-14:19/28 15:38
9	04:39 19:39-19:44/5 21:02	05:19 19:35-19:47/12 20:22	06:08 19:17	06:56 16:38-17:02/24 18:09 17:00-17:20/20	06:50 15:10-15:29/19 16:08	07:36 13:51-14:19/28 15:38
10	04:40 19:36-19:45/9 21:01	05:21 19:39-19:43/4 20:20	06:10 19:15	06:58 16:36-17:03/27 18:07 17:01-17:21/20	06:52 15:12-15:27/15 16:07	07:37 13:52-14:21/29 15:38
11	04:41 19:35-19:46/11 21:01	05:23 20:18	06:12 19:13	07:00 16:34-16:47/13 18:05 16:45-17:21/36	06:53 15:16-15:24/8 16:05	07:39 13:52-14:21/29 15:38
12	04:42 19:34-19:48/14 21:00	05:24 20:16	06:13 19:11	07:01 16:30-16:49/19 18:03 16:47-17:20/33	06:55 16:03	07:40 13:52-14:22/30 15:37
13	04:43 19:33-19:49/16 20:59	05:26 20:15	06:15 19:08	07:03 16:27-16:52/25 18:00 16:49-17:19/30	06:57 16:02	07:41 13:53-14:22/29 15:37
14	04:44 19:32-19:50/18 20:58	05:27 20:13	06:16 19:06	07:05 16:26-16:54/28 17:58 16:51-17:19/28	06:58 16:01	07:42 13:53-14:23/30 15:37
15	04:45 19:32-19:50/18 20:57	05:29 20:11	06:18 19:04	07:06 16:24-16:55/31 17:56 16:52-17:18/26	07:00 15:59	07:42 13:53-14:23/30 15:37
16	04:46 19:32-19:52/20 20:56	05:30 20:09	06:19 19:01	07:08 16:23-16:55/32 17:54 16:52-17:16/24	07:02 15:58	07:43 13:54-14:24/30 15:37
17	04:47 19:31-19:53/22 20:55	05:32 20:07	06:21 18:59	07:10 16:22-16:56/34 17:52 16:53-17:15/22	07:04 15:56	07:44 13:54-14:25/31 15:38
18	04:48 19:31-19:53/22 20:54	05:34 20:05	06:23 18:57	07:12 16:21-16:56/35 17:50 16:53-17:14/21	07:05 15:55	07:45 13:54-14:25/31 15:38
19	04:50 19:30-19:54/24 20:53	05:35 20:03	06:24 18:55	07:13 16:16-16:28/12 17:48 16:28-17:12/44	07:07 15:54	07:46 13:55-14:25/30 15:38
20	04:51 19:29-19:54/25 20:52	05:37 20:01	06:26 18:52	07:15 16:13-16:32/19 17:46 16:31-17:09/38	07:09 15:53	07:46 13:56-14:26/30 15:38
21	04:52 19:29-19:54/25 20:51	05:38 19:59	06:27 18:50	07:17 16:10-16:33/23 17:43 16:32-17:05/33	07:10 15:51	07:47 13:55-14:26/31 15:39
22	04:53 19:29-19:56/27 20:50	05:40 19:57	06:29 18:48	07:18 16:08-16:34/26 17:41 16:33-17:04/31	07:12 15:50	07:48 13:56-14:27/31 15:39
23	04:55 19:29-19:56/27 20:48	05:41 19:55	06:31 18:45	07:20 16:07-16:35/28 17:39 16:34-17:02/28	07:14 15:49	07:48 13:56-14:27/31 15:40
24	04:56 19:28-19:56/28 20:47	05:43 19:53	06:32 18:43	07:22 16:06-16:36/30 17:37 16:35-16:59/24	07:15 15:48	07:49 13:57-14:28/31 15:40
25	04:57 19:28-19:56/28 20:46	05:45 19:50	06:34 18:41	17:00-17:11/11 06:24 15:05-15:37/32	07:17 15:47	07:49 13:58-14:28/30 15:41
26	04:59 19:28-19:57/29 20:44	05:46 19:48	06:35 18:39	16:57-17:15/18 06:25 15:05-15:38/33	07:18 15:46	07:49 13:58-14:28/30 15:41
27	05:00 19:28-19:57/29 20:43	05:48 19:46	06:37 18:36	16:53-17:16/23 06:27 15:03-15:36/33	07:20 15:45	13:58-14:05/7 07:50 13:58-14:29/31 15:42
28	05:02 19:28-19:56/28 20:42	05:49 19:44	06:39 18:34	16:51-17:18/27 06:29 15:03-15:36/33	07:21 15:44	13:56-14:08/12 07:50 14:00-14:30/30 15:43
29	05:03 19:28-19:57/29 20:40	05:51 19:42	06:40 18:32	16:50-17:19/29 06:30 15:03-15:37/34	07:23 15:43	13:54-14:10/16 07:50 14:00-14:30/30 15:44
30	05:04 19:28-19:56/28 20:39	05:53 19:40	06:42 18:29	16:48-17:19/31 06:32 15:03-15:37/34	07:24 15:43	13:53-14:12/19 07:50 14:01-14:31/30 15:44
31	05:06 19:28-19:56/28 20:37	05:54 19:38		16:26 15:37-15:46/9 06:34 15:03-15:37/34		07:50 14:01-14:31/30 15:45
Potential sun hours	500	453	382	334	270	247
Sum of minutes with flicker	510	198	139	1449	325	887

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:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 17

Licensed user:

ENVO
 ul.Sikorskiego 25/20
 PL-62 030 Lubon
 0048 662 643 300
 ENVO / envo-i.nowicki@wp.pl
 Calculated:
 2015-03-07 11:38/2.9.285

SHADOW - Calendar per WTG

Calculation: Analiza migotania cienia - wariant alternatywny **WTG: 2 - E2**

Assumptions for shadow calculations

Reference year for calendar

2015

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	January	February	March	April	May	June
1	07:51 15:02-15:14/12 15:47	07:26 15:47-16:01/14 16:33	06:34 17:23	06:25 19:16	05:21 20:06	04:36 20:51
2	07:51 15:02-15:14/12 15:48	07:24 15:47-16:02/15 16:35	06:32 17:25	06:23 19:18	05:19 20:07	04:36 20:52
3	07:50 15:02-15:15/13 15:49	07:23 15:46-16:02/16 16:36	06:30 17:27	06:20 19:19	05:17 20:09	04:35 20:53
4	07:50 15:03-15:16/13 15:50	07:21 15:47-16:04/17 16:38	06:28 17:29	06:18 19:21	05:16 20:11	04:34 20:54
5	07:50 15:02-15:16/14 15:51	07:20 15:48-16:03/15 16:40	06:26 17:30	06:16 19:23	05:14 20:12	04:33 20:55
6	07:50 15:03-15:17/14 15:52	07:18 15:48-16:02/14 16:42	06:23 17:32	06:14 19:24	05:12 20:14	04:33 20:56
7	07:50 15:04-15:18/14 15:53	07:16 15:49-16:01/12 16:44	06:21 17:34	06:11 19:26	05:10 20:15	04:32 20:57
8	07:49 15:03-15:18/15 15:55	07:15 15:52-16:01/9 16:45	06:19 17:35	06:09 19:28	05:08 20:17	04:31 20:58
9	07:49 15:03-15:18/15 15:56	07:13 15:55-16:13/18 16:47	06:17 17:37	06:07 19:29	05:07 20:19	04:31 20:59
10	07:48 15:04-15:19/15 15:57	07:11 15:56-16:12/16 16:49	06:15 17:39	06:05 19:31	05:05 20:20	04:31 20:59
11	07:48 15:04-15:19/15 15:59	07:10 15:57-16:11/14 16:51	06:12 17:41	06:03 19:33	05:03 20:22	04:30 21:00
12	07:47 15:04-15:19/15 16:00	07:08 15:59-16:09/10 16:53	06:10 17:42	06:00 19:34	05:02 20:23	04:30 21:01
13	07:47 15:06-15:20/14 16:01	07:06 16:01-16:14/13 16:55	06:08 17:44	05:58 19:36	05:00 20:25	04:29 21:02
14	07:46 15:06-15:20/14 16:03	07:04 16:02-16:11/9 16:56	06:06 17:46	05:56 19:38	04:59 20:26	04:29 21:02
15	07:45 15:07-15:20/13 16:04	07:02 16:03-16:15/12 16:58	06:03 17:47	05:54 19:39	04:57 20:28	04:29 21:03
16	07:44 15:07-15:20/13 16:06	07:00 16:04-16:19/15 17:00	06:01 17:49	05:52 19:41	04:55 20:29	04:29 21:03
17	07:44 15:08-15:20/12 16:07	06:58 16:05-16:17/12 17:02	05:59 17:51	05:50 19:43	04:54 20:31	04:29 21:04
18	07:43 15:10-15:20/10 16:09	06:57 16:09-16:11/2 17:04	05:57 17:53	05:47 19:44	04:53 20:32	04:29 21:04
19	07:42 15:11-15:19/8 16:11	06:55 17:05	05:54 17:54	05:45 19:46	04:51 20:34	04:29 21:05
20	07:41 15:14-15:17/3 16:12	06:53 17:07	05:52 17:56	05:43 19:48	04:50 20:35	04:29 21:05
21	07:40 16:14	06:51 17:09	05:50 17:58	05:41 19:49	04:48 20:37	04:29 21:05
22	07:39 16:15	06:49 17:11	05:48 17:59	05:39 19:51	04:47 20:38	04:29 21:06
23	07:38 16:17	06:47 17:13	05:45 18:01	05:37 19:53	04:46 20:39	04:29 21:06
24	07:36 16:19	06:45 17:14	05:43 18:03	05:35 19:54	04:45 20:41	04:29 21:06
25	07:35 16:21	06:42 17:16	05:41 18:04	05:33 19:56	04:43 20:42	04:30 21:06
26	07:34 16:22	06:40 17:18	05:39 18:06	05:31 19:57	04:42 20:43	04:30 21:06
27	07:33 16:24	06:38 17:20	05:36 18:08	05:29 19:59	04:41 20:45	04:31 21:06
28	07:31 15:51-15:56/5 16:26	06:36 17:22	05:34 18:09	05:27 20:01	04:40 20:46	04:31 21:06
29	07:30 15:48-15:57/9 16:27		06:32 19:11	05:25 20:02	04:39 20:47	04:31 21:06
30	07:29 15:48-15:59/11 16:29		06:29 19:13	05:23 20:04	04:38 20:48	04:32 21:06
31	07:27 15:47-16:00/13 16:31		06:27 19:14		04:37 20:50	
Potential sun hours	261	278	366	413	481	495
Sum of minutes with flicker	292	351	108	213	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:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 18

Licensed user:

ENVO
 ul.Sikorskiego 25/20
 PL-62 030 Lubon
 0048 662 643 300
 ENVO / envo-i.nowicki@wp.pl
 Calculated:
 2015-03-07 11:38/2.9.285

SHADOW - Calendar per WTG

Calculation: Analiza migotania cienia - wariant alternatywny WTG: 2 - E2

Assumptions for shadow calculations

Reference year for calendar

2015

The calculated times are "worst case" given by the following assumptions:

The sun is shining all the day, from sunrise to sunset

The rotor plane is always perpendicular to the line from the WTG to the sun

The WTG is always operating

	July	August	September	October	November	December
1	04:33 21:05	05:07 20:36	05:56 19:35	06:43 17:48-17:58/10	06:36 15:27-15:40/13	07:26 14:46-15:01/15
2	04:33 21:05	05:09 20:34	05:57 19:33	06:45 17:50-17:55/5	06:37 15:25-15:41/16	07:27 14:47-15:02/15
3	04:34 21:05	05:10 20:32	05:59 19:31	06:47 18:23	06:39 15:25-15:42/17	07:29 14:47-15:02/15
4	04:35 21:05	05:12 20:31	06:00 19:29	06:48 18:20	06:41 15:22-15:29/7	07:30 14:48-15:02/14
5	04:35 21:04	05:13 20:29	06:02 19:26	06:50 18:18	06:43 15:20-15:32/12	07:31 14:48-15:02/14
6	04:36 21:04	05:15 20:27	06:04 19:24	06:52 18:16	06:45 15:18-15:32/14	07:33 14:49-15:03/14
7	04:37 21:03	05:16 20:26	06:05 19:22	06:53 18:14	06:46 15:17-15:33/16	07:34 14:49-15:03/14
8	04:38 21:03	05:18 20:24	06:07 19:20	06:55 18:11	06:48 15:17-15:33/16	07:35 14:50-15:03/13
9	04:39 21:02	05:20 20:22	06:08 19:17	06:56 18:09	06:50 15:17-15:33/16	07:36 14:50-15:03/13
10	04:40 21:01	05:21 20:20	06:10 19:15	06:58 18:07	06:52 15:17-15:33/16	07:37 14:51-15:04/13
11	04:41 21:01	05:23 20:18	06:12 19:13	07:00 18:05	06:53 15:18-15:33/15	07:39 14:52-15:04/12
12	04:42 21:00	05:24 20:17	06:13 19:11	07:01 18:03	06:55 15:18-15:32/14	07:40 14:53-15:04/11
13	04:43 20:59	05:26 20:15	06:15 19:08	07:03 18:00	06:57 15:19-15:31/12	07:41 14:53-15:04/11
14	04:44 20:58	05:27 20:13	06:16 19:06	07:05 17:58	06:58 15:21-15:30/9	07:42 14:54-15:05/11
15	04:45 20:57	05:29 20:11	06:18 19:04	07:06 17:56	07:00 15:22-15:29/7	07:43 14:55-15:05/10
16	04:46 20:56	05:30 20:09	06:19 19:02	07:08 17:54	07:02 15:58	07:43 14:56-15:05/9
17	04:47 20:55	05:32 20:07	06:21 18:59	07:10 17:52	07:04 15:56	07:44 14:56-15:05/9
18	04:48 20:54	05:34 20:05	06:23 18:57	07:12 17:50	07:05 15:55	07:45 14:56-15:05/9
19	04:50 20:53	05:35 20:03	06:24 18:55	07:13 17:48	07:07 15:54	07:46 14:57-15:05/8
20	04:51 20:52	05:37 20:01	06:26 18:52	07:15 17:46	07:09 15:53	07:46 14:58-15:06/8
21	04:52 20:51	05:38 19:59	06:27 18:50	07:17 17:44	07:10 15:51	07:47 14:58-15:06/8
22	04:53 20:50	05:40 19:57	06:29 18:48	07:18 17:41	07:12 15:50	07:48 14:59-15:07/8
23	04:55 20:48	05:42 19:55	06:31 18:45	07:20 17:39	07:14 15:49	07:48 14:59-15:07/8
24	04:56 20:47	05:43 19:53	06:32 18:43	07:22 17:37	07:15 15:48	07:49 15:00-15:08/8
25	04:57 20:46	05:45 19:50	06:34 18:41	07:24 17:35	07:17 15:47	07:49 15:00-15:08/8
26	04:59 20:44	05:46 19:48	06:35 18:39	07:25 17:33	07:18 15:46	07:49 15:00-15:09/9
27	05:00 20:43	05:48 19:46	06:37 18:36	07:27 17:31	07:20 15:45	07:50 15:00-15:09/9
28	05:02 20:42	05:49 19:44	06:39 18:34	07:29 17:29	07:21 15:44	07:50 15:01-15:11/10
29	05:03 20:40	05:51 19:42	06:40 18:32	07:31 17:27	07:23 15:43	07:50 15:02-15:11/9
30	05:05 20:39	05:53 19:40	06:42 18:29	07:32 17:25	07:24 15:43	07:50 15:02-15:12/10
31	05:06 20:37	05:54 19:38		07:34 17:23	07:26 15:42	07:50 15:02-15:13/11
Potential sun hours	500	453	382	334	270	247
Sum of minutes with flicker	0	216	97	116	372	336

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:

Elektrownie wiatrowe Galewice

Printed/Page

2015-03-07 11:39 / 19

Licensed user:

ENVO

ul.Sikorskiego 25/20

PL-62 030 Lubon

0048 662 643 300

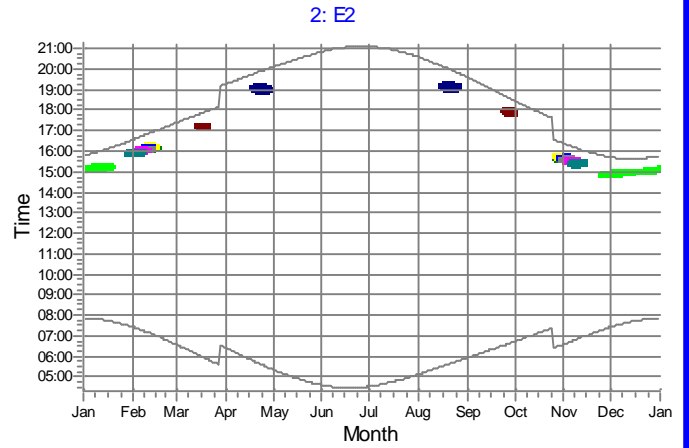
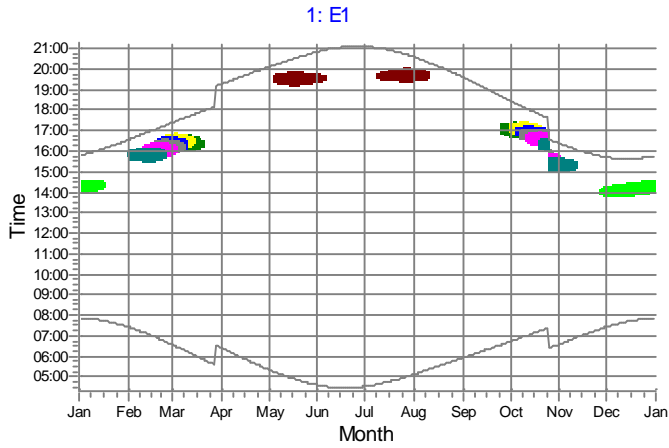
ENVO / env0-i.nowicki@wp.pl

Calculated:


2015-03-07 11:38/2.9.285

SHADOW - Calendar per WTG, graphical

Calculation: Analiza migotania cienia - wariant alternatywny



Shadow receptors

- | | | | | |
|--|--|--|---|--|
|  A: SH1 |  C: SH3 |  E: SH5 |  G: Sh7 |  I: SH9 |
|  B: SH2 |  D: SH4 |  F: SH6 |  H: SH8 | |