

Oweninny Wind Farm Phase 3

Environmental Impact Assessment Report

Appendix 14.1 WindPro Model Report

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH3_T01 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (1)

Assumptions for shadow calculations

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	08:59	08:28	07:29	07:14	06:04	05:13	05:09	05:50	06:45	07:39	07:38	08:34
	16:25	17:17	18:14	20:13	21:09	22:00	22:15	21:39	20:32	19:17	17:06	16:21
2	08:58	08:26	07:27	07:11	06:01	05:12	05:10	05:52	06:47	07:41	07:40	08:35
	16:27	17:19	18:16	20:15	21:11	22:01	22:15	21:37	20:29	19:15	17:04	16:20
3	08:58	08:24	07:25	07:09	05:59	05:12	05:11	05:53	06:49	07:43	07:42	08:37
	16:28	17:21	18:18	20:17	21:13	22:03	22:14	21:35	20:27	19:12	17:02	16:19
4	08:58	08:22	07:22	07:06	05:57	05:11	05:12	05:55	06:50	07:44	07:44	08:38
	16:29	17:23	18:20	20:19	21:15	22:04	22:14	21:33	20:24	19:10	17:00	16:19
5	08:58	08:21	07:20	07:04	05:55	05:10	05:13	05:57	06:52	07:46	07:46	08:40
	16:30	17:26	18:22	20:21	21:17	22:05	22:13	21:32	20:22	19:07	16:58	16:18
6	08:57	08:19	07:18	07:01	05:53	05:09	05:13	05:58	06:54	07:48	07:48	08:41
	16:32	17:28	18:24	20:23	21:19	22:06	22:12	21:30	20:19	19:05	16:56	16:17
7	08:57	08:17	07:15	06:59	05:51	05:08	05:14	06:00	06:56	07:50	07:50	08:42
	16:33	17:30	18:26	20:24	21:20	22:07	22:12	21:28	20:17	19:02	16:54	16:17
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	16:34	17:32	18:28	20:26	21:22	22:08	22:11	21:26	20:14	19:00	16:52	16:17
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11	08:54	08:09	07:05	06:49	05:44	05:06	05:19	06:07	07:03	07:57	07:58	08:47
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	16:42	17:42	18:37	20:36	21:31	22:12	22:07	21:15	20:02	18:48	16:44	16:15
14	08:52	08:03	06:58	06:42	05:38	05:05	05:22	06:13	07:08	08:03	08:03	08:51
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	17:00	18:02	18:56	20:54	21:47	22:16	21:54	20:53	19:37	18:25	16:29	16:18
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	17:02	18:04	18:58	20:56	21:49	22:16	21:52	20:51	19:35	18:23	16:28	16:18
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	17:04	18:06	19:00	20:58	21:50	22:16	21:51	20:48	19:32	17:21	16:27	16:19
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31	08:29		07:16		05:14		05:48	06:43		07:36		08:59
	17:15		20:11		21:59		21:41	20:34		17:08		16:24
Potential sun hours	248	272	367	421	495	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH3_T02 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (2)

Assumptions for shadow calculations

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
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	January	February	March	April	May	June	July	August	September	October	November	December
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2	08:58 16:27	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:28	08:24 17:21	07:25 18:18	07:09 20:17	05:59 21:13	05:12 22:02	05:11 22:14	05:53 21:35	06:48 20:27	07:43 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:11 22:04	05:12 22:14	05:55 21:33	06:50 20:24	07:44 19:10	07:44 17:00	08:38 16:19
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12	08:53 16:41	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:08	06:09 21:17	07:05 20:05	07:59 18:50	08:00 16:45	08:48 16:15
13	08:53 16:42	08:05 17:42	07:01 18:37	06:44 20:36	05:40 21:31	05:06 22:12	05:21 22:07	06:11 21:15	07:06 20:02	08:01 18:48	08:01 16:44	08:49 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:38 21:33	05:05 22:12	05:22 22:05	06:13 21:13	07:08 20:00	08:03 18:46	08:03 16:42	08:50 16:15
15	08:51 16:45	08:01 17:46	06:56 18:41	06:40 20:39	05:37 21:34	05:05 22:13	05:24 22:04	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:51 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:55	08:07 18:41	08:07 16:39	08:52 16:15
17	08:49 16:49	07:56 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:14	05:26 22:02	06:18 21:06	07:14 19:52	08:09 18:39	08:09 16:37	08:53 16:15
18	08:48 16:51	07:54 17:52	06:48 18:47	06:33 20:45	05:32 21:39	05:05 22:15	05:28 22:01	06:20 21:04	07:15 19:50	08:11 18:36	08:11 16:36	08:54 16:16
19	08:47 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:29 21:59	06:22 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:51	06:28 20:49	05:29 21:43	05:05 22:15	05:31 21:58	06:23 21:00	07:19 19:45	08:15 18:32	08:15 16:33	08:55 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:26 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:57	07:21 19:42	08:16 18:29	08:17 16:32	08:56 16:17
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23	08:41 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:47	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:06 22:16	05:37 21:52	06:30 20:51	07:26 19:35	08:22 18:23	08:22 16:28	08:57 16:18
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29	08:33 17:11		07:21 20:08	06:08 21:06	05:17 21:56	05:08 22:16	05:45 21:44	06:39 20:39	07:35 19:22	08:30 17:12	08:30 16:23	08:59 16:22
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31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
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2	08:58 16:27	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
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7	08:57 16:33	08:17 17:30	07:15 18:26	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:28	06:56 20:17	07:50 19:02	07:50 16:54	08:42 16:17
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17	08:49 16:49	07:56 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:14	05:26 22:02	06:18 21:06	07:14 19:52	08:09 18:39	08:09 16:37	08:53 16:15
18	08:48 16:51	07:54 17:52	06:48 18:47	06:32 20:45	05:32 21:39	05:05 22:15	05:28 22:01	06:20 21:04	07:15 19:50	08:11 18:36	08:11 16:36	08:54 16:16
19	08:47 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:29 21:59	06:21 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:51	06:28 20:49	05:28 21:43	05:05 22:15	05:31 21:58	06:23 21:00	07:19 19:44	08:15 18:32	08:15 16:33	08:55 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:26 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:57	07:21 19:42	08:16 18:29	08:17 16:31	08:56 16:17
22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:53	05:26 21:46	05:05 22:16	05:34 21:55	06:27 20:55	07:23 19:39	08:18 18:27	08:18 16:30	08:57 16:17
23	08:41 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:47	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:06 22:16	05:37 21:52	06:30 20:51	07:26 19:34	08:22 18:23	08:22 16:28	08:57 16:18
25	08:39 17:04	07:39 18:06	06:31 19:00	06:17 20:58	05:21 21:50	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:20	08:24 16:27	08:58 16:19
26	08:37 17:06	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:29	08:25 17:18	08:25 16:25	08:58 16:20
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:44	07:32 19:27	08:28 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:06	06:10 21:04	05:18 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:33 19:25	08:29 17:14	08:29 16:23	08:59 16:21
29	08:33 17:11	07:31 19:04	06:21 20:07	06:08 21:06	05:16 21:56	05:08 22:16	05:45 21:44	06:39 20:39	07:35 19:22	08:30 17:12	08:30 16:22	08:59 16:22
30	08:31 17:13	07:29 19:04	06:18 20:09	06:06 21:07	05:15 21:57	05:09 22:15	05:46 21:43	06:41 20:36	07:37 19:20	08:34 17:10	08:32 16:22	08:59 16:23
31	08:29 17:15	07:27 19:06	06:16 20:11	06:04 21:09	05:14 21:59	05:08 22:16	05:48 21:41	06:43 20:34	07:38 19:12	08:36 17:08	08:36 16:23	08:59 16:24
Potential sun hours	248	272	367	421	495	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH3_T04 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (4)

Assumptions for shadow calculations

- 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	08:59	08:28	07:29	07:14	06:04	05:13	05:09	05:50	06:45	07:39	07:38	08:34
	16:25	17:17	18:14	20:13	21:09	22:00	22:15	21:39	20:32	19:17	17:06	16:21
2	08:58	08:26	07:27	07:11	06:01	05:12	05:10	05:51	06:47	07:41	07:40	08:35
	16:27	17:19	18:16	20:15	21:11	22:01	22:15	21:37	20:29	19:15	17:04	16:20
3	08:58	08:24	07:25	07:09	05:59	05:11	05:11	05:53	06:48	07:43	07:42	08:37
	16:28	17:21	18:18	20:17	21:13	22:02	22:14	21:35	20:27	19:12	17:02	16:19
4	08:58	08:22	07:22	07:06	05:57	05:11	05:12	05:55	06:50	07:44	07:44	08:38
	16:29	17:23	18:20	20:19	21:15	22:04	22:14	21:33	20:24	19:10	17:00	16:19
5	08:58	08:21	07:20	07:04	05:55	05:10	05:12	05:57	06:52	07:46	07:46	08:40
	16:30	17:25	18:22	20:21	21:17	22:05	22:13	21:32	20:22	19:07	16:58	16:18
6	08:57	08:19	07:18	07:01	05:53	05:09	05:13	05:58	06:54	07:48	07:48	08:41
	16:32	17:28	18:24	20:23	21:18	22:06	22:12	21:30	20:19	19:05	16:56	16:17
7	08:57	08:17	07:15	06:59	05:51	05:08	05:14	06:00	06:56	07:50	07:50	08:42
	16:33	17:30	18:26	20:24	21:20	22:07	22:12	21:28	20:17	19:02	16:54	16:17
8	08:56	08:15	07:13	06:56	05:49	05:08	05:15	06:02	06:57	07:52	07:52	08:44
	16:34	17:32	18:28	20:26	21:22	22:08	22:11	21:26	20:14	19:00	16:52	16:16
9	08:56	08:13	07:10	06:54	05:47	05:07	05:16	06:04	06:59	07:54	07:54	08:45
	16:36	17:34	18:30	20:28	21:24	22:09	22:10	21:24	20:12	18:58	16:50	16:16
10	08:55	08:11	07:08	06:52	05:46	05:07	05:18	06:05	07:01	07:56	07:56	08:46
	16:37	17:36	18:31	20:30	21:26	22:10	22:09	21:21	20:09	18:55	16:49	16:16
11	08:54	08:09	07:05	06:49	05:44	05:06	05:19	06:07	07:03	07:57	07:58	08:47
	16:39	17:38	18:33	20:32	21:27	22:10	22:09	21:19	20:07	18:53	16:47	16:16
12	08:53	08:07	07:03	06:47	05:42	05:06	05:20	06:09	07:05	07:59	08:00	08:48
	16:40	17:40	18:35	20:34	21:29	22:11	22:08	21:17	20:05	18:50	16:45	16:15
13	08:53	08:05	07:01	06:44	05:40	05:05	05:21	06:11	07:06	08:01	08:01	08:50
	16:42	17:42	18:37	20:36	21:31	22:12	22:07	21:15	20:02	18:48	16:43	16:15
14	08:52	08:03	06:58	06:42	05:38	05:05	05:22	06:13	07:08	08:03	08:03	08:51
	16:44	17:44	18:39	20:38	21:33	22:13	22:06	21:13	20:00	18:46	16:42	16:15
15	08:51	08:01	06:56	06:40	05:37	05:05	05:24	06:14	07:10	08:05	08:05	08:51
	16:45	17:46	18:41	20:39	21:34	22:13	22:04	21:11	19:57	18:43	16:40	16:15
16	08:50	07:59	06:53	06:37	05:35	05:05	05:25	06:16	07:12	08:07	08:07	08:52
	16:47	17:48	18:43	20:41	21:36	22:14	22:03	21:09	19:55	18:41	16:39	16:15
17	08:49	07:56	06:51	06:35	05:33	05:05	05:26	06:18	07:14	08:09	08:09	08:53
	16:49	17:50	18:45	20:43	21:38	22:14	22:02	21:07	19:52	18:39	16:37	16:15
18	08:48	07:54	06:48	06:32	05:32	05:05	05:28	06:20	07:15	08:11	08:11	08:54
	16:51	17:52	18:47	20:45	21:39	22:15	22:01	21:04	19:50	18:36	16:36	16:16
19	08:47	07:52	06:46	06:30	05:30	05:05	05:29	06:21	07:17	08:13	08:13	08:55
	16:52	17:54	18:49	20:47	21:41	22:15	22:00	21:02	19:47	18:34	16:34	16:16
20	08:45	07:50	06:43	06:28	05:29	05:05	05:31	06:23	07:19	08:15	08:15	08:55
	16:54	17:56	18:51	20:49	21:43	22:15	21:58	21:00	19:45	18:32	16:33	16:16
21	08:44	07:48	06:41	06:26	05:27	05:05	05:32	06:25	07:21	08:16	08:17	08:56
	16:56	17:58	18:52	20:51	21:44	22:16	21:57	20:58	19:42	18:29	16:32	16:17
22	08:43	07:45	06:38	06:23	05:26	05:05	05:34	06:27	07:23	08:18	08:18	08:57
	16:58	18:00	18:54	20:53	21:46	22:16	21:55	20:55	19:40	18:27	16:30	16:17
23	08:41	07:43	06:36	06:21	05:24	05:05	05:35	06:29	07:24	08:20	08:20	08:57
	17:00	18:02	18:56	20:54	21:47	22:16	21:54	20:53	19:37	18:25	16:29	16:18
24	08:40	07:41	06:33	06:19	05:23	05:06	05:37	06:30	07:26	08:22	08:22	08:57
	17:02	18:04	18:58	20:56	21:49	22:16	21:52	20:51	19:35	18:23	16:28	16:18
25	08:39	07:39	06:31	06:17	05:21	05:06	05:38	06:32	07:28	08:24	08:24	08:58
	17:04	18:06	19:00	20:58	21:50	22:16	21:51	20:48	19:32	17:20	16:27	16:19
26	08:37	07:36	06:28	06:14	05:20	05:06	05:40	06:34	07:30	08:26	08:25	08:58
	17:06	18:08	19:02	21:00	21:52	22:16	21:49	20:46	19:30	17:18	16:25	16:20
27	08:36	07:34	06:26	06:12	05:19	05:07	05:41	06:36	07:32	08:28	08:27	08:58
	17:07	18:10	19:04	21:02	21:53	22:16	21:48	20:44	19:27	17:16	16:24	16:20
28	08:34	07:32	06:23	06:10	05:18	05:07	05:43	06:38	07:33	08:29	08:29	08:59
	17:09	18:12	19:06	21:04	21:55	22:16	21:46	20:41	19:25	17:14	16:23	16:21
29	08:33		07:21	06:08	05:16	05:08	05:45	06:39	07:35	08:31	08:30	08:59
	17:11		20:08	21:06	21:56	22:16	21:44	20:39	19:22	17:12	16:22	16:22
30	08:31		07:18	06:06	05:15	05:09	05:46	06:41	07:37	08:34	08:32	08:59
	17:13		20:09	21:07	21:57	22:15	21:43	20:36	19:20	17:10	16:22	16:23
31	08:29		07:16		05:14		05:48	06:43		07:36		08:59
	17:15		20:11		21:59		21:41	20:34		17:08		16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH3_T05 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (5)

Assumptions for shadow calculations

- 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	08:59	08:28	07:29	07:14	06:04	05:13	05:09	05:50	06:45	07:39	07:38	08:34
	16:26	17:17	18:14	20:13	21:09	22:00	22:15	21:39	20:32	19:17	17:06	16:21
2	08:58	08:26	07:27	07:11	06:01	05:12	05:10	05:52	06:47	07:41	07:40	08:35
	16:27	17:19	18:16	20:15	21:11	22:01	22:15	21:37	20:29	19:15	17:04	16:20
3	08:58	08:24	07:25	07:09	05:59	05:12	05:11	05:53	06:49	07:43	07:42	08:37
	16:28	17:21	18:18	20:17	21:13	22:02	22:14	21:35	20:27	19:12	17:02	16:19
4	08:58	08:22	07:22	07:06	05:57	05:11	05:12	05:55	06:50	07:44	07:44	08:38
	16:29	17:23	18:20	20:19	21:15	22:04	22:14	21:33	20:24	19:10	17:00	16:19
5	08:58	08:21	07:20	07:04	05:55	05:10	05:13	05:57	06:52	07:46	07:46	08:40
	16:30	17:26	18:22	20:21	21:17	22:05	22:13	21:32	20:22	19:07	16:58	16:18
6	08:57	08:19	07:18	07:01	05:53	05:09	05:13	05:58	06:54	07:48	07:48	08:41
	16:32	17:28	18:24	20:23	21:18	22:06	22:12	21:30	20:19	19:05	16:56	16:17
7	08:57	08:17	07:15	06:59	05:51	05:08	05:14	06:00	06:56	07:50	07:50	08:42
	16:33	17:30	18:26	20:24	21:20	22:07	22:12	21:28	20:17	19:02	16:54	16:17
8	08:56	08:15	07:13	06:56	05:49	05:08	05:15	06:02	06:57	07:52	07:52	08:44
	16:34	17:32	18:28	20:26	21:22	22:08	22:11	21:26	20:14	19:00	16:52	16:17
9	08:56	08:13	07:10	06:54	05:48	05:07	05:17	06:04	06:59	07:54	07:54	08:45
	16:36	17:34	18:30	20:28	21:24	22:09	22:10	21:24	20:12	18:58	16:50	16:16
10	08:55	08:11	07:08	06:52	05:46	05:07	05:18	06:05	07:01	07:56	07:56	08:46
	16:37	17:36	18:31	20:30	21:26	22:10	22:09	21:22	20:10	18:55	16:49	16:16
11	08:54	08:09	07:05	06:49	05:44	05:06	05:19	06:07	07:03	07:57	07:58	08:47
	16:39	17:38	18:33	20:32	21:27	22:10	22:09	21:19	20:07	18:53	16:47	16:16
12	08:53	08:07	07:03	06:47	05:42	05:06	05:20	06:09	07:05	07:59	08:00	08:48
	16:41	17:40	18:35	20:34	21:29	22:11	22:08	21:17	20:05	18:50	16:45	16:15
13	08:53	08:05	07:01	06:44	05:40	05:06	05:21	06:11	07:06	08:01	08:01	08:50
	16:42	17:42	18:37	20:36	21:31	22:12	22:07	21:15	20:02	18:48	16:44	16:15
14	08:52	08:03	06:58	06:42	05:38	05:05	05:22	06:13	07:08	08:03	08:03	08:51
	16:44	17:44	18:39	20:38	21:33	22:13	22:06	21:13	20:00	18:46	16:42	16:15
15	08:51	08:01	06:56	06:40	05:37	05:05	05:24	06:14	07:10	08:05	08:05	08:51
	16:45	17:46	18:41	20:39	21:34	22:13	22:04	21:11	19:57	18:43	16:40	16:15
16	08:50	07:59	06:53	06:37	05:35	05:05	05:25	06:16	07:12	08:07	08:07	08:52
	16:47	17:48	18:43	20:41	21:36	22:14	22:03	21:09	19:55	18:41	16:39	16:15
17	08:49	07:56	06:51	06:35	05:33	05:05	05:26	06:18	07:14	08:09	08:09	08:53
	16:49	17:50	18:45	20:43	21:38	22:14	22:02	21:07	19:52	18:39	16:37	16:15
18	08:48	07:54	06:48	06:33	05:32	05:05	05:28	06:20	07:15	08:11	08:11	08:54
	16:51	17:52	18:47	20:45	21:39	22:15	22:01	21:04	19:50	18:36	16:36	16:16
19	08:47	07:52	06:46	06:30	05:30	05:05	05:29	06:22	07:17	08:13	08:13	08:55
	16:52	17:54	18:49	20:47	21:41	22:15	22:00	21:02	19:47	18:34	16:34	16:16
20	08:45	07:50	06:43	06:28	05:29	05:05	05:31	06:23	07:19	08:15	08:15	08:55
	16:54	17:56	18:51	20:49	21:43	22:15	21:58	21:00	19:45	18:32	16:33	16:16
21	08:44	07:48	06:41	06:26	05:27	05:05	05:32	06:25	07:21	08:16	08:17	08:56
	16:56	17:58	18:52	20:51	21:44	22:16	21:57	20:58	19:42	18:29	16:32	16:17
22	08:43	07:45	06:38	06:23	05:26	05:05	05:34	06:27	07:23	08:18	08:18	08:57
	16:58	18:00	18:54	20:53	21:46	22:16	21:55	20:55	19:40	18:27	16:30	16:17
23	08:41	07:43	06:36	06:21	05:24	05:05	05:35	06:29	07:24	08:20	08:20	08:57
	17:00	18:02	18:56	20:54	21:47	22:16	21:54	20:53	19:37	18:25	16:29	16:18
24	08:40	07:41	06:33	06:19	05:23	05:06	05:37	06:31	07:26	08:22	08:22	08:57
	17:02	18:04	18:58	20:56	21:49	22:16	21:52	20:51	19:35	18:23	16:28	16:18
25	08:39	07:39	06:31	06:17	05:21	05:06	05:38	06:32	07:28	08:24	08:24	08:58
	17:04	18:06	19:00	20:58	21:50	22:16	21:51	20:48	19:32	17:21	16:27	16:19
26	08:37	07:36	06:28	06:14	05:20	05:06	05:40	06:34	07:30	08:26	08:25	08:58
	17:06	18:08	19:02	21:00	21:52	22:16	21:49	20:46	19:30	17:18	16:26	16:20
27	08:36	07:34	06:26	06:12	05:19	05:07	05:42	06:36	07:32	08:28	08:27	08:58
	17:08	18:10	19:04	21:02	21:53	22:16	21:48	20:44	19:27	17:16	16:24	16:20
28	08:34	07:32	06:23	06:10	05:18	05:07	05:43	06:38	07:33	08:29	08:29	08:59
	17:09	18:12	19:06	21:04	21:55	22:16	21:46	20:41	19:25	17:14	16:23	16:21
29	08:33		07:21	06:08	05:17	05:08	05:45	06:40	07:35	08:30	08:30	08:59
	17:11		20:08	21:06	21:56	22:16	21:44	20:39	19:22	17:12	16:23	16:22
30	08:31		07:18	06:06	05:15	05:09	05:46	06:41	07:37	08:32	08:32	08:59
	17:13		20:09	21:07	21:57	22:15	21:43	20:36	19:20	17:10	16:22	16:23
31	08:29		07:16		05:14		05:48	06:43		07:36		08:59
	17:15		20:11		21:59		21:41	20:34		17:08		16:24
Potential sun hours	248	272	367	421	495	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH3_T06 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (6)

Assumptions for shadow calculations

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	08:59	08:28	07:29	07:14	06:04	05:13	05:09	05:50	06:45	07:39	07:38	08:34
	16:25	17:17	18:14	20:13	21:09	22:00	22:15	21:39	20:32	19:17	17:06	16:21
2	08:58	08:26	07:27	07:11	06:01	05:12	05:10	05:51	06:47	07:41	07:40	08:35
	16:27	17:19	18:16	20:15	21:11	22:01	22:15	21:37	20:29	19:15	17:04	16:20
3	08:58	08:24	07:25	07:09	05:59	05:11	05:11	05:53	06:48	07:43	07:42	08:37
	16:28	17:21	18:18	20:17	21:13	22:03	22:14	21:35	20:27	19:12	17:02	16:19
4	08:58	08:22	07:22	07:06	05:57	05:11	05:12	05:55	06:50	07:44	07:44	08:38
	16:29	17:23	18:20	20:19	21:15	22:04	22:14	21:33	20:24	19:10	17:00	16:19
5	08:58	08:21	07:20	07:04	05:55	05:10	05:12	05:57	06:52	07:46	07:46	08:40
	16:30	17:25	18:22	20:21	21:17	22:05	22:13	21:32	20:22	19:07	16:58	16:18
6	08:57	08:19	07:18	07:01	05:53	05:09	05:13	05:58	06:54	07:48	07:48	08:41
	16:32	17:27	18:24	20:23	21:19	22:06	22:12	21:30	20:19	19:05	16:56	16:17
7	08:57	08:17	07:15	06:59	05:51	05:08	05:14	06:00	06:56	07:50	07:50	08:42
	16:33	17:30	18:26	20:24	21:20	22:07	22:12	21:28	20:17	19:02	16:54	16:17
8	08:56	08:15	07:13	06:56	05:49	05:08	05:15	06:02	06:57	07:52	07:52	08:44
	16:34	17:32	18:28	20:26	21:22	22:08	22:11	21:26	20:14	19:00	16:52	16:16
9	08:56	08:13	07:10	06:54	05:47	05:07	05:16	06:04	06:59	07:54	07:54	08:45
	16:36	17:34	18:30	20:28	21:24	22:09	22:10	21:24	20:12	18:58	16:50	16:16
10	08:55	08:11	07:08	06:51	05:46	05:07	05:18	06:05	07:01	07:56	07:56	08:46
	16:37	17:36	18:31	20:30	21:26	22:10	22:09	21:22	20:10	18:55	16:49	16:16
11	08:54	08:09	07:05	06:49	05:44	05:06	05:19	06:07	07:03	07:57	07:58	08:47
	16:39	17:38	18:33	20:32	21:27	22:10	22:09	21:19	20:07	18:53	16:47	16:15
12	08:53	08:07	07:03	06:47	05:42	05:06	05:20	06:09	07:05	07:59	08:00	08:48
	16:40	17:40	18:35	20:34	21:29	22:11	22:08	21:17	20:05	18:50	16:45	16:15
13	08:53	08:05	07:01	06:44	05:40	05:05	05:21	06:11	07:06	08:01	08:02	08:50
	16:42	17:42	18:37	20:36	21:31	22:12	22:07	21:15	20:02	18:48	16:43	16:15
14	08:52	08:03	06:58	06:42	05:38	05:05	05:22	06:12	07:08	08:03	08:03	08:51
	16:44	17:44	18:39	20:38	21:33	22:13	22:06	21:13	20:00	18:46	16:42	16:15
15	08:51	08:01	06:56	06:40	05:37	05:05	05:24	06:14	07:10	08:05	08:05	08:52
	16:45	17:46	18:41	20:39	21:34	22:13	22:04	21:11	19:57	18:43	16:40	16:15
16	08:50	07:59	06:53	06:37	05:35	05:05	05:25	06:16	07:12	08:07	08:07	08:52
	16:47	17:48	18:43	20:41	21:36	22:14	22:03	21:09	19:55	18:41	16:39	16:15
17	08:49	07:56	06:51	06:35	05:33	05:05	05:26	06:18	07:14	08:09	08:09	08:53
	16:49	17:50	18:45	20:43	21:38	22:14	22:02	21:07	19:52	18:39	16:37	16:15
18	08:48	07:54	06:48	06:32	05:32	05:05	05:28	06:20	07:15	08:11	08:11	08:54
	16:51	17:52	18:47	20:45	21:39	22:15	22:01	21:04	19:50	18:36	16:36	16:16
19	08:47	07:52	06:46	06:30	05:30	05:05	05:29	06:21	07:17	08:13	08:13	08:55
	16:52	17:54	18:49	20:47	21:41	22:15	22:00	21:02	19:47	18:34	16:34	16:16
20	08:45	07:50	06:43	06:28	05:28	05:05	05:31	06:23	07:19	08:15	08:15	08:55
	16:54	17:56	18:51	20:49	21:43	22:15	21:58	21:00	19:45	18:32	16:33	16:16
21	08:44	07:48	06:41	06:26	05:27	05:05	05:32	06:25	07:21	08:16	08:17	08:56
	16:56	17:58	18:52	20:51	21:44	22:16	21:57	20:58	19:42	18:29	16:31	16:17
22	08:43	07:45	06:38	06:23	05:25	05:05	05:34	06:27	07:23	08:18	08:18	08:57
	16:58	18:00	18:54	20:53	21:46	22:16	21:55	20:55	19:40	18:27	16:30	16:17
23	08:42	07:43	06:36	06:21	05:24	05:05	05:35	06:29	07:24	08:20	08:20	08:57
	17:00	18:02	18:56	20:54	21:47	22:16	21:54	20:53	19:37	18:25	16:29	16:18
24	08:40	07:41	06:33	06:19	05:23	05:06	05:37	06:30	07:26	08:22	08:22	08:58
	17:02	18:04	18:58	20:56	21:49	22:16	21:52	20:51	19:35	18:23	16:28	16:18
25	08:39	07:39	06:31	06:17	05:21	05:06	05:38	06:32	07:28	08:24	08:24	08:58
	17:04	18:06	19:00	20:58	21:50	22:16	21:51	20:48	19:32	17:20	16:27	16:19
26	08:37	07:36	06:28	06:14	05:20	05:06	05:40	06:34	07:30	08:26	08:25	08:58
	17:06	18:08	19:02	21:00	21:52	22:16	21:49	20:46	19:30	17:18	16:25	16:20
27	08:36	07:34	06:26	06:12	05:19	05:07	05:41	06:36	07:32	08:28	08:27	08:58
	17:07	18:10	19:04	21:02	21:53	22:16	21:48	20:44	19:27	17:16	16:24	16:20
28	08:34	07:32	06:23	06:10	05:18	05:07	05:43	06:38	07:33	08:29	08:29	08:59
	17:09	18:12	19:06	21:04	21:55	22:16	21:46	20:41	19:25	17:14	16:23	16:21
29	08:33		07:21	06:08	05:16	05:08	05:45	06:39	07:35	08:31	08:31	08:59
	17:11		20:08	21:06	21:56	22:16	21:44	20:39	19:22	17:12	16:22	16:22
30	08:31		07:18	06:06	05:15	05:08	05:46	06:41	07:37	08:34	08:32	08:59
	17:13		20:09	21:07	21:58	22:15	21:43	20:36	19:20	17:10	16:22	16:23
31	08:29		07:16		05:14		05:48	06:43		07:36		08:59
	17:15		20:11		21:59		21:41	20:34		17:08		16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH3_T07 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (7)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:58 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:33	08:24 17:21	07:25 18:18	07:09 20:17	05:59 21:13	05:11 22:02	05:11 22:14	05:53 21:35	06:48 20:27	07:43 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:11 22:04	05:12 22:14	05:55 21:33	06:50 20:24	07:44 19:10	07:44 17:00	08:38 16:18
5	08:58 16:30	08:20 17:25	07:20 18:22	07:04 20:21	05:55 21:17	05:10 22:05	05:12 22:13	05:57 21:31	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:32	08:19 17:27	07:17 18:24	07:01 20:22	05:53 21:18	05:09 22:06	05:13 22:12	05:58 21:30	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:29	07:15 18:26	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:28	06:56 20:17	07:50 19:02	07:50 16:54	08:42 16:17
8	08:56 16:34	08:15 17:32	07:13 18:28	06:56 20:26	05:49 21:22	05:08 22:08	05:15 22:11	06:02 21:26	06:57 20:14	07:52 19:00	07:52 16:52	08:44 16:16
9	08:56 16:36	08:13 17:34	07:10 18:29	06:54 20:28	05:47 21:24	05:07 22:09	05:16 22:10	06:04 21:24	06:59 20:12	07:54 18:57	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:36	07:08 18:31	06:51 20:30	05:46 21:26	05:07 22:10	05:18 22:09	06:05 21:21	07:01 20:09	07:56 18:55	07:56 16:49	08:46 16:16
11	08:54 16:39	08:09 17:38	07:05 18:33	06:49 20:32	05:44 21:27	05:06 22:10	05:19 22:08	06:07 21:19	07:03 20:07	07:57 18:53	07:58 16:47	08:47 16:15
12	08:53 16:40	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:08	06:09 21:17	07:05 20:04	07:59 18:50	08:00 16:45	08:48 16:15
13	08:53 16:42	08:05 17:42	07:01 18:37	06:44 20:36	05:40 21:31	05:05 22:12	05:21 22:07	06:11 21:15	07:06 20:02	08:01 18:48	08:01 16:43	08:49 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:38 21:33	05:05 22:13	05:22 22:05	06:12 21:13	07:08 19:59	08:03 18:46	08:03 16:42	08:51 16:15
15	08:51 16:45	08:01 17:46	06:56 18:41	06:39 20:39	05:37 21:34	05:05 22:13	05:24 22:04	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:51 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:54	08:07 18:41	08:07 16:39	08:52 16:15
17	08:49 16:49	07:56 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:14	05:26 22:02	06:18 21:06	07:14 19:52	08:09 18:38	08:09 16:37	08:53 16:15
18	08:48 16:51	07:54 17:52	06:48 18:47	06:32 20:45	05:32 21:39	05:05 22:15	05:28 22:01	06:20 21:04	07:15 19:49	08:11 18:36	08:11 16:36	08:54 16:16
19	08:47 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:29 21:59	06:21 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:51	06:28 20:49	05:28 21:43	05:05 22:15	05:31 21:58	06:23 21:00	07:19 19:44	08:15 18:32	08:15 16:33	08:55 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:26 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:57	07:21 19:42	08:16 18:29	08:17 16:31	08:56 16:17
22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:53	05:25 21:46	05:05 22:16	05:34 21:55	06:27 20:55	07:23 19:39	08:18 18:27	08:18 16:30	08:57 16:17
23	08:41 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:47	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:05 22:16	05:37 21:52	06:30 20:51	07:26 19:34	08:22 18:23	08:22 16:28	08:57 16:18
25	08:39 17:04	07:39 18:06	06:31 19:00	06:16 20:58	05:21 21:50	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:20	08:24 16:27	08:58 16:19
26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:29	08:25 17:18	08:25 16:25	08:58 16:20
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:44	07:32 19:27	08:28 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:06	06:10 21:04	05:18 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:33 19:24	08:29 17:14	08:29 16:23	08:59 16:21
29	08:33 17:11		07:21 20:07	06:08 21:06	05:16 21:56	05:08 22:16	05:45 21:44	06:39 20:39	07:35 19:22	08:30 17:12	08:30 16:22	08:59 16:22
30	08:31 17:13		07:18 20:09	06:06 21:07	05:15 21:57	05:08 22:15	05:46 21:43	06:41 20:36	07:37 19:20	08:32 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH3_T08 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (8)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:31	07:39 19:17	07:38 17:06	08:34 16:21
2	08:58 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:14	07:40 17:04	08:35 16:20
3	08:58 16:28	08:24 17:21	07:25 18:18	07:08 20:17	05:59 21:13	05:11 22:02	05:11 22:14	05:53 21:35	06:48 20:27	07:42 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:10 22:04	05:11 22:14	05:55 21:33	06:50 20:24	07:44 19:10	07:44 17:00	08:38 16:18
5	08:58 16:30	08:20 17:25	07:20 18:22	07:04 20:21	05:55 21:17	05:10 22:05	05:12 22:13	05:56 21:31	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:31	08:19 17:27	07:17 18:24	07:01 20:22	05:53 21:18	05:09 22:06	05:13 22:12	05:58 21:29	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:29	07:15 18:25	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:27	06:55 20:17	07:50 19:02	07:50 16:54	08:42 16:17
8	08:56 16:34	08:15 17:31	07:13 18:27	06:56 20:26	05:49 21:22	05:08 22:08	05:15 22:11	06:02 21:25	06:57 20:14	07:52 19:00	07:52 16:52	08:44 16:16
9	08:55 16:36	08:13 17:33	07:10 18:29	06:54 20:28	05:47 21:24	05:07 22:09	05:16 22:10	06:03 21:23	06:59 20:12	07:54 18:57	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:35	07:08 18:31	06:51 20:30	05:45 21:26	05:06 22:10	05:17 22:09	06:05 21:21	07:01 20:09	07:55 18:55	07:56 16:48	08:46 16:16
11	08:54 16:39	08:09 17:38	07:05 18:33	06:49 20:32	05:44 21:27	05:06 22:10	05:19 22:08	06:07 21:19	07:03 20:07	07:57 18:53	07:58 16:47	08:47 16:15
12	08:53 16:40	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:07	06:09 21:17	07:04 20:04	07:59 18:50	07:59 16:45	08:48 16:15
13	08:53 16:42	08:05 17:42	07:00 18:37	06:44 20:36	05:40 21:31	05:05 22:12	05:21 22:06	06:11 21:15	07:06 20:02	08:01 18:48	08:01 16:43	08:49 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:37	05:38 21:33	05:05 22:12	05:22 22:05	06:12 21:13	07:08 19:59	08:03 18:45	08:03 16:42	08:50 16:15
15	08:51 16:45	08:01 17:46	06:55 18:41	06:39 20:39	05:36 21:34	05:05 22:13	05:23 22:04	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:51 16:15
16	08:50 16:47	07:58 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:54	08:07 18:41	08:07 16:38	08:52 16:15
17	08:49 16:49	07:56 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:04 22:14	05:26 22:02	06:18 21:06	07:13 19:52	08:09 18:38	08:09 16:37	08:53 16:15
18	08:48 16:50	07:54 17:52	06:48 18:47	06:32 20:45	05:31 21:39	05:04 22:15	05:28 22:01	06:20 21:04	07:15 19:49	08:11 18:36	08:11 16:35	08:54 16:15
19	08:46 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:04 22:15	05:29 22:02	06:21 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:50	06:28 20:49	05:28 21:43	05:04 22:15	05:30 21:58	06:23 21:00	07:19 19:44	08:14 18:31	08:15 16:33	08:55 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:25 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:57	07:21 19:42	08:16 18:29	08:16 16:31	08:56 16:16
22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:52	05:25 21:46	05:05 22:16	05:33 21:55	06:27 20:55	07:22 19:39	08:18 18:27	08:18 16:30	08:56 16:17
23	08:41 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:47	05:05 22:16	05:35 21:54	06:28 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:17
24	08:40 17:01	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:05 22:16	05:36 21:52	06:30 20:50	07:26 19:34	08:22 18:23	08:22 16:28	08:57 16:18
25	08:39 17:03	07:39 18:06	06:31 19:00	06:16 20:58	05:21 21:50	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:20	08:24 16:26	08:58 16:19
26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:29	08:25 17:18	08:25 16:25	08:58 16:19
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:43	07:31 19:27	08:27 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:06	06:10 21:04	05:17 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:33 19:24	08:29 17:14	08:29 16:23	08:58 16:21
29	08:33 17:11	7:31 19:04	06:21 20:07	06:08 21:06	05:16 21:56	05:08 22:16	05:45 21:44	06:39 20:39	07:35 19:22	08:30 17:12	08:30 16:22	08:59 16:22
30	08:31 17:13	7:29 19:09	06:18 20:09	06:05 21:07	05:15 21:57	05:08 22:15	05:46 21:42	06:41 20:36	07:37 19:19	08:32 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15	7:27 19:11	06:16 20:11	6:03 21:09	05:14 21:59	05:08 22:15	05:48 21:41	06:43 20:34	7:38 19:14	08:36 17:08	08:36 16:24	08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH3_T09 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (9)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:31	07:39 19:17	07:38 17:06	08:34 16:20
2	08:58 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:46 20:29	07:41 19:14	07:40 17:03	08:35 16:20
3	08:58 16:27	08:24 17:21	07:25 18:18	07:08 20:17	05:59 21:13	05:11 22:02	05:10 22:14	05:53 21:35	06:48 20:27	07:42 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:10 22:04	05:11 22:14	05:55 21:33	06:50 20:24	07:44 19:10	07:44 17:00	08:38 16:18
5	08:58 16:30	08:20 17:25	07:20 18:22	07:03 20:21	05:55 21:17	05:10 22:05	05:12 22:13	05:56 21:31	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:31	08:19 17:27	07:17 18:24	07:01 20:22	05:53 21:18	05:09 22:06	05:13 22:12	05:58 21:29	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:29	07:15 18:25	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:27	06:55 20:17	07:50 19:02	07:50 16:54	08:42 16:17
8	08:56 16:34	08:15 17:31	07:13 18:27	06:56 20:26	05:49 21:22	05:07 22:08	05:15 22:11	06:02 21:25	06:57 20:14	07:52 19:00	07:52 16:52	08:44 16:16
9	08:56 16:36	08:13 17:33	07:10 18:29	06:54 20:28	05:47 21:24	05:07 22:09	05:16 22:10	06:03 21:23	06:59 20:12	07:54 18:57	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:35	07:08 18:31	06:51 20:30	05:45 21:26	05:06 22:10	05:17 22:09	06:05 21:21	07:01 20:09	07:55 18:55	07:56 16:48	08:46 16:16
11	08:54 16:39	08:09 17:37	07:05 18:33	06:49 20:32	05:43 21:27	05:06 22:10	05:18 22:08	06:07 21:19	07:03 20:07	07:57 18:53	07:58 16:47	08:47 16:15
12	08:53 16:40	08:07 17:40	07:03 18:35	06:46 20:34	05:42 21:29	05:06 22:11	05:20 22:08	06:09 21:17	07:04 20:04	07:59 18:50	07:59 16:45	08:48 16:15
13	08:53 16:42	08:05 17:42	07:00 18:37	06:44 20:36	05:40 21:31	05:05 22:12	05:21 22:06	06:11 21:15	07:06 20:02	08:01 18:48	08:01 16:43	08:49 16:15
14	08:52 16:43	08:03 17:44	06:58 18:39	06:42 20:37	05:38 21:33	05:05 22:12	05:22 22:05	06:12 21:13	07:08 19:59	08:03 18:45	08:03 16:42	08:50 16:15
15	08:51 16:45	08:01 17:46	06:55 18:41	06:39 20:39	05:36 21:34	05:05 22:13	05:23 22:04	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:51 16:15
16	08:50 16:47	07:58 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:04 22:14	05:25 22:03	06:16 21:09	07:12 19:54	08:07 18:41	08:07 16:38	08:52 16:15
17	08:49 16:49	07:56 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:04 22:14	05:26 22:02	06:18 21:06	07:13 19:52	08:09 18:38	08:09 16:37	08:53 16:15
18	08:48 16:50	07:54 17:52	06:48 18:47	06:32 20:45	05:31 21:39	05:04 22:15	05:28 22:01	06:19 21:04	07:15 19:49	08:11 18:36	08:11 16:35	08:54 16:15
19	08:46 16:52	07:52 17:54	06:46 18:48	06:30 20:47	05:30 21:41	05:04 22:15	05:29 22:15	06:21 21:02	07:17 19:47	08:12 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:50	06:28 20:49	05:28 21:43	05:04 22:15	05:30 21:58	06:23 21:00	07:19 19:44	08:14 18:31	08:15 16:33	08:55 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:25 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:57	07:21 19:42	08:16 18:29	08:16 16:31	08:56 16:16
22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:52	05:25 21:46	05:05 22:16	05:33 21:55	06:27 20:55	07:22 19:39	08:18 18:27	08:18 16:30	08:57 16:17
23	08:41 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:47	05:05 22:16	05:35 21:54	06:28 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:17
24	08:40 17:01	07:41 18:04	06:33 18:58	06:19 20:56	05:22 21:49	05:05 22:16	05:36 21:52	06:30 20:50	07:26 19:34	08:22 18:22	08:22 16:27	08:57 16:18
25	08:39 17:03	07:39 18:06	06:31 19:00	06:16 20:58	05:21 21:50	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:20	08:24 16:26	08:58 16:19
26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:29	08:26 17:18	08:25 16:25	08:58 16:19
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:43	07:31 19:27	08:27 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:05	06:10 21:04	05:17 21:55	05:07 22:16	05:43 21:46	06:37 20:41	07:33 19:24	08:29 17:14	08:29 16:23	08:58 16:21
29	08:33 17:11	07:31 18:07	06:21 19:01	06:08 21:05	05:16 21:56	05:08 22:16	05:44 21:44	06:39 20:39	07:35 19:22	08:30 17:12	08:30 16:22	08:59 16:22
30	08:31 17:13	07:29 18:04	06:18 19:00	06:05 21:07	05:15 21:57	05:08 22:15	05:46 21:42	06:41 20:36	07:37 19:19	08:32 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15	07:27 18:01	06:16 19:00	06:03 21:04	05:14 21:59	05:07 22:16	05:48 21:41	06:43 20:34	07:38 19:10	08:33 17:08	08:33 16:20	08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH3_T10 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (10)

Assumptions for shadow calculations

- 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

Table with columns for months (January to December) and rows for days (1 to 31). Each cell contains a time range (Sun rise to Sun set). Summary rows at the bottom show 'Potential sun hours' and 'Sum of minutes with flicker' for each month.

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

Matrix with 2 rows and 3 columns: Day in month, Sun rise (hh:mm) / Sun set (hh:mm), First time (hh:mm) with flicker / Last time (hh:mm) with flicker / Minutes with flicker.

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH3_T11 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !OI hub: 121.0 m (TOT: 200.0 m) (11)

Assumptions for shadow calculations

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	08:58 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:31	07:39 19:17	07:38 17:06	08:34 16:21
2	08:58 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:14	05:51 21:37	06:47 20:29	07:41 19:14	07:40 17:04	08:35 16:20
3	08:58 16:28	08:24 17:21	07:25 18:18	07:08 20:17	05:59 21:13	05:11 22:02	05:11 22:14	05:53 21:35	06:48 20:27	07:42 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:10 22:04	05:11 22:14	05:55 21:33	06:50 20:24	07:44 19:10	07:44 17:00	08:38 16:18
5	08:57 16:30	08:20 17:25	07:20 18:22	07:04 20:21	05:55 21:17	05:10 22:05	05:12 22:13	05:56 21:31	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:31	08:19 17:27	07:17 18:24	07:01 20:22	05:53 21:18	05:09 22:06	05:13 22:12	05:58 21:29	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:29	07:15 18:25	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:27	06:55 20:17	07:50 19:02	07:50 16:54	08:42 16:17
8	08:56 16:34	08:15 17:31	07:13 18:27	06:56 20:26	05:49 21:22	05:08 22:08	05:15 22:11	06:02 21:25	06:57 20:14	07:52 19:00	07:52 16:52	08:44 16:16
9	08:55 16:36	08:13 17:33	07:10 18:29	06:54 20:28	05:47 21:24	05:07 22:09	05:16 22:10	06:03 21:23	06:59 20:12	07:54 18:57	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:36	07:08 18:31	06:51 20:30	05:45 21:26	05:07 22:09	05:17 22:09	06:05 21:21	07:01 20:09	07:55 18:55	07:56 16:48	08:46 16:16
11	08:54 16:39	08:09 17:38	07:05 18:33	06:49 20:32	05:44 21:27	05:06 22:10	05:19 22:08	06:07 21:19	07:03 20:07	07:57 18:53	07:57 16:47	08:47 16:15
12	08:53 16:40	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:07	06:09 21:17	07:04 20:04	07:59 18:50	07:59 16:45	08:48 16:15
13	08:52 16:42	08:05 17:42	07:00 18:37	06:44 20:36	05:40 21:31	05:05 22:12	05:21 22:06	06:11 21:15	07:06 20:02	08:01 18:48	08:01 16:43	08:49 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:37	05:38 21:33	05:05 22:12	05:22 22:05	06:12 21:13	07:08 19:59	08:03 18:45	08:03 16:42	08:50 16:15
15	08:51 16:45	08:01 17:46	06:55 18:41	06:39 20:39	05:36 21:34	05:05 22:13	05:24 22:04	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:51 16:15
16	08:50 16:47	07:58 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:54	08:07 18:41	08:07 16:39	08:52 16:15
17	08:49 16:49	07:56 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:14	05:26 22:02	06:18 21:06	07:13 19:52	08:09 18:38	08:09 16:37	08:53 16:15
18	08:48 16:50	07:54 17:52	06:48 18:47	06:32 20:45	05:31 21:39	05:04 22:14	05:28 22:01	06:20 21:04	07:15 19:49	08:11 18:36	08:11 16:36	08:54 16:15
19	08:46 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:04 22:15	05:29 22:02	06:21 21:02	07:17 19:47	08:12 18:34	08:12 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:50	06:28 20:49	05:28 21:43	05:05 22:15	05:30 21:58	06:23 21:00	07:19 19:44	08:14 18:31	08:15 16:33	08:55 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:25 20:51	05:27 21:44	05:05 22:15	05:32 21:57	06:25 20:57	07:21 19:42	08:16 18:29	08:16 16:31	08:56 16:16
22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:52	05:25 21:46	05:05 22:16	05:33 21:55	06:27 20:55	07:22 19:39	08:18 18:27	08:18 16:30	08:56 16:17
23	08:41 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:47	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:17
24	08:40 17:02	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:05 22:16	05:37 21:52	06:30 20:50	07:26 19:34	08:22 18:23	08:22 16:28	08:57 16:18
25	08:39 17:03	07:39 18:06	06:31 19:00	06:16 20:58	05:21 21:50	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:20	08:24 16:26	08:58 16:19
26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:29	08:25 17:18	08:25 16:25	08:58 16:19
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:43	07:31 19:27	08:28 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:05	06:10 21:04	05:17 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:33 19:24	08:29 17:14	08:29 16:23	08:58 16:21
29	08:32 17:11		07:21 20:07	06:08 21:05	05:16 21:56	05:08 22:15	05:45 21:44	06:39 20:39	07:35 19:22	08:30 17:12	08:30 16:22	08:59 16:22
30	08:31 17:13		07:18 20:09	06:05 21:07	05:15 21:57	05:08 22:15	05:46 21:42	06:41 20:36	07:37 19:19	08:32 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH3_T12 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !OI hub: 121.0 m (TOT: 200.0 m) (12)

Assumptions for shadow calculations

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	08:58 16:25	08:27 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:31	07:39 19:17	07:38 17:06	08:34 16:21
2	08:58 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:14	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:28	08:24 17:21	07:25 18:18	07:08 20:17	05:59 21:13	05:11 22:02	05:11 22:14	05:53 21:35	06:48 20:27	07:42 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:11 22:03	05:12 22:13	05:55 21:33	06:50 20:24	07:44 19:10	07:44 17:00	08:38 16:18
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29	08:32 17:11		07:21 20:07	06:08 21:05	05:16 21:56	05:08 22:15	05:45 21:44	06:39 20:39	07:35 19:22	08:30 17:12	08:30 16:22	08:59 16:22
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31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		08:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	495	512	514	461	382	328	258	231
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) Sun set (hh:mm)	First time (hh:mm) with flicker Last time (hh:mm) with flicker/Minutes with flicker	Last time (hh:mm) with flicker Minutes with flicker
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SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH3_T13 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !0! hub: 121.0 m (TOT: 200.0 m) (13)

Assumptions for shadow calculations

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	08:58 16:25	08:27 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:31	07:39 19:17	07:38 17:06	08:33 16:21
2	08:58 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:14	05:51 21:37	06:47 20:29	07:41 19:14	07:40 17:04	08:35 16:20
3	08:58 16:28	08:24 17:21	07:25 18:18	07:08 20:17	05:59 21:13	05:11 22:02	05:11 22:14	05:53 21:35	06:48 20:27	07:42 19:12	07:42 17:02	08:37 16:19
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15	08:51 16:45	08:01 17:46	06:55 18:41	06:39 20:39	05:37 21:34	05:05 22:13	05:24 22:04	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:51 16:15
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Potential sun hours	248	272	367	421	495	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH3_T14 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (14)

Assumptions for shadow calculations

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	08:58 16:25	08:27 17:17	07:29 18:14	07:13 20:13	06:03 21:09	20:17-20:21/4	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:31	07:39 19:17	07:38 17:06	08:34 16:21
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22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:52	20:10-20:23/13	05:25 21:46	05:33 21:55	06:27 20:55	20:15-20:26/11	07:22 19:39	08:18 18:27	08:18 16:30	08:56 16:17
23	08:41 17:00	07:43 18:02	06:36 18:56	06:21 20:54	20:10-20:25/15	05:24 21:47	05:35 21:54	06:29 20:53	20:16-20:24/8	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:17
24	08:40 17:02	07:41 18:04	06:33 18:58	06:19 20:56	20:10-20:27/17	05:23 21:49	05:37 21:52	06:30 20:50	20:16-20:21/5	07:26 19:34	08:22 18:23	08:22 16:28	08:57 16:18
25	08:39 17:03	07:39 18:06	06:31 19:00	06:16 20:58	20:10-20:29/19	05:21 21:50	05:38 21:51	06:32 20:48	20:17-20:19/2	07:28 19:32	07:24 17:20	08:24 16:26	08:58 16:19
26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	20:10-20:29/19	05:20 21:52	05:40 21:49	06:34 20:46		07:30 19:29	07:26 17:18	08:25 16:25	08:58 16:19
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	20:10-20:28/18	05:19 21:53	05:41 21:47	06:36 20:43		07:31 19:27	07:28 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:05	06:10 21:04	20:11-20:27/16	05:17 21:55	05:43 21:46	06:38 20:41		07:33 19:24	07:30 17:14	08:29 16:23	08:58 16:21
29	08:32 17:11	07:21 18:07	06:08 19:05	06:08 21:05	20:12-20:26/14	05:16 21:56	05:45 21:44	06:39 20:39		07:35 19:22	07:32 17:12	08:30 16:22	08:59 16:22
30	08:31 17:13	07:18 18:09	06:05 19:07	06:05 21:07	20:14-20:24/10	05:15 21:57	05:46 21:42	06:41 20:36		07:37 19:19	07:34 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15	07:15 18:11	06:11 19:06			05:14 21:59	05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24	
Potential sun hours	248	272	367	421	496	512	514	461	382	328	258	231	0
Sum of minutes with flicker	0	0	0	167	4	0	0	176	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
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Project:

10889_Oweninny Wind Farm_Model_200_TH

Licensed user:

Tobin Consulting Engineers
Block 10-4, Blanchardstown, Corporate Park
IE-DUBLIN 15
+353 1 80304 01
michael.nolan / michael.nolan@tobin.ie
Calculated:
26/05/2022 12:56/3.3.294

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH3_T15 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (15)

Assumptions for shadow calculations

- 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

Table with 12 columns for months (January to December) and 13 rows of time slots (1-13). Each cell contains start and end times for shadow events. Summary row at bottom shows 'Potential sun hours' and 'Sum of minutes with flicker' for each month.

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

Matrix with 2 rows and 3 columns: Day in month, Sun rise (hh:mm) / Sun set (hh:mm), First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH3_T16 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !O! hub: 121.0 m (TOT: 200.0 m) (16)

Assumptions for shadow calculations

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	08:58 16:25	08:27 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	21:15-21:25/10 22:15	05:09 22:15	21:18-21:39/21 21:39	06:45 20:31	07:39 19:17	07:38 17:06	08:33 16:21
2	08:58 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	21:15-21:26/11 22:14	05:10 22:14	21:18-21:38/20 21:37	06:46 20:29	07:41 19:14	07:40 17:04	08:35 16:20
3	08:58 16:28	08:24 17:21	07:24 18:18	07:08 20:17	05:59 21:13	05:11 22:02	21:15-21:27/12 22:14	05:11 22:14	21:18-21:38/20 21:35	06:48 20:27	07:42 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:10 22:03	21:14-21:28/14 22:13	05:11 22:13	21:19-21:38/19 21:33	06:50 20:24	07:44 19:09	07:44 17:00	08:38 16:18
5	08:57 16:30	08:20 17:25	07:20 18:22	07:03 20:20	05:55 21:16	05:10 22:05	21:14-21:29/15 22:13	05:12 22:13	21:20-21:37/17 21:31	06:52 20:22	07:46 19:07	07:46 16:58	08:39 16:18
6	08:57 16:31	08:18 17:27	07:17 18:23	07:01 20:22	05:53 21:18	05:09 22:06	21:14-21:30/16 22:12	05:13 22:12	21:20-21:37/17 21:29	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:29	07:15 18:25	06:59 20:24	05:51 21:20	05:08 22:07	21:13-21:31/18 22:12	05:14 22:12	21:20-21:35/15 21:27	06:00 20:17	06:55 19:02	07:50 16:54	08:42 16:17
8	08:56 16:34	08:15 17:31	07:13 18:27	06:56 20:26	05:49 21:22	05:08 22:08	21:14-21:32/18 22:11	05:15 22:11	21:20-21:35/15 21:25	06:02 20:14	06:57 19:00	07:52 16:52	08:44 16:16
9	08:55 16:36	08:13 17:33	07:10 18:29	06:54 20:28	05:47 21:24	05:07 22:09	21:13-21:32/19 22:10	05:16 22:10	21:21-21:34/13 21:23	06:03 20:12	06:59 18:57	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:35	07:08 18:31	06:51 20:30	05:45 21:25	05:06 22:09	21:14-21:33/19 22:09	05:17 22:09	21:22-21:33/11 21:21	06:05 20:09	07:55 18:55	07:55 16:48	08:46 16:16
11	08:54 16:39	08:09 17:37	07:05 18:33	06:49 20:32	05:44 21:27	05:06 22:10	21:13-21:34/21 22:08	05:19 22:08	21:23-21:34/11 21:19	06:07 20:07	07:57 18:52	07:57 16:47	08:47 16:15
12	08:53 16:40	08:07 17:40	07:03 18:35	06:46 20:34	05:42 21:29	05:06 22:11	21:13-21:35/22 22:07	05:20 22:07	21:24-21:33/9 21:17	06:09 20:04	07:59 18:50	07:59 16:45	08:48 16:15
13	08:52 16:42	08:05 17:42	07:00 18:37	06:44 20:35	05:40 21:31	05:05 22:12	21:13-21:35/22 22:06	05:21 22:06	21:25-21:32/7 21:15	06:11 20:02	08:01 18:48	08:01 16:43	08:49 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:37	05:38 21:33	05:05 22:12	21:14-21:36/22 22:05	05:22 22:05	21:26-21:31/5 21:13	06:12 19:59	08:03 18:45	08:03 16:42	08:50 16:15
15	08:51 16:45	08:01 17:46	06:55 18:41	06:39 20:39	05:36 21:34	05:05 22:13	21:14-21:37/23 22:04	05:23 22:04	21:27-21:29/2 21:11	06:14 19:57	08:05 18:43	08:05 16:40	08:51 16:15
16	08:50 16:47	07:58 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:13	21:14-21:37/23 22:03	05:25 22:03	06:16 21:09	06:12 19:54	08:07 18:41	08:07 16:38	08:52 16:15
17	08:49 16:49	07:56 17:50	06:50 18:45	06:35 20:43	05:33 21:38	05:04 22:14	21:14-21:38/24 22:02	05:26 22:02	06:18 21:06	07:13 19:52	08:09 18:38	08:09 16:37	08:53 16:15
18	08:47 16:50	07:54 17:52	06:48 18:47	06:32 20:45	05:31 21:39	05:04 22:14	21:14-21:38/24 22:01	05:28 22:01	06:19 21:04	07:15 19:49	08:11 18:36	08:11 16:35	08:54 16:15
19	08:46 16:52	07:52 17:54	06:46 18:48	06:30 20:47	05:30 21:41	05:04 22:15	21:15-21:39/24 21:59	05:29 21:59	06:21 21:02	07:17 19:47	08:12 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:50	06:28 20:49	05:28 21:43	05:04 22:15	21:15-21:39/24 21:58	05:30 21:58	06:23 21:00	07:19 19:44	08:14 18:31	08:15 16:33	08:55 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:25 20:50	05:27 21:44	05:05 22:15	21:15-21:39/24 21:57	05:32 21:57	06:25 20:57	07:21 19:42	08:16 18:29	08:16 16:31	08:56 16:16
22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:52	05:25 21:46	05:05 22:16	21:15-21:39/24 21:55	05:33 21:55	06:27 20:55	07:22 19:39	08:18 18:27	08:18 16:30	08:56 16:17
23	08:41 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:47	05:05 22:16	21:15-21:39/24 21:54	05:35 21:54	06:28 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:17
24	08:40 17:01	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:05 22:16	21:16-21:39/23 21:52	05:36 21:52	06:30 20:50	07:26 19:34	08:22 18:22	08:22 16:28	08:57 16:18
25	08:39 17:03	07:38 18:06	06:31 19:00	06:16 20:58	05:21 21:50	05:06 22:16	21:15-21:39/24 21:51	05:38 21:51	06:32 20:48	07:28 19:32	07:24 17:20	08:24 16:26	08:58 16:19
26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	21:16-21:40/24 21:49	05:40 21:49	06:34 20:46	07:30 19:29	07:26 17:18	08:25 16:25	08:58 16:19
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	21:16-21:39/23 21:47	05:41 21:47	06:36 20:43	07:31 19:27	07:28 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:05	06:10 21:04	05:17 21:55	05:07 22:16	21:17-21:39/22 21:46	05:43 21:46	06:37 20:41	07:33 19:24	07:30 17:14	08:29 16:23	08:58 16:21
29	08:32 17:11	07:21 20:07	06:08 21:05	05:16 21:56	21:18-21:21/3 21:56	05:08 22:15	21:17-21:39/22 21:44	05:45 21:44	06:39 20:39	07:35 19:22	07:32 17:12	08:30 16:22	08:58 16:22
30	08:31 17:13	07:18 20:09	06:05 21:07	05:15 21:57	21:17-21:23/6 21:57	05:08 22:15	21:17-21:39/22 21:42	05:46 21:42	06:41 20:36	07:37 19:19	07:34 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15	07:16 20:11	06:04 21:04	05:14 21:59	21:16-21:24/8 21:59	05:08 21:41	21:17-21:39/22 21:41	05:48 21:41	06:43 20:34	07:36 17:08	07:36 16:22	08:58 16:24	08:58 16:24
Potential sun hours	248	272	367	421	496	512	613	202	461	382	328	258	231
Sum of minutes with flicker	0	0	0	0	18	512	613	202	461	382	328	258	231

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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH3_T18 - GE WIND ENERGY 5.3-158 Thrust 665 5300 158.0 !OI hub: 121.0 m (TOT: 200.0 m) (18)

Assumptions for shadow calculations

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	08:58 16:25	08:27 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:31	07:39 19:17	07:38 17:06	08:34 16:21
2	08:58 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:14	05:51 21:37	06:46 20:29	07:41 19:14	07:40 17:04	08:35 16:20
3	08:58 16:28	08:24 17:21	07:25 18:18	07:08 20:17	05:59 21:13	05:11 22:02	05:11 22:14	05:53 21:35	06:48 20:27	07:42 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:10 22:04	05:11 22:14	05:55 21:33	06:50 20:24	07:44 19:10	07:44 17:00	08:38 16:18
5	08:57 16:30	08:20 17:25	07:20 18:22	07:03 20:20	05:55 21:17	05:10 22:05	05:12 22:13	05:56 21:31	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:31	08:19 17:27	07:17 18:24	07:01 20:22	05:53 21:18	05:09 22:06	05:13 22:12	05:58 21:29	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:29	07:15 18:25	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:27	06:55 20:17	07:50 19:02	07:50 16:54	08:42 16:17
8	08:56 16:34	08:15 17:31	07:13 18:27	06:56 20:26	05:49 21:22	05:08 22:08	05:15 22:11	06:02 21:25	06:57 20:14	07:52 19:00	07:52 16:52	08:44 16:16
9	08:55 16:36	08:13 17:33	07:10 18:29	06:54 20:28	05:47 21:24	05:07 22:09	05:16 22:10	06:03 21:23	06:59 20:12	07:54 18:57	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:35	07:08 18:31	06:51 20:30	05:45 21:26	05:06 22:09	05:17 22:09	06:05 21:21	07:01 20:09	07:55 18:55	07:56 16:48	08:46 16:16
11	08:54 16:39	08:09 17:37	07:05 18:33	06:49 20:32	05:44 21:27	05:06 22:10	05:19 22:08	06:07 21:19	07:03 20:07	07:57 18:53	07:57 16:47	08:47 16:15
12	08:53 16:40	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:07	06:09 21:17	07:04 20:04	07:59 18:50	07:59 16:45	08:48 16:15
13	08:52 16:42	08:05 17:42	07:00 18:37	06:44 20:36	05:40 21:31	05:05 22:12	05:21 22:06	06:11 21:15	07:06 20:02	08:01 18:48	08:01 16:43	08:49 16:15
14	08:52 16:43	08:03 17:44	06:58 18:39	06:42 20:37	05:38 21:33	05:05 22:12	05:22 22:05	06:12 21:13	07:08 19:59	08:03 18:45	08:03 16:42	08:50 16:15
15	08:51 16:45	08:01 17:46	06:55 18:41	06:39 20:39	05:36 21:34	05:05 22:13	05:23 22:04	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:51 16:15
16	08:50 16:47	07:58 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:54	08:07 18:41	08:07 16:38	08:52 16:15
17	08:49 16:49	07:56 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:04 22:14	05:26 22:02	06:18 21:06	07:13 19:52	08:09 18:38	08:09 16:37	08:53 16:15
18	08:48 16:50	07:54 17:52	06:48 18:47	06:32 20:45	05:31 21:39	05:04 22:15	05:28 22:01	06:19 21:04	07:15 19:49	08:11 18:36	08:11 16:35	08:54 16:15
19	08:46 16:52	07:52 17:54	06:46 18:48	06:30 20:47	05:30 21:41	05:04 22:15	05:29 22:15	06:21 21:02	07:17 19:47	08:12 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:50	06:28 20:49	05:28 21:43	05:04 22:15	05:30 21:58	06:23 21:00	07:19 19:44	08:14 18:31	08:15 16:33	08:55 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:25 20:51	05:27 21:44	05:05 22:15	05:32 21:57	06:25 20:57	07:21 19:42	08:16 18:29	08:16 16:31	08:56 16:16
22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:52	05:25 21:46	05:05 22:16	05:33 21:55	06:27 20:55	07:22 19:39	08:18 18:27	08:18 16:30	08:56 16:17
23	08:41 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:47	05:05 22:16	05:35 21:54	06:28 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:17
24	08:40 17:01	07:41 18:04	06:33 18:58	06:19 20:56	05:22 21:49	05:05 22:16	05:36 21:52	06:30 20:50	07:26 19:34	08:22 18:22	08:22 16:28	08:57 16:18
25	08:39 17:03	07:39 18:06	06:31 19:00	06:16 20:58	05:21 21:50	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:20	08:24 16:26	08:58 16:19
26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:29	08:25 17:18	08:25 16:25	08:58 16:19
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:43	07:31 19:27	08:27 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:05	06:10 21:04	05:17 21:55	05:07 22:16	05:43 21:46	06:37 20:41	07:33 19:24	08:29 17:14	08:29 16:23	08:58 16:21
29	08:32 17:11		07:21 20:07	06:08 21:05	05:16 21:56	05:08 22:15	05:45 21:44	06:39 20:39	07:35 19:22	08:30 17:12	08:30 16:22	08:59 16:22
30	08:31 17:13		07:18 20:09	06:05 21:07	05:15 21:57	05:08 22:15	05:46 21:42	06:41 20:36	07:37 19:19	08:32 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH1_T01 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (1)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:33	08:24 17:23	07:25 18:20	07:09 20:19	05:59 21:15	05:11 22:04	05:11 22:14	05:53 21:34	06:48 20:24	07:43 19:10	07:42 17:00	08:37 16:18
4	08:58 16:30	08:22 17:25	07:22 18:22	07:06 20:21	05:57 21:17	05:10 22:05	05:11 22:13	05:55 21:32	06:50 20:22	07:44 19:07	07:44 16:58	08:38 16:18
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31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		08:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T04 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (4)

Assumptions for shadow calculations

- 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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
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Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T05 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (5)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:20
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23	08:42 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:47	05:05 22:16	05:35 21:54	06:28 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:17
24	08:40 17:01	07:41 18:04	06:33 18:58	06:19 20:56	05:22 21:49	05:05 22:16	05:36 21:52	06:30 20:51	07:26 19:34	08:22 18:23	08:22 16:28	08:58 16:18
25	08:39 17:03	07:39 18:06	06:31 19:00	06:16 20:58	05:21 21:51	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:20	08:24 16:26	08:58 16:19
26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:29	08:25 17:18	08:25 16:25	08:58 16:19
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:44	07:32 19:27	08:28 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:06	06:10 21:04	05:17 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:33 19:24	08:29 17:14	08:29 16:23	08:59 16:21
29	08:33 17:11		07:21 20:07	06:08 21:06	05:16 21:56	05:08 22:16	05:45 21:44	06:39 20:39	07:35 19:22	08:31 17:12	08:31 16:22	08:59 16:22
30	08:31 17:13		07:18 20:09	06:05 21:07	05:15 21:58	05:08 22:15	05:46 21:43	06:41 20:36	07:37 19:19	08:32 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T06 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (6)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:28	08:24 17:21	07:25 18:18	07:09 20:17	05:59 21:13	05:11 22:03	05:11 22:14	05:53 21:35	06:48 20:27	07:43 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:10 22:04	05:11 22:14	05:55 21:33	06:50 20:24	07:44 19:10	07:44 17:00	08:38 16:18
5	08:58 16:30	08:21 17:25	07:20 18:22	07:04 20:21	05:55 21:17	05:10 22:05	05:12 22:13	05:56 21:32	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:31	08:19 17:27	07:18 18:24	07:01 20:23	05:53 21:19	05:09 22:06	05:13 22:13	05:58 21:30	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:29	07:15 18:26	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:28	06:56 20:17	07:50 19:02	07:50 16:54	08:42 16:17
8	08:56 16:34	08:15 17:31	07:13 18:28	06:56 20:26	05:49 21:22	05:08 22:08	05:15 22:11	06:02 21:26	06:57 20:14	07:52 19:00	07:52 16:52	08:44 16:16
9	08:56 16:36	08:13 17:33	07:10 18:29	06:54 20:28	05:47 21:24	05:07 22:09	05:16 22:10	06:03 21:24	06:59 20:12	07:54 18:57	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:36	07:08 18:31	06:51 20:30	05:45 21:26	05:06 22:10	05:17 22:10	06:05 21:22	07:01 20:09	07:56 18:55	07:56 16:48	08:46 16:16
11	08:54 16:39	08:09 17:38	07:05 18:33	06:49 20:32	05:44 21:28	05:06 22:11	05:19 22:09	06:07 21:19	07:03 20:07	07:57 18:53	07:58 16:47	08:47 16:15
12	08:54 16:40	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:08	06:09 21:17	07:05 20:04	07:59 18:50	08:00 16:45	08:49 16:15
13	08:53 16:42	08:05 17:42	07:01 18:37	06:44 20:36	05:40 21:31	05:05 22:12	05:21 22:07	06:11 21:15	07:06 20:02	08:01 18:48	08:02 16:43	08:50 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:38 21:33	05:05 22:13	05:22 22:06	06:12 21:13	07:08 20:00	08:03 18:45	08:03 16:42	08:51 16:15
15	08:51 16:45	08:01 17:46	06:56 18:41	06:39 20:39	05:36 21:34	05:05 22:13	05:24 22:04	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:52 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:55	08:07 18:41	08:07 16:39	08:52 16:15
17	08:49 16:49	07:56 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:04 22:14	05:26 22:02	06:18 21:07	07:13 19:52	08:09 18:38	08:09 16:37	08:53 16:15
18	08:48 16:50	07:54 17:52	06:48 18:47	06:32 20:45	05:31 21:40	05:04 22:15	05:28 22:01	06:20 21:04	07:15 19:49	08:11 18:36	08:11 16:36	08:54 16:15
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20	08:45 16:54	07:50 17:56	06:43 18:51	06:28 20:49	05:28 21:43	05:04 22:15	05:30 21:58	06:23 21:00	07:19 19:44	08:15 18:32	08:15 16:33	08:56 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:25 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:58	07:21 19:42	08:16 18:29	08:16 16:31	08:56 16:16
22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:53	05:25 21:46	05:05 22:16	05:33 21:55	06:27 20:55	07:22 19:39	08:18 18:27	08:18 16:30	08:57 16:17
23	08:42 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:48	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:17
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26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:29	07:26 17:18	08:26 16:25	08:58 16:19
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:44	07:32 19:27	07:28 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:06	06:10 21:04	05:17 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:33 19:24	08:29 17:14	08:29 16:23	08:59 16:21
29	08:33 17:11		07:21 20:07	06:08 21:06	05:16 21:56	05:08 22:16	05:45 21:44	06:39 20:39	07:35 19:22	07:32 17:12	08:31 16:22	08:59 16:22
30	08:31 17:13		07:18 20:09	06:06 21:07	05:15 21:58	05:08 22:15	05:46 21:43	06:41 20:36	07:37 19:20	07:34 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T07 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (7)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:14 20:13	06:04 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:33	08:24 17:21	07:25 18:18	07:09 20:17	05:59 21:13	05:11 22:03	05:11 22:14	05:53 21:35	06:48 20:27	07:43 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:11 22:04	05:11 22:14	05:55 21:34	06:50 20:24	07:45 19:10	07:44 17:00	08:38 16:18
5	08:58 16:30	08:21 17:25	07:20 18:22	07:04 20:21	05:55 21:17	05:10 22:05	05:12 22:13	05:57 21:32	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:32	08:19 17:27	07:18 18:24	07:01 20:23	05:53 21:19	05:09 22:06	05:13 22:13	05:58 21:30	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:30	07:15 18:26	06:59 20:25	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:28	06:56 20:17	07:50 19:02	07:50 16:54	08:43 16:17
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10	08:55 16:37	08:11 17:36	07:08 18:31	06:52 20:30	05:46 21:26	05:07 22:10	05:18 22:10	06:05 21:22	07:01 20:10	07:56 18:55	07:56 16:49	08:46 16:16
11	08:54 16:39	08:09 17:38	07:06 18:33	06:49 20:32	05:44 21:28	05:06 22:11	05:19 22:09	06:07 21:20	07:03 20:07	07:58 18:53	07:58 16:47	08:48 16:15
12	08:54 16:40	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:08	06:09 21:17	07:05 20:05	07:59 18:50	08:00 16:45	08:49 16:15
13	08:53 16:42	08:05 17:42	07:01 18:37	06:44 20:36	05:40 21:31	05:05 22:12	05:21 22:07	06:11 21:15	07:06 20:02	08:01 18:48	08:02 16:43	08:50 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:38 21:33	05:05 22:13	05:22 22:06	06:12 21:13	07:08 20:00	08:03 18:46	08:04 16:42	08:51 16:15
15	08:51 16:45	08:01 17:46	06:56 18:41	06:40 20:40	05:37 21:35	05:05 22:13	05:24 22:05	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:52 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:55	08:07 18:41	08:07 16:39	08:53 16:15
17	08:49 16:49	07:57 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:14	05:26 22:02	06:18 21:07	07:14 19:52	08:09 18:39	08:09 16:37	08:53 16:15
18	08:48 16:51	07:54 17:52	06:48 18:47	06:32 20:45	05:32 21:40	05:05 22:15	05:28 22:01	06:20 21:04	07:15 19:50	08:11 18:36	08:11 16:36	08:54 16:16
19	08:47 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:29 22:00	06:21 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:46 16:54	07:50 17:56	06:43 18:51	06:28 20:49	05:28 21:43	05:05 22:16	05:31 21:58	06:23 21:00	07:19 19:45	08:15 18:32	08:15 16:33	08:56 16:16
21	08:44 16:56	07:48 17:58	06:41 18:53	06:26 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:58	07:21 19:42	08:17 18:29	08:17 16:31	08:56 16:17
22	08:43 16:58	07:46 18:00	06:38 18:54	06:23 20:53	05:25 21:46	05:05 22:16	05:34 21:56	06:27 20:55	07:23 19:40	08:19 18:27	08:19 16:30	08:57 16:17
23	08:42 17:00	07:43 18:02	06:36 18:56	06:21 20:55	05:24 21:48	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:05 22:16	05:37 21:53	06:30 20:51	07:26 19:35	08:22 18:23	08:22 16:28	08:58 16:18
25	08:39 17:04	07:39 18:06	06:31 19:00	06:17 20:58	05:21 21:51	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:20	08:24 16:27	08:58 16:19
26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:30	07:26 17:18	08:26 16:25	08:58 16:20
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:54	05:07 22:16	05:41 21:48	06:36 20:44	07:32 19:27	07:28 17:16	08:27 16:24	08:59 16:20
28	08:34 17:09	07:32 18:12	06:23 19:06	06:10 21:04	05:18 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:33 19:25	08:29 17:14	08:29 16:23	08:59 16:21
29	08:33 17:11		07:21 20:08	06:08 21:06	05:16 21:56	05:08 22:16	05:45 21:44	06:39 20:39	07:35 19:22	07:32 17:12	08:31 16:22	08:59 16:22
30	08:31 17:13		07:18 20:09	06:06 21:08	05:15 21:58	05:08 22:16	05:46 21:43	06:41 20:37	07:37 19:20	07:34 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T08 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (8)

Assumptions for shadow calculations

- 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

Table with 12 columns (January to December) and 31 rows (days). Columns contain time ranges for sun rise and set. Summary rows at the bottom show 'Potential sun hours' and 'Sum of minutes with flicker' for each month.

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

Matrix defining columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), First time (hh:mm) with flicker, Last time (hh:mm) with flicker, Minutes with flicker.

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T09 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (9)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:33	08:24 17:23	07:25 18:20	07:08 20:19	05:59 21:15	05:11 22:04	05:11 22:14	05:53 21:33	06:48 20:24	07:43 19:10	07:42 17:00	08:37 16:18
4	08:58 16:30	08:22 17:25	07:22 18:22	07:06 20:21	05:57 21:17	05:10 22:05	05:11 22:13	05:55 21:32	06:50 20:22	07:44 19:07	07:44 16:58	08:38 16:18
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6	08:57 16:31	08:19 17:27	07:17 18:24	07:01 20:22	05:53 21:19	05:09 22:06	05:13 22:13	05:58 21:30	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
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8	08:56 16:34	08:15 17:31	07:13 18:27	06:56 20:26	05:49 21:22	05:08 22:08	05:15 22:11	06:02 21:26	06:57 20:14	07:52 19:00	07:52 16:52	08:44 16:16
9	08:56 16:36	08:13 17:33	07:10 18:29	06:54 20:28	05:47 21:24	05:07 22:09	05:16 22:10	06:03 21:24	06:59 20:12	07:54 18:57	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:36	07:08 18:31	06:51 20:30	05:45 21:26	05:06 22:10	05:17 22:09	06:05 21:22	07:01 20:09	07:56 18:55	07:56 16:48	08:46 16:16
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Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T10 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (10)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:20
2	08:58 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:14	07:40 17:04	08:35 16:20
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Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T12 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (11)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:14 20:13	06:04 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
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Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH1_T13 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (12)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:14 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:33	08:24 17:23	07:25 18:20	07:09 20:19	05:59 21:15	05:11 22:04	05:11 22:14	05:53 21:34	06:48 20:24	07:43 19:10	07:42 17:00	08:37 16:18
4	08:58 16:30	08:22 17:25	07:22 18:22	07:06 20:21	05:57 21:17	05:11 22:05	05:11 22:13	05:55 21:32	06:50 20:22	07:44 19:07	07:44 16:58	08:38 16:18
5	08:58 16:30	08:21 17:25	07:20 18:22	07:04 20:21	05:55 21:17	05:10 22:05	05:12 22:13	05:57 21:32	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:31	08:19 17:27	07:18 18:24	07:01 20:23	05:53 21:19	05:09 22:06	05:13 22:13	05:58 21:30	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:29	07:15 18:26	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:28	06:56 20:17	07:50 19:02	07:50 16:54	08:43 16:17
8	08:56 16:34	08:15 17:32	07:13 18:28	06:56 20:26	05:49 21:22	05:08 22:08	05:15 22:11	06:02 21:26	06:57 20:15	07:52 19:00	07:52 16:52	08:44 16:16
9	08:56 16:36	08:13 17:34	07:10 18:30	06:54 20:28	05:47 21:24	05:07 22:09	05:16 22:10	06:04 21:24	06:59 20:12	07:54 18:58	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:36	07:08 18:31	06:51 20:30	05:46 21:26	05:07 22:10	05:17 22:10	06:05 21:22	07:01 20:10	07:56 18:55	07:56 16:49	08:46 16:16
11	08:54 16:39	08:09 17:38	07:05 18:33	06:49 20:32	05:44 21:28	05:06 22:11	05:19 22:09	06:07 21:20	07:03 20:07	07:58 18:53	07:58 16:47	08:47 16:15
12	08:54 16:40	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:08	06:09 21:17	07:05 20:05	07:59 18:50	08:00 16:45	08:49 16:15
13	08:53 16:42	08:05 17:42	07:01 18:37	06:44 20:36	05:40 21:31	05:05 22:12	05:21 22:07	06:11 21:15	07:06 20:02	08:01 18:48	08:02 16:43	08:50 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:38 21:33	05:05 22:13	05:22 22:06	06:12 21:13	07:08 20:00	08:03 18:46	08:04 16:42	08:51 16:15
15	08:51 16:45	08:01 17:46	06:56 18:41	06:40 20:39	05:37 21:35	05:05 22:13	05:24 22:05	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:52 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:55	08:07 18:41	08:07 16:39	08:53 16:15
17	08:49 16:49	07:57 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:14	05:26 22:02	06:18 21:07	07:14 19:52	08:09 18:39	08:09 16:37	08:53 16:15
18	08:48 16:51	07:54 17:52	06:48 18:47	06:32 20:45	05:32 21:40	05:05 22:15	05:28 22:01	06:20 21:04	07:15 19:50	08:11 18:36	08:11 16:36	08:54 16:16
19	08:47 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:29 22:00	06:21 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:51	06:28 20:49	05:28 21:43	05:05 22:15	05:31 21:58	06:23 21:00	07:19 19:45	08:15 18:32	08:15 16:33	08:56 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:26 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:58	07:21 19:42	08:17 18:29	08:17 16:31	08:56 16:17
22	08:43 16:58	07:46 18:00	06:38 18:54	06:23 20:53	05:25 21:46	05:05 22:16	05:34 21:56	06:27 20:55	07:23 19:40	08:18 18:27	08:19 16:30	08:57 16:17
23	08:42 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:48	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:18
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25	08:39 17:04	07:39 18:06	06:31 19:00	06:16 20:58	05:21 21:51	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:20	08:24 16:27	08:58 16:19
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27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:54	05:07 22:16	05:41 21:48	06:36 20:44	07:32 19:27	07:28 17:16	08:27 16:24	08:59 16:20
28	08:34 17:09	07:32 18:12	06:23 19:06	06:10 21:04	05:18 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:33 19:25	08:29 17:14	08:29 16:23	08:59 16:21
29	08:33 17:11		07:21 20:08	06:08 21:06	05:16 21:56	05:08 22:16	05:45 21:44	06:39 20:39	07:35 19:22	07:32 17:12	08:31 16:22	08:59 16:22
30	08:31 17:13		07:18 20:09	06:06 21:08	05:15 21:58	05:08 22:15	05:46 21:43	06:41 20:36	07:37 19:20	07:34 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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) Sun set (hh:mm)	First time (hh:mm) with flicker First time (hh:mm) with flicker	Last time (hh:mm) with flicker Last time (hh:mm) with flicker	Minutes with flicker Minutes with flicker
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SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T15 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (14)

Assumptions for shadow calculations

- 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

Table with columns for months (January to December) and rows for days (1 to 31). Columns contain sun rise and set times. Summary rows at the bottom show Potential sun hours and Sum of minutes with flicker for each month.

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

Matrix with 2 rows and 3 columns: Day in month, Sun rise (hh:mm) / Sun set (hh:mm), First time (hh:mm) with flicker - Last time (hh:mm) with flicker / Minutes with flicker.

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH1_T23 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (15)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:14 20:13	06:04 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:27	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:33	08:24 17:21	07:25 18:18	07:09 20:17	05:59 21:13	05:11 22:03	05:11 22:14	05:53 21:35	06:49 20:27	07:43 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:11 22:04	05:12 22:14	05:55 21:34	06:50 20:24	07:45 19:10	07:44 17:00	08:38 16:19
5	08:58 16:30	08:21 17:25	07:20 18:22	07:04 20:21	05:55 21:17	05:10 22:05	05:12 22:13	05:57 21:32	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:32	08:19 17:28	07:18 18:24	07:01 20:23	05:53 21:19	05:09 22:06	05:13 22:13	05:58 21:30	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
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12	08:54 16:40	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:08	06:09 21:17	07:05 20:05	07:59 18:50	08:00 16:45	08:49 16:15
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15	08:51 16:45	08:01 17:46	06:56 18:41	06:40 20:40	05:37 21:35	05:05 22:13	05:24 22:05	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:52 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:55	08:07 18:41	08:07 16:39	08:53 16:15
17	08:49 16:49	07:57 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:14	05:26 22:02	06:18 21:07	07:14 19:52	08:09 18:39	08:09 16:37	08:53 16:15
18	08:48 16:51	07:54 17:52	06:48 18:47	06:33 20:45	05:32 21:40	05:05 22:15	05:28 22:01	06:20 21:04	07:15 19:50	08:11 18:36	08:11 16:36	08:54 16:16
19	08:47 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:29 22:00	06:21 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:51	06:28 20:49	05:28 21:43	05:05 22:16	05:31 21:58	06:23 21:00	07:19 19:45	08:15 18:32	08:15 16:33	08:56 16:16
21	08:44 16:56	07:48 17:58	06:41 18:53	06:26 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:58	07:21 19:42	08:17 18:29	08:17 16:32	08:56 16:17
22	08:43 16:58	07:46 18:00	06:38 18:54	06:23 20:53	05:26 21:46	05:05 22:16	05:34 21:56	06:27 20:55	07:23 19:40	08:19 18:27	08:19 16:30	08:57 16:17
23	08:42 17:00	07:43 18:02	06:36 18:56	06:21 20:55	05:24 21:48	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:06 22:16	05:37 21:53	06:31 20:51	07:26 19:35	08:22 18:23	08:22 16:28	08:58 16:18
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26	08:37 17:06	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:30	07:26 17:18	08:26 16:25	08:58 16:20
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28	08:34 17:09	07:32 18:12	06:23 19:06	06:10 21:04	05:18 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:34 19:25	08:29 17:14	08:29 16:23	08:59 16:21
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30	08:31 17:13	07:29 18:04	06:19 20:06	06:06 21:08	05:15 21:58	05:09 22:15	05:46 21:43	06:41 20:37	07:37 19:20	07:34 17:10	08:32 16:22	08:59 16:23
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Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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:

10889_Oweninny Wind Farm_Model_200_TH

Licensed user:

Tobin Consulting Engineers
 Block 10-4, Blanchardstown, Corporate Park
 IE-DUBLIN 15
 +353 1 80304 01
 michael.nolan / michael.nolan@tobin.ie
 Calculated:
 26/05/2022 12:56/3.3.294

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T24 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (16)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:14 20:13	06:04 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:27	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:33	08:24 17:21	07:25 18:18	07:09 20:17	05:59 21:13	05:11 22:03	05:11 22:14	05:53 21:35	06:48 20:27	07:43 19:12	07:42 17:02	08:37 16:19
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17	08:49 16:49	07:57 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:14	05:26 22:02	06:18 21:07	07:14 19:52	08:09 18:39	08:09 16:37	08:53 16:15
18	08:48 16:51	07:54 17:52	06:48 18:47	06:32 20:45	05:32 21:40	05:05 22:15	05:28 22:01	06:20 21:04	07:15 19:50	08:11 18:36	08:11 16:36	08:54 16:16
19	08:47 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:29 22:00	06:21 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:51	06:28 20:49	05:28 21:43	05:05 22:15	05:31 21:58	06:23 21:00	07:19 19:45	08:15 18:32	08:15 16:33	08:56 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:26 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:58	07:21 19:42	08:17 18:29	08:17 16:31	08:56 16:17
22	08:43 16:58	07:46 18:00	06:38 18:54	06:23 20:53	05:25 21:46	05:05 22:16	05:34 21:55	06:27 20:55	07:23 19:40	08:18 18:27	08:19 16:30	08:57 16:17
23	08:42 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:48	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:18
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27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:44	07:32 19:27	07:28 17:16	08:27 16:24	08:59 16:20
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29	08:33 17:11		07:21 20:08	06:08 21:06	05:16 21:56	05:08 22:16	05:45 21:44	06:39 20:39	07:35 19:22	07:32 17:12	08:31 16:22	08:59 16:22
30	08:31 17:13		07:18 20:09	06:06 21:08	05:15 21:58	05:08 22:15	05:46 21:43	06:41 20:36	07:37 19:20	07:34 17:10	08:32 16:22	08:59 16:23
31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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) Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
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SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T25 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (17)

Assumptions for shadow calculations

- 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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:58 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:28	08:24 17:21	07:25 18:18	07:09 20:17	05:59 21:13	05:11 22:03	05:11 22:14	05:53 21:35	06:48 20:27	07:43 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:10 22:04	05:11 22:14	05:55 21:33	06:50 20:24	07:44 19:10	07:44 17:00	08:38 16:18
5	08:58 16:30	08:21 17:25	07:20 18:22	07:04 20:21	05:55 21:17	05:10 22:05	05:12 22:13	05:56 21:32	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:31	08:19 17:27	07:17 18:24	07:01 20:22	05:53 21:18	05:09 22:06	05:13 22:12	05:58 21:30	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:29	07:15 18:26	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:28	06:56 20:17	07:50 19:02	07:50 16:54	08:42 16:17
8	08:56 16:34	08:15 17:31	07:13 18:28	06:56 20:26	05:49 21:22	05:08 22:08	05:15 22:11	06:02 21:26	06:57 20:14	07:52 19:00	07:52 16:52	08:44 16:16
9	08:56 16:36	08:13 17:33	07:10 18:29	06:54 20:28	05:47 21:24	05:07 22:09	05:16 22:10	06:04 21:24	06:59 20:12	07:54 18:57	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:36	07:08 18:31	06:51 20:30	05:45 21:26	05:06 22:10	05:17 22:09	06:05 21:22	07:01 20:09	07:56 18:55	07:56 16:48	08:46 16:16
11	08:54 16:39	08:09 17:38	07:05 18:33	06:49 20:32	05:44 21:27	05:06 22:10	05:19 22:09	06:07 21:19	07:03 20:07	07:57 18:53	07:58 16:47	08:47 16:15
12	08:53 16:40	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:08	06:09 21:17	07:05 20:04	07:59 18:50	08:00 16:45	08:48 16:15
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14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:38 21:33	05:05 22:13	05:22 22:06	06:12 21:13	07:08 19:59	08:03 18:45	08:03 16:42	08:51 16:15
15	08:51 16:45	08:01 17:46	06:56 18:41	06:39 20:39	05:36 21:34	05:05 22:13	05:24 22:04	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:52 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:54	08:07 18:41	08:07 16:39	08:52 16:15
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18	08:48 16:50	07:54 17:52	06:48 18:47	06:32 20:45	05:31 21:39	05:04 22:15	05:28 22:01	06:20 21:04	07:15 19:49	08:11 18:36	08:11 16:36	08:54 16:15
19	08:47 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:04 22:15	05:29 22:00	06:21 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:50	06:28 20:49	05:28 21:43	05:05 22:15	05:30 21:58	06:23 21:00	07:19 19:44	08:15 18:32	08:15 16:33	08:55 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:25 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:57	07:21 19:42	08:16 18:29	08:16 16:31	08:56 16:16
22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:53	05:25 21:46	05:05 22:16	05:33 21:55	06:27 20:55	07:22 19:39	08:18 18:27	08:18 16:30	08:57 16:17
23	08:42 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:47	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:17
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31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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	

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T29 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (18)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:14 20:13	06:04 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:27	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
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4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:11 22:04	05:12 22:14	05:55 21:34	06:50 20:24	07:44 19:10	07:44 17:00	08:38 16:19
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7	08:57 16:33	08:17 17:30	07:15 18:26	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:28	06:56 20:17	07:50 19:02	07:50 16:54	08:43 16:17
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14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:38 21:33	05:05 22:13	05:22 22:06	06:13 21:13	07:08 20:00	08:03 18:46	08:04 16:42	08:51 16:15
15	08:51 16:45	08:01 17:46	06:56 18:41	06:40 20:40	05:37 21:35	05:05 22:13	05:24 22:05	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:52 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:55	08:07 18:41	08:07 16:39	08:53 16:15
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18	08:48 16:51	07:54 17:52	06:48 18:47	06:33 20:45	05:32 21:40	05:05 22:15	05:28 22:01	06:20 21:04	07:15 19:50	08:11 18:36	08:11 16:36	08:54 16:16
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21	08:44 16:56	07:48 17:58	06:41 18:53	06:26 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:58	07:21 19:42	08:17 18:29	08:17 16:32	08:56 16:17
22	08:43 16:58	07:46 18:00	06:38 18:54	06:23 20:53	05:26 21:46	05:05 22:16	05:34 21:55	06:27 20:55	07:23 19:40	08:18 18:27	08:18 16:30	08:57 16:17
23	08:42 17:00	07:43 18:02	06:36 18:56	06:21 20:55	05:24 21:48	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:06 22:16	05:37 21:53	06:30 20:51	07:26 19:35	08:22 18:23	08:22 16:28	08:58 16:18
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26	08:37 17:06	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:30	08:26 17:18	08:26 16:25	08:58 16:20
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:44	07:32 19:27	08:28 17:16	08:27 16:24	08:59 16:20
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31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH1_T30 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (19)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
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6	08:57 16:32	08:19 17:27	07:18 18:24	07:01 20:23	05:53 21:19	05:09 22:06	05:13 22:13	05:58 21:30	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:29	07:15 18:26	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:28	06:56 20:17	07:50 19:02	07:50 16:54	08:42 16:17
8	08:56 16:34	08:15 17:32	07:13 18:28	06:56 20:26	05:49 21:22	05:08 22:08	05:15 22:11	06:02 21:26	06:57 20:14	07:52 19:00	07:52 16:52	08:44 16:16
9	08:56 16:36	08:13 17:34	07:10 18:30	06:54 20:28	05:47 21:24	05:07 22:09	05:16 22:10	06:04 21:24	06:59 20:12	07:54 18:57	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:36	07:08 18:31	06:51 20:30	05:46 21:26	05:07 22:10	05:18 22:09	06:05 21:22	07:01 20:10	07:56 18:55	07:56 16:49	08:46 16:16
11	08:54 16:39	08:09 17:38	07:05 18:33	06:49 20:32	05:44 21:28	05:06 22:10	05:19 22:09	06:07 21:19	07:03 20:07	07:57 18:53	07:58 16:47	08:47 16:15
12	08:54 16:40	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:08	06:09 21:17	07:05 20:05	07:59 18:50	08:00 16:45	08:49 16:15
13	08:53 16:42	08:05 17:42	07:01 18:37	06:44 20:36	05:40 21:31	05:05 22:12	05:21 22:07	06:11 21:15	07:06 20:02	08:01 18:48	08:02 16:43	08:50 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:38 21:33	05:05 22:13	05:22 22:06	06:12 21:13	07:08 20:00	08:03 18:46	08:03 16:42	08:51 16:15
15	08:51 16:45	08:01 17:46	06:56 18:41	06:40 20:39	05:37 21:34	05:05 22:13	05:24 22:04	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:52 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:55	08:07 18:41	08:07 16:39	08:52 16:15
17	08:49 16:49	07:56 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:14	05:26 22:02	06:18 21:07	07:14 19:52	08:09 18:39	08:09 16:37	08:53 16:15
18	08:48 16:51	07:54 17:52	06:48 18:47	06:32 20:45	05:32 21:40	05:05 22:15	05:28 22:01	06:20 21:04	07:15 19:50	08:11 18:36	08:11 16:36	08:54 16:16
19	08:47 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:29 22:00	06:21 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:51	06:28 20:49	05:28 21:43	05:05 22:15	05:31 21:58	06:23 21:00	07:19 19:45	08:15 18:32	08:15 16:33	08:55 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:26 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:58	07:21 19:42	08:17 18:29	08:17 16:31	08:56 16:17
22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:53	05:25 21:46	05:05 22:16	05:34 21:55	06:27 20:55	07:23 19:40	08:18 18:27	08:18 16:30	08:57 16:17
23	08:42 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:48	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:05 22:16	05:37 21:52	06:30 20:51	07:26 19:35	08:22 18:23	08:22 16:28	08:58 16:18
25	08:39 17:04	07:39 18:06	06:31 19:00	06:16 20:58	05:21 21:51	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:20	08:24 16:27	08:58 16:19
26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:30	08:26 17:18	08:26 16:25	08:58 16:20
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:44	07:32 19:27	08:28 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:06	06:10 21:04	05:18 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:33 19:25	08:29 17:14	08:29 16:23	08:59 16:21
29	08:33 17:11		07:21 20:08	06:08 21:06	05:16 21:56	05:08 22:16	05:45 21:44	06:39 20:39	07:35 19:22	08:31 17:12	08:31 16:22	08:59 16:22
30	08:31 17:13		07:18 20:09	06:06 21:08	05:15 21:58	05:08 22:15	05:46 21:43	06:41 20:36	07:37 19:20	08:32 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T37 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (21)

Assumptions for shadow calculations

- 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	08:59	08:28	07:29	07:13	06:03	05:13	05:09	05:50	06:45	07:39	07:38	08:34
	16:25	17:17	18:14	20:13	21:09	22:00	22:15	21:39	20:32	19:17	17:06	16:21
2	08:58	08:26	07:27	07:11	06:01	05:12	05:10	05:51	06:47	07:41	07:40	08:35
	16:26	17:19	18:16	20:15	21:11	22:01	22:15	21:37	20:29	19:15	17:04	16:20
3	08:58	08:24	07:25	07:09	05:59	05:11	05:11	05:53	06:48	07:43	07:42	08:37
	16:28	17:21	18:18	20:17	21:13	22:03	22:14	21:35	20:27	19:12	17:02	16:19
4	08:58	08:22	07:22	07:06	05:57	05:10	05:11	05:55	06:50	07:44	07:44	08:38
	16:29	17:23	18:20	20:19	21:15	22:04	22:14	21:33	20:24	19:10	17:00	16:18
5	08:58	08:21	07:20	07:04	05:55	05:10	05:12	05:57	06:52	07:46	07:46	08:40
	16:30	17:25	18:22	20:21	21:17	22:05	22:13	21:32	20:22	19:07	16:58	16:18
6	08:57	08:19	07:18	07:01	05:53	05:09	05:13	05:58	06:54	07:48	07:48	08:41
	16:31	17:27	18:24	20:23	21:18	22:06	22:12	21:30	20:19	19:05	16:56	16:17
7	08:57	08:17	07:15	06:59	05:51	05:08	05:14	06:00	06:56	07:50	07:50	08:42
	16:33	17:29	18:26	20:24	21:20	22:07	22:12	21:28	20:17	19:02	16:54	16:17
8	08:56	08:15	07:13	06:56	05:49	05:08	05:15	06:02	06:57	07:52	07:52	08:44
	16:34	17:31	18:28	20:26	21:22	22:08	22:11	21:26	20:14	19:00	16:52	16:16
9	08:56	08:13	07:10	06:54	05:47	05:07	05:16	06:04	06:59	07:54	07:54	08:45
	16:36	17:34	18:29	20:28	21:24	22:09	22:10	21:24	20:12	18:57	16:50	16:16
10	08:55	08:11	07:08	06:51	05:45	05:07	05:17	06:05	07:01	07:56	07:56	08:46
	16:37	17:36	18:31	20:30	21:26	22:10	22:09	21:21	20:09	18:55	16:49	16:16
11	08:54	08:09	07:05	06:49	05:44	05:06	05:19	06:07	07:03	07:57	07:58	08:47
	16:39	17:38	18:33	20:32	21:27	22:10	22:09	21:19	20:07	18:53	16:47	16:15
12	08:53	08:07	07:03	06:47	05:42	05:06	05:20	06:09	07:05	07:59	08:00	08:48
	16:40	17:40	18:35	20:34	21:29	22:11	22:08	21:17	20:04	18:50	16:45	16:15
13	08:53	08:05	07:01	06:44	05:40	05:05	05:21	06:11	07:06	08:01	08:01	08:50
	16:42	17:42	18:37	20:36	21:31	22:12	22:07	21:15	20:02	18:48	16:43	16:15
14	08:52	08:03	06:58	06:42	05:38	05:05	05:22	06:12	07:08	08:03	08:03	08:51
	16:44	17:44	18:39	20:38	21:33	22:13	22:06	21:13	19:59	18:45	16:42	16:15
15	08:51	08:01	06:56	06:39	05:37	05:05	05:24	06:14	07:10	08:05	08:05	08:52
	16:45	17:46	18:41	20:39	21:34	22:13	22:04	21:11	19:57	18:43	16:40	16:15
16	08:50	07:59	06:53	06:37	05:35	05:05	05:25	06:16	07:12	08:07	08:07	08:52
	16:47	17:48	18:43	20:41	21:36	22:14	22:03	21:09	19:54	18:41	16:39	16:15
17	08:49	07:56	06:51	06:35	05:33	05:05	05:26	06:18	07:14	08:09	08:09	08:53
	16:49	17:50	18:45	20:43	21:38	22:14	22:02	21:06	19:52	18:38	16:37	16:15
18	08:48	07:54	06:48	06:32	05:32	05:04	05:28	06:20	07:15	08:11	08:11	08:54
	16:51	17:52	18:47	20:45	21:39	22:15	22:01	21:04	19:49	18:36	16:36	16:16
19	08:47	07:52	06:46	06:30	05:30	05:05	05:29	06:21	07:17	08:13	08:13	08:55
	16:52	17:54	18:49	20:47	21:41	22:15	22:00	21:02	19:47	18:34	16:34	16:16
20	08:45	07:50	06:43	06:28	05:28	05:05	05:31	06:23	07:19	08:15	08:15	08:55
	16:54	17:56	18:51	20:49	21:43	22:15	21:58	21:00	19:44	18:32	16:33	16:16
21	08:44	07:48	06:41	06:25	05:27	05:05	05:32	06:25	07:21	08:16	08:17	08:56
	16:56	17:58	18:52	20:51	21:44	22:16	21:57	20:57	19:42	18:29	16:31	16:17
22	08:43	07:45	06:38	06:23	05:25	05:05	05:34	06:27	07:23	08:18	08:18	08:57
	16:58	18:00	18:54	20:53	21:46	22:16	21:55	20:55	19:39	18:27	16:30	16:17
23	08:42	07:43	06:36	06:21	05:24	05:05	05:35	06:29	07:24	08:20	08:20	08:57
	17:00	18:02	18:56	20:54	21:47	22:16	21:54	20:53	19:37	18:25	16:29	16:18
24	08:40	07:41	06:33	06:19	05:23	05:05	05:37	06:30	07:26	08:22	08:22	08:58
	17:02	18:04	18:58	20:56	21:49	22:16	21:52	20:51	19:34	18:23	16:28	16:18
25	08:39	07:39	06:31	06:16	05:21	05:06	05:38	06:32	07:28	08:24	08:24	08:58
	17:04	18:06	19:00	20:58	21:50	22:16	21:51	20:48	19:32	17:20	16:26	16:19
26	08:37	07:36	06:28	06:14	05:20	05:06	05:40	06:34	07:30	08:26	08:25	08:58
	17:05	18:08	19:02	21:00	21:52	22:16	21:49	20:46	19:29	17:18	16:25	16:19
27	08:36	07:34	06:26	06:12	05:19	05:07	05:41	06:36	07:32	08:28	08:27	08:58
	17:07	18:10	19:04	21:02	21:53	22:16	21:48	20:44	19:27	17:16	16:24	16:20
28	08:34	07:32	06:23	06:10	05:18	05:07	05:43	06:38	07:33	08:29	08:29	08:59
	17:09	18:12	19:06	21:04	21:55	22:16	21:46	20:41	19:24	17:14	16:23	16:21
29	08:33		07:21	06:08	05:16	05:08	05:45	06:39	07:35	08:31	08:30	08:59
	17:11		20:07	21:06	21:56	22:16	21:44	20:39	19:22	17:12	16:22	16:22
30	08:31		07:18	06:06	05:15	05:08	05:46	06:41	07:37	08:34	08:32	08:59
	17:13		20:09	21:07	21:58	22:15	21:43	20:36	19:20	17:10	16:21	16:23
31	08:29		07:16		05:14		05:48	06:43		07:36		08:59
	17:15		20:11		21:59		21:41	20:34		17:08		16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T41 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (22)

Assumptions for shadow calculations

- 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

Table with columns for months (January to December) and rows for days (1 to 31). Columns contain sunrise and sunset times in hh:mm format. Bottom row shows 'Potential sun hours' and 'Sum of minutes with flicker' for each month.

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

Matrix with 2 columns: Day in month, and a 2x2 grid of time labels: Sun rise (hh:mm), Sun set (hh:mm), First time (hh:mm) with flicker, Last time (hh:mm) with flicker/Minutes with flicker.

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T42 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (23)

Assumptions for shadow calculations

- 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

Table with 12 columns for months (January-December) and 31 rows for days. Columns contain start and end times for shadow calculations. Summary rows at the bottom show 'Potential sun hours' and 'Sum of minutes with flicker' for each month.

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

Matrix with 2 rows and 3 columns: Day in month, Sun rise (hh:mm) / Sun set (hh:mm), and First time (hh:mm) with flicker / Last time (hh:mm) with flicker / Minutes with flicker.

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH1_T44 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (24)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:13 20:13	06:03 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:58 16:26	08:26 17:19	07:27 18:16	07:11 20:15	06:01 21:11	05:12 22:01	05:10 22:15	05:51 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:28	08:24 17:21	07:25 18:18	07:08 20:17	05:59 21:13	05:11 22:02	05:11 22:14	05:53 21:35	06:48 20:27	07:43 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:23	07:22 18:20	07:06 20:19	05:57 21:15	05:10 22:04	05:11 22:14	05:55 21:33	06:50 20:24	07:44 19:10	07:44 17:00	08:38 16:18
5	08:58 16:30	08:20 17:25	07:20 18:22	07:04 20:21	05:55 21:17	05:10 22:05	05:12 22:13	05:57 21:31	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:31	08:19 17:27	07:17 18:24	07:01 20:22	05:53 21:18	05:09 22:06	05:13 22:12	05:58 21:30	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:29	07:15 18:26	06:59 20:24	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:28	06:56 20:17	07:50 19:02	07:50 16:54	08:42 16:17
8	08:56 16:34	08:15 17:31	07:13 18:27	06:56 20:26	05:49 21:22	05:08 22:08	05:15 22:11	06:02 21:26	06:57 20:14	07:52 19:00	07:52 16:52	08:44 16:16
9	08:56 16:36	08:13 17:34	07:10 18:29	06:54 20:28	05:47 21:24	05:07 22:09	05:16 22:10	06:04 21:24	06:59 20:12	07:54 18:57	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:36	07:08 18:31	06:51 20:30	05:45 21:26	05:07 22:10	05:17 22:09	06:05 21:21	07:01 20:09	07:56 18:55	07:56 16:48	08:46 16:16
11	08:54 16:39	08:09 17:38	07:05 18:33	06:49 20:32	05:44 21:27	05:06 22:10	05:19 22:08	06:07 21:19	07:03 20:07	07:57 18:53	07:58 16:47	08:47 16:15
12	08:53 16:40	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:08	06:09 21:17	07:05 20:04	07:59 18:50	08:00 16:45	08:48 16:15
13	08:53 16:42	08:05 17:42	07:00 18:37	06:44 20:36	05:40 21:31	05:05 22:12	05:21 22:07	06:11 21:15	07:06 20:02	08:01 18:48	08:01 16:43	08:49 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:37	05:38 21:33	05:05 22:13	05:22 22:05	06:12 21:13	07:08 19:59	08:03 18:45	08:03 16:42	08:50 16:15
15	08:51 16:45	08:01 17:46	06:56 18:41	06:39 20:39	05:36 21:34	05:05 22:13	05:24 22:04	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:51 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:54	08:07 18:41	08:07 16:39	08:52 16:15
17	08:49 16:49	07:56 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:14	05:26 22:02	06:18 21:06	07:13 19:52	08:09 18:38	08:09 16:37	08:53 16:15
18	08:48 16:50	07:54 17:52	06:48 18:47	06:32 20:45	05:32 21:39	05:04 22:15	05:28 22:01	06:20 21:04	07:15 19:49	08:11 18:36	08:11 16:36	08:54 16:15
19	08:47 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:04 22:15	05:29 21:59	06:21 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:50	06:28 20:49	05:28 21:43	05:05 22:15	05:31 21:58	06:23 21:00	07:19 19:44	08:14 18:32	08:15 16:33	08:55 16:16
21	08:44 16:56	07:48 17:58	06:41 18:52	06:25 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:57	07:21 19:42	08:16 18:29	08:17 16:31	08:56 16:17
22	08:43 16:58	07:45 18:00	06:38 18:54	06:23 20:52	05:25 21:46	05:05 22:16	05:33 21:55	06:27 20:55	07:22 19:39	08:18 18:27	08:18 16:30	08:57 16:17
23	08:41 17:00	07:43 18:02	06:36 18:56	06:21 20:54	05:24 21:47	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:17
24	08:40 17:02	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:05 22:16	05:37 21:52	06:30 20:51	07:26 19:34	08:22 18:23	08:22 16:28	08:57 16:18
25	08:39 17:03	07:39 18:06	06:31 19:00	06:16 20:58	05:21 21:50	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:20	08:24 16:26	08:58 16:19
26	08:37 17:05	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:29	08:25 17:18	08:25 16:25	08:58 16:19
27	08:36 17:07	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:41 21:48	06:36 20:43	07:32 19:27	08:28 17:16	08:27 16:24	08:58 16:20
28	08:34 17:09	07:32 18:12	06:23 19:06	06:10 21:04	05:17 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:33 19:24	08:29 17:14	08:29 16:23	08:59 16:21
29	08:33 17:11		07:21 20:07	06:08 21:06	05:16 21:56	05:08 22:16	05:45 21:44	06:39 20:39	07:35 19:22	08:30 17:12	08:30 16:22	08:59 16:22
30	08:31 17:13		07:18 20:09	06:06 21:07	05:15 21:57	05:08 22:15	05:46 21:43	06:41 20:36	07:37 19:19	08:32 17:10	08:32 16:21	08:59 16:23
31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	258	231
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:

10889_Oweninny Wind Farm_Model_200_TH

Licensed user:

Tobin Consulting Engineers
Block 10-4, Blanchardstown, Corporate Park
IE-DUBLIN 15
+353 1 80304 01
michael.nolan / michael.nolan@tobin.ie
Calculated:
26/05/2022 12:56/3.3.294

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T45 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (25)

Assumptions for shadow calculations

- 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

Table with columns for months (January to December) and rows for days (1 to 31). Columns contain start and end times for shadow events. Summary rows at the bottom show 'Potential sun hours' and 'Sum of minutes with flicker' for each month.

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

Matrix with 2 rows and 3 columns: Day in month, Sun rise (hh:mm) / Sun set (hh:mm), First time (hh:mm) with flicker - Last time (hh:mm) with flicker / Minutes with flicker.

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH1_T46 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (26)

Assumptions for shadow calculations

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	08:59 16:25	08:28 17:17	07:29 18:14	07:14 20:13	06:04 21:09	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:27	08:26 17:19	07:27 18:16	07:11 20:15	06:02 21:11	05:12 22:01	05:10 22:15	05:52 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:35 16:20
3	08:58 16:33	08:24 17:21	07:25 18:18	07:09 20:17	05:59 21:13	05:12 22:03	05:11 22:14	05:53 21:35	06:49 20:27	07:43 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:22 17:24	07:22 18:20	07:06 20:19	05:57 21:15	05:11 22:04	05:12 22:14	05:55 21:34	06:50 20:24	07:45 19:10	07:44 17:00	08:38 16:19
5	08:58 16:30	08:21 17:26	07:20 18:22	07:04 20:21	05:55 21:17	05:10 22:05	05:13 22:13	05:57 21:32	06:52 20:22	07:46 19:07	07:46 16:58	08:40 16:18
6	08:57 16:32	08:19 17:28	07:18 18:24	07:01 20:23	05:53 21:19	05:09 22:06	05:13 22:13	05:58 21:30	06:54 20:19	07:48 19:05	07:48 16:56	08:41 16:17
7	08:57 16:33	08:17 17:30	07:15 18:26	06:59 20:25	05:51 21:20	05:08 22:07	05:14 22:12	06:00 21:28	06:56 20:17	07:50 19:02	07:50 16:54	08:43 16:17
8	08:56 16:34	08:15 17:32	07:13 18:28	06:56 20:26	05:49 21:22	05:08 22:08	05:15 22:11	06:02 21:26	06:58 20:15	07:52 19:00	07:52 16:52	08:44 16:17
9	08:56 16:36	08:13 17:34	07:10 18:30	06:54 20:28	05:48 21:24	05:07 22:09	05:17 22:10	06:04 21:24	06:59 20:12	07:54 18:58	07:54 16:50	08:45 16:16
10	08:55 16:37	08:11 17:36	07:08 18:32	06:52 20:30	05:46 21:26	05:07 22:10	05:18 22:10	06:05 21:22	07:01 20:10	07:56 18:55	07:56 16:49	08:46 16:16
11	08:54 16:39	08:09 17:38	07:06 18:33	06:49 20:32	05:44 21:28	05:06 22:10	05:19 22:09	06:07 21:20	07:03 20:07	07:58 18:53	07:58 16:47	08:47 16:16
12	08:54 16:41	08:07 17:40	07:03 18:35	06:47 20:34	05:42 21:29	05:06 22:11	05:20 22:08	06:09 21:17	07:05 20:05	07:59 18:50	08:00 16:45	08:49 16:15
13	08:53 16:42	08:05 17:42	07:01 18:37	06:44 20:36	05:40 21:31	05:06 22:12	05:21 22:07	06:11 21:15	07:06 20:02	08:01 18:48	08:02 16:44	08:50 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:38 21:33	05:05 22:13	05:22 22:06	06:13 21:13	07:08 20:00	08:03 18:46	08:04 16:42	08:51 16:15
15	08:51 16:45	08:01 17:46	06:56 18:41	06:40 20:40	05:37 21:35	05:05 22:13	05:24 22:05	06:14 21:11	07:10 19:57	08:05 18:43	08:05 16:40	08:52 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:41	05:35 21:36	05:05 22:14	05:25 22:03	06:16 21:09	07:12 19:55	08:07 18:41	08:07 16:39	08:52 16:15
17	08:49 16:49	07:57 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:14	05:26 22:02	06:18 21:07	07:14 19:52	08:09 18:39	08:09 16:37	08:53 16:15
18	08:48 16:51	07:54 17:52	06:48 18:47	06:33 20:45	05:32 21:40	05:05 22:15	05:28 22:01	06:20 21:04	07:15 19:50	08:11 18:36	08:11 16:36	08:54 16:16
19	08:47 16:52	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:29 22:00	06:22 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:45 16:54	07:50 17:56	06:43 18:51	06:28 20:49	05:29 21:43	05:05 22:15	05:31 21:58	06:23 21:00	07:19 19:45	08:15 18:32	08:15 16:33	08:56 16:16
21	08:44 16:56	07:48 17:58	06:41 18:53	06:26 20:51	05:27 21:44	05:05 22:16	05:32 21:57	06:25 20:58	07:21 19:42	08:17 18:29	08:17 16:32	08:56 16:17
22	08:43 16:58	07:46 18:00	06:38 18:54	06:23 20:53	05:26 21:46	05:05 22:16	05:34 21:55	06:27 20:55	07:23 19:40	08:19 18:27	08:18 16:30	08:57 16:17
23	08:42 17:00	07:43 18:02	06:36 18:56	06:21 20:55	05:24 21:48	05:05 22:16	05:35 21:54	06:29 20:53	07:24 19:37	08:20 18:25	08:20 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:33 18:58	06:19 20:56	05:23 21:49	05:06 22:16	05:37 21:53	06:31 20:51	07:26 19:35	08:22 18:23	08:22 16:28	08:58 16:18
25	08:39 17:04	07:39 18:06	06:31 19:00	06:17 20:58	05:21 21:51	05:06 22:16	05:38 21:51	06:32 20:48	07:28 19:32	08:24 17:21	08:24 16:27	08:58 16:19
26	08:37 17:06	07:36 18:08	06:28 19:02	06:14 21:00	05:20 21:52	05:06 22:16	05:40 21:49	06:34 20:46	07:30 19:30	08:26 17:18	08:26 16:26	08:58 16:20
27	08:36 17:08	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:53	05:07 22:16	05:42 21:48	06:36 20:44	07:32 19:27	08:28 17:16	08:27 16:24	08:58 16:20
28	08:34 17:10	07:32 18:12	06:23 19:06	06:10 21:04	05:18 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:34 19:25	08:29 17:14	08:29 16:23	08:59 16:21
29	08:33 17:11		07:21 20:08	06:08 21:06	05:17 21:56	05:08 22:16	05:45 21:44	06:40 20:39	07:35 19:22	08:31 17:12	08:31 16:23	08:59 16:22
30	08:31 17:13		07:19 20:09	06:06 21:08	05:15 21:58	05:09 22:15	05:46 21:43	06:41 20:36	07:37 19:20	08:32 17:10	08:32 16:22	08:59 16:23
31	08:29 17:15		07:16 20:11		05:14 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T67 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (27)

Assumptions for shadow calculations

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	08:59 09:36-09:45/9	08:28 09:06-09:30/24	07:30 07:14	06:04 05:13	05:09 05:09	05:50 06:45	07:39 07:39	07:38 08:38-08:59/21	08:34 09:13-09:36/23			
2	08:59 09:34-09:45/11	08:26 09:06-09:30/24	07:27 07:11	06:02 05:13	05:10 05:52	06:47 07:41	07:40 08:37-09:00/23	08:35 09:14-09:37/23				
3	08:58 09:35-09:47/12	08:24 09:05-09:31/26	07:25 07:09	06:00 05:12	05:11 05:53	06:49 07:43	07:42 08:36-09:00/24	08:37 09:15-09:36/21				
4	08:58 09:34-09:48/14	08:22 09:05-09:31/26	07:22 07:06	05:57 05:11	05:12 05:55	06:50 07:45	07:44 08:36-09:01/25	08:38 09:17-09:36/19				
5	08:58 09:34-09:49/15	08:21 09:05-09:31/26	07:20 07:04	05:55 05:10	05:13 05:57	06:52 07:46	07:46 08:35-09:01/26	08:40 09:19-09:37/18				
6	08:57 09:34-09:50/16	08:19 09:06-09:31/25	07:18 07:01	05:53 05:09	05:14 05:59	06:54 07:48	07:48 08:36-09:02/26	08:41 09:20-09:36/16				
7	08:57 09:33-09:50/17	08:17 09:06-09:31/25	07:15 07:00	05:51 05:09	05:15 06:00	06:56 07:50	07:50 08:36-09:02/26	08:43 09:20-09:35/15				
8	08:56 09:33-09:52/19	08:15 09:07-09:31/24	07:13 07:06	05:50 05:08	05:16 06:02	06:58 07:52	07:52 08:36-09:01/25	08:44 09:22-09:36/14				
9	08:56 09:32-09:53/21	08:13 09:07-09:30/23	07:10 07:04	05:48 05:07	05:17 06:04	06:59 07:54	07:54 08:36-09:01/25	08:45 09:23-09:35/12				
10	08:55 09:31-09:54/23	08:11 09:08-09:30/22	07:08 07:02	05:46 05:07	05:18 06:06	07:01 07:56	07:56 08:37-09:00/23	08:46 09:23-09:35/12				
11	08:54 09:31-09:54/23	08:09 09:09-09:29/20	07:06 07:00	05:44 05:06	05:19 06:07	07:03 07:58	07:58 08:37-09:00/23	08:47 09:26-09:35/9				
12	08:54 09:31-09:55/25	08:07 09:11-09:27/16	07:03 07:03	05:42 05:06	05:20 06:09	07:05 07:59	08:00 09:07-09:24/17	08:49 09:27-09:34/7				
13	08:53 09:30-09:56/26	08:05 09:13-09:26/13	07:01 07:01	05:44 05:06	05:21 06:11	07:07 08:01	08:02 09:07-09:27/20	08:50 09:28-09:34/6				
14	08:52 09:30-09:56/26	08:03 09:16-09:21/5	06:58 07:00	05:42 05:05	05:23 06:13	07:08 08:03	08:04 09:06-09:29/23	08:51 09:30-09:32/2				
15	08:51 09:30-09:57/27	08:01 08:01	06:56 06:40	05:37 05:05	05:24 06:14	07:10 08:05	08:05 09:06-09:30/24	08:52 09:06-09:30/24				
16	08:50 09:30-09:58/28	07:59 07:59	06:53 06:37	05:35 05:05	05:25 06:16	07:12 08:07	08:07 09:05-09:31/26	08:53 09:05-09:31/26				
17	08:49 09:29-09:58/29	07:57 07:57	06:51 06:35	05:33 05:05	05:27 06:18	07:14 08:09	08:09 09:05-09:32/27	08:53 09:05-09:32/27				
18	08:48 09:30-09:58/28	07:54 07:54	06:48 06:33	05:32 05:05	05:28 06:20	07:16 08:11	08:11 09:05-09:33/28	08:54 09:05-09:33/28				
19	08:47 09:30-09:59/29	07:52 07:52	06:46 06:30	05:30 05:05	05:29 06:22	07:17 08:13	08:13 09:05-09:33/28	08:55 09:05-09:33/28				
20	08:45 09:30-09:59/29	07:50 07:50	06:43 06:28	05:29 05:05	05:31 06:23	07:19 08:15	08:15 09:05-09:34/29	08:56 09:05-09:34/29				
21	08:44 09:30-09:59/29	07:48 07:48	06:41 06:26	05:27 05:05	05:32 06:25	07:21 08:17	08:17 09:05-09:34/29	08:56 09:05-09:34/29				
22	08:43 09:30-09:59/29	07:46 07:46	06:38 06:23	05:26 05:05	05:34 06:27	07:23 08:19	08:19 09:06-09:35/29	08:57 09:06-09:35/29				
23	08:42 09:31-09:59/28	07:43 07:43	06:36 06:21	05:24 05:05	05:35 06:29	07:25 08:20	08:20 09:06-09:35/29	08:57 09:06-09:35/29				
24	08:40 09:31-09:59/28	07:41 07:41	06:33 06:19	05:23 05:06	05:37 06:31	07:26 08:22	08:22 09:07-09:35/28	08:58 09:07-09:35/28				
25	08:39 09:32-09:59/27	07:39 07:39	06:31 06:17	05:22 05:06	05:38 06:32	07:28 08:24	08:24 09:07-09:36/29	08:58 09:07-09:36/29				
26	08:37 09:32-09:58/26	07:37 07:37	06:29 06:14	05:20 05:06	05:40 06:34	07:30 08:26	08:26 09:08-09:36/28	08:58 09:08-09:36/28				
27	08:36 09:33-09:57/24	07:34 07:34	06:26 06:12	05:19 05:07	05:42 06:36	07:32 08:28	08:27 09:09-09:36/27	08:59 09:09-09:36/27				
28	08:34 09:33-09:56/23	07:32 07:32	06:24 06:10	05:18 05:07	05:43 06:38	07:34 08:30	08:30 08:44-08:52/8	08:29 09:10-09:37/27				
29	08:33 09:35-09:55/20	07:29 07:29	06:21 06:08	05:17 05:08	05:45 06:40	07:35 08:31	08:31 08:41-08:55/14	08:29 09:11-09:37/26				
30	08:31 09:36-09:53/17	07:27 07:27	06:19 06:06	05:16 05:09	05:47 06:41	07:37 08:33	08:33 08:40-08:57/17	08:29 09:11-09:36/25				
31	08:29 09:36-09:52/15	07:25 07:25	06:17 06:04	05:15 05:08	05:46 06:40	07:38 08:34	08:34 08:39-08:58/19	08:29 09:11-09:36/25				
Potential sun hours	248	272	367	421	495	512	514	461	382	328	258	231
Sum of minutes with flicker	808	313	0	0	0	0	0	0	58	887	209	

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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH1_T68 - Siemens SWT-3.2-113 2A 3200 113.0 IO! hub: 119.5 m (TOT: 176.0 m) (28)

Assumptions for shadow calculations

- 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

Table with columns for months (January to December) and rows for days (1 to 31). Each cell contains start and end times for shadow flicker. Summary rows at the bottom show 'Potential sun hours' and 'Sum of minutes with flicker' for each month.

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

Matrix with 2 rows and 3 columns: Day in month, Sun rise (hh:mm) / Sun set (hh:mm), and First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker.

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T19 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (34)

Assumptions for shadow calculations

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

Table with columns for months (January to December) and rows for days (1 to 31). Each cell contains two time values (rise and set). Summary rows at the bottom show Potential sun hours and Sum of minutes with flicker for each month.

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

Matrix layout for each day in each month: Day in month, Sun rise (hh:mm), Sun set (hh:mm), First time (hh:mm) with flicker, Last time (hh:mm) with flicker, Minutes with flicker.

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T20 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (35)

Assumptions for shadow calculations

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	08:59 16:26	08:28 17:18	07:30 18:14	07:14 20:13	06:04 21:10	05:13 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:27	08:26 17:20	07:27 18:16	07:11 20:15	06:02 21:11	05:13 22:02	05:10 22:15	05:52 21:38	06:47 20:29	07:41 19:15	07:40 17:04	08:36 16:20
3	08:59 16:28	08:24 17:22	07:25 18:18	07:09 20:17	06:00 21:13	05:12 22:03	05:11 22:15	05:53 21:36	06:49 20:27	07:43 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:23 17:24	07:23 18:20	07:06 20:19	05:58 21:15	05:11 22:04	05:12 22:14	05:55 21:34	06:51 20:25	07:45 19:10	07:44 17:00	08:39 16:19
5	08:58 16:30	08:21 17:26	07:20 18:22	07:04 20:21	05:56 21:17	05:10 22:05	05:13 22:13	05:57 21:32	06:52 20:22	07:47 19:07	07:46 16:58	08:40 16:18
6	08:58 16:32	08:19 17:28	07:18 18:24	07:01 20:23	05:54 21:19	05:09 22:06	05:14 22:13	05:59 21:30	06:54 20:20	07:48 19:05	07:48 16:56	08:41 16:18
7	08:57 16:33	08:17 17:30	07:15 18:26	06:59 20:25	05:52 21:21	05:09 22:07	05:15 22:12	06:00 21:28	06:56 20:17	07:50 19:03	07:50 16:54	08:43 16:17
8	08:57 16:35	08:15 17:32	07:13 18:28	06:57 20:27	05:50 21:22	05:08 22:08	05:16 22:11	06:02 21:26	06:58 20:15	07:52 19:00	07:52 16:52	08:44 16:17
9	08:56 16:36	08:13 17:34	07:11 18:30	06:54 20:28	05:48 21:24	05:07 22:09	05:17 22:11	06:04 21:24	06:59 20:12	07:54 18:58	07:54 16:51	08:45 16:16
10	08:55 16:38	08:11 17:36	07:08 18:32	06:52 20:30	05:46 21:26	05:07 22:10	05:18 22:10	06:06 21:22	07:01 20:10	07:56 18:55	07:56 16:49	08:47 16:16
11	08:55 16:39	08:09 17:38	07:06 18:34	06:49 20:32	05:44 21:28	05:06 22:11	05:19 22:09	06:07 21:20	07:03 20:07	07:58 18:53	07:58 16:47	08:48 16:16
12	08:54 16:41	08:07 17:40	07:03 18:36	06:47 20:34	05:42 21:30	05:06 22:12	05:20 22:08	06:09 21:18	07:05 20:05	08:00 18:51	08:00 16:45	08:49 16:16
13	08:53 16:42	08:05 17:42	07:01 18:37	06:45 20:36	05:40 21:31	05:06 22:12	05:21 22:07	06:11 21:16	07:07 20:02	08:02 18:48	08:02 16:44	08:50 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:39 21:33	05:05 22:13	05:23 22:06	06:13 21:13	07:08 20:00	08:03 18:46	08:04 16:42	08:51 16:15
15	08:51 16:46	08:01 17:46	06:56 18:41	06:40 20:40	05:37 21:35	05:05 22:14	05:24 22:05	06:15 21:11	07:10 19:57	08:05 18:43	08:06 16:40	08:52 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:42	05:35 21:36	05:05 22:14	05:25 22:04	06:16 21:09	07:12 19:55	08:07 18:41	08:08 16:39	08:53 16:15
17	08:49 16:49	07:57 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:15	05:27 22:02	06:18 21:07	07:14 19:52	08:09 18:39	08:09 16:37	08:54 16:16
18	08:48 16:51	07:55 17:52	06:49 18:47	06:33 20:45	05:32 21:40	05:05 22:15	05:28 22:01	06:20 21:05	07:16 19:50	08:11 18:36	08:11 16:36	08:54 16:16
19	08:47 16:53	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:29 22:00	06:22 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:46 16:54	07:50 17:56	06:44 18:51	06:28 20:49	05:29 21:43	05:05 22:16	05:31 21:59	06:23 21:00	07:19 19:45	08:15 18:32	08:15 16:33	08:56 16:16
21	08:44 16:56	07:48 17:58	06:41 18:53	06:26 20:51	05:27 21:45	05:05 22:16	05:32 21:57	06:25 20:58	07:21 19:42	08:17 18:30	08:17 16:32	08:56 16:17
22	08:43 16:58	07:46 18:00	06:39 18:55	06:24 20:53	05:26 21:46	05:05 22:16	05:34 21:56	06:27 20:56	07:23 19:40	08:19 18:27	08:19 16:30	08:57 16:17
23	08:42 17:00	07:44 18:02	06:36 18:56	06:21 20:55	05:24 21:48	05:05 22:16	05:35 21:54	06:29 20:53	07:25 19:37	08:21 18:25	08:21 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:34 18:58	06:19 20:57	05:23 21:49	05:06 22:16	05:37 21:53	06:31 20:51	07:26 19:35	08:23 18:23	08:22 16:28	08:58 16:18
25	08:39 17:04	07:39 18:06	06:31 19:00	06:17 20:58	05:22 21:51	05:06 22:16	05:38 21:51	06:33 20:49	07:28 19:32	08:24 17:21	08:24 16:27	08:58 16:19
26	08:38 17:06	07:37 18:08	06:29 19:02	06:15 21:00	05:20 21:52	05:06 22:16	05:40 21:50	06:34 20:46	07:30 19:30	07:27 17:19	08:26 16:26	08:59 16:20
27	08:36 17:08	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:54	05:07 22:16	05:42 21:48	06:36 20:44	07:32 19:27	07:28 17:16	08:28 16:25	08:59 16:21
28	08:35 17:10	07:32 18:12	06:24 19:06	06:10 21:04	05:18 21:55	05:07 22:16	05:43 21:46	06:38 20:41	07:34 19:25	08:29 17:14	08:29 16:24	08:59 16:21
29	08:33 17:12	07:30 18:08	06:21 20:08	06:08 21:06	05:17 21:57	05:08 22:16	05:45 21:45	06:40 20:39	07:36 19:22	07:32 17:12	08:31 16:23	08:59 16:22
30	08:31 17:14	07:28 18:04	06:19 20:06	06:06 21:08	05:16 21:58	05:09 22:16	05:47 21:43	06:42 20:37	07:37 19:20	07:34 17:10	08:32 16:22	08:59 16:23
31	08:30 17:16	07:26 18:02	06:17 20:02	06:04 21:06	05:15 21:59	05:09 22:16	05:48 21:41	06:43 20:34	07:38 19:16	07:36 17:08	08:33 16:21	08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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) Sun set (hh:mm)	First time (hh:mm) with flicker First time (hh:mm) with flicker	Last time (hh:mm) with flicker Last time (hh:mm) with flicker	Minutes with flicker Minutes with flicker
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Project:

10889_Oweninny Wind Farm_Model_200_TH

Licensed user:

Tobin Consulting Engineers
Block 10-4, Blanchardstown, Corporate Park
IE-DUBLIN 15
+353 1 80304 01
michael nolan / michael.nolan@tobin.ie
Calculated:
26/05/2022 12:56/3.3.294

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH2_T27 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (38)

Assumptions for shadow calculations

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

Table with columns for months (January to December) and rows for days (1 to 31). Includes 'Potential sun hours' and 'Sum of minutes with flicker' at the bottom.

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:

10889_Oweninny Wind Farm_Model_200_TH

Licensed user:

Tobin Consulting Engineers
 Block 10-4, Blanchardstown, Corporate Park
 IE-DUBLIN 15
 +353 1 80304 01
 michael.nolan / michael.nolan@tobin.ie
 Calculated:
 26/05/2022 12:56/3.3.294

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH2_T28 - NORDEX N117 2400 117.0 !OI! hub: 117.5 m (TOT: 176.0 m) (39)

Assumptions for shadow calculations

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	08:59 16:26	08:28 17:18	07:30 18:14	07:14 20:13	06:04 21:10	05:14 22:00	05:09 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:27	08:26 17:20	07:27 18:16	07:11 20:15	06:02 21:11	05:13 22:02	05:10 22:15	05:52 21:38	06:47 20:29	07:41 19:15	07:40 17:04	08:36 16:20
3	08:59 16:28	08:24 17:22	07:25 18:18	07:09 20:17	06:00 21:13	05:12 22:03	05:11 22:15	05:53 21:36	06:49 20:27	07:43 19:12	07:42 17:02	08:37 16:19
4	08:58 16:29	08:23 17:24	07:23 18:20	07:06 20:19	05:58 21:15	05:11 22:04	05:12 22:14	05:55 21:34	06:51 20:25	07:45 19:10	07:44 17:00	08:39 16:19
5	08:58 16:30	08:21 17:26	07:20 18:22	07:04 20:21	05:56 21:17	05:10 22:05	05:13 22:13	05:57 21:32	06:52 20:22	07:47 19:08	07:46 16:58	08:40 16:18
6	08:58 16:32	08:19 17:28	07:18 18:24	07:01 20:23	05:54 21:19	05:09 22:06	05:14 22:13	05:59 21:30	06:54 20:20	07:48 19:05	07:48 16:56	08:41 16:18
7	08:57 16:33	08:17 17:30	07:15 18:26	06:59 20:25	05:52 21:21	05:09 22:07	05:15 22:12	06:00 21:28	06:56 20:17	07:50 19:03	07:50 16:54	08:43 16:17
8	08:57 16:35	08:15 17:32	07:13 18:28	06:57 20:27	05:50 21:22	05:08 22:08	05:16 22:11	06:02 21:26	06:58 20:15	07:52 19:00	07:52 16:52	08:44 16:17
9	08:56 16:36	08:13 17:34	07:11 18:30	06:54 20:28	05:48 21:24	05:07 22:09	05:17 22:11	06:04 21:24	07:00 20:12	07:54 18:58	07:54 16:51	08:45 16:16
10	08:55 16:38	08:11 17:36	07:08 18:32	06:52 20:30	05:46 21:26	05:07 22:10	05:18 22:10	06:06 21:22	07:01 20:10	07:56 18:55	07:56 16:49	08:47 16:16
11	08:55 16:39	08:09 17:38	07:06 18:34	06:49 20:32	05:44 21:28	05:06 22:11	05:19 22:09	06:07 21:20	07:03 20:07	07:58 18:53	07:58 16:47	08:48 16:16
12	08:54 16:41	08:07 17:40	07:03 18:36	06:47 20:34	05:42 21:30	05:06 22:12	05:20 22:08	06:09 21:18	07:05 20:05	08:00 18:51	08:00 16:45	08:49 16:16
13	08:53 16:42	08:05 17:42	07:01 18:38	06:45 20:36	05:40 21:31	05:06 22:12	05:21 22:07	06:11 21:16	07:07 20:02	08:02 18:48	08:02 16:44	08:50 16:15
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:39 21:33	05:05 22:13	05:23 22:06	06:13 21:13	07:08 20:00	08:03 18:46	08:04 16:42	08:51 16:15
15	08:51 16:46	08:01 17:46	06:56 18:41	06:40 20:40	05:37 21:35	05:05 22:14	05:24 22:05	06:15 21:11	07:10 19:57	08:05 18:43	08:06 16:40	08:52 16:15
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:42	05:35 21:36	05:05 22:14	05:25 22:04	06:16 21:09	07:12 19:55	08:07 18:41	08:08 16:39	08:53 16:15
17	08:49 16:49	07:57 17:50	06:51 18:45	06:35 20:43	05:33 21:38	05:05 22:15	05:27 22:02	06:18 21:07	07:14 19:52	08:09 18:39	08:09 16:37	08:54 16:16
18	08:48 16:51	07:55 17:52	06:49 18:47	06:33 20:45	05:32 21:40	05:05 22:15	05:28 22:01	06:20 21:05	07:16 19:50	08:11 18:36	08:11 16:36	08:54 16:16
19	08:47 16:53	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:29 22:00	06:22 21:02	07:17 19:47	08:13 18:34	08:13 16:34	08:55 16:16
20	08:46 16:54	07:50 17:56	06:44 18:51	06:28 20:49	05:29 21:43	05:05 22:16	05:31 21:59	06:24 21:00	07:19 19:45	08:15 18:32	08:15 16:33	08:56 16:16
21	08:44 16:56	07:48 17:58	06:41 18:53	06:26 20:51	05:27 21:45	05:05 22:16	05:32 21:57	06:25 20:58	07:21 19:42	08:17 18:30	08:17 16:32	08:56 16:17
22	08:43 16:58	07:46 18:00	06:39 18:55	06:24 20:53	05:26 21:46	05:05 22:16	05:34 21:56	06:27 20:56	07:23 19:40	08:19 18:27	08:19 16:30	08:57 16:17
23	08:42 17:00	07:44 18:02	06:36 18:57	06:21 20:55	05:24 21:48	05:05 22:16	05:35 21:54	06:29 20:53	07:25 19:37	08:21 18:25	08:21 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:34 18:58	06:19 20:57	05:23 21:49	05:06 22:16	05:37 21:53	06:31 20:51	07:26 19:35	08:23 18:23	08:22 16:28	08:58 16:18
25	08:39 17:04	07:39 18:06	06:31 19:00	06:17 20:58	05:22 21:51	05:06 22:16	05:38 21:51	06:33 20:49	07:28 19:32	08:24 17:21	08:24 16:27	08:58 16:19
26	08:38 17:06	07:37 18:08	06:29 19:02	06:15 21:00	05:20 21:52	05:07 22:16	05:40 21:50	06:34 20:46	07:30 19:30	08:26 17:19	08:26 16:26	08:59 16:20
27	08:36 17:08	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:54	05:07 22:16	05:42 21:48	06:36 20:44	07:32 19:27	08:28 17:16	08:28 16:25	08:59 16:21
28	08:35 17:10	07:32 18:12	06:24 19:06	06:10 21:04	05:18 21:55	05:08 22:16	05:43 21:46	06:38 20:41	07:34 19:25	08:29 17:14	08:29 16:24	08:59 16:21
29	08:33 17:12		07:21 20:08	06:08 21:06	05:17 21:57	05:08 22:16	05:45 21:45	06:40 20:39	07:36 19:22	08:31 17:12	08:31 16:23	08:59 16:22
30	08:31 17:14		07:19 20:10	06:06 21:08	05:16 21:58	05:09 22:16	05:47 21:43	06:42 20:37	07:37 19:20	08:32 17:10	08:32 16:22	08:59 16:23
31	08:30 17:16		07:16 20:12		05:15 21:59		05:48 21:41	06:43 20:34		08:32 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	257	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T33 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (40)
Assumptions for shadow calculations

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

Table with 12 columns (January to December) and 31 rows (Day 1 to Day 31). Each cell contains two time values representing sunrise and sunset. Summary rows at the bottom show 'Potential sun hours' and 'Sum of minutes with flicker' for each month.

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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst Case WTG: PH2_T52 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (47)
 Assumptions for shadow calculations

- 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	08:59 16:26	08:28 17:18	07:30 18:14	07:14 20:13	06:04 21:10	05:14 22:00	05:10 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:27	08:26 17:20	07:27 18:16	07:11 20:15	06:02 21:12	05:13 22:02	05:10 22:15	05:52 21:38	06:47 20:30	07:41 19:15	07:40 17:04	08:36 16:20
31	08:30 17:16	07:19 18:04	06:06 20:08	05:16 21:08	05:09 21:58	05:09 22:16	05:47 21:43	06:42 20:37	07:37 19:20	07:34 17:10	08:32 16:22	08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	258	231
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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T53 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (48)

Assumptions for shadow calculations

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	08:59 16:26	08:28 17:18	07:30 18:14	07:14 20:13	06:04 21:10	05:14 22:00	05:10 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:27	08:26 17:20	07:27 18:16	07:11 20:15	06:02 21:11	05:13 22:02	05:10 22:15	05:52 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:36 16:20
3	08:59 16:28	08:24 17:22	07:25 18:18	07:09 20:17	06:00 21:13	05:12 22:03	05:11 22:14	05:53 21:36	06:49 20:27	07:43 19:12	07:42 17:02	08:37 16:20
4	08:58 16:29	08:23 17:24	07:23 18:20	07:06 20:19	05:58 21:15	05:11 22:04	05:12 22:14	05:55 21:34	06:51 20:25	07:45 19:10	07:44 17:00	08:39 16:19
5	08:58 16:31	08:21 17:26	07:20 18:22	07:04 20:21	05:56 21:17	05:10 22:05	05:13 22:13	05:57 21:32	06:52 20:22	07:47 19:08	07:46 16:58	08:40 16:18
6	08:58 16:32	08:19 17:28	07:18 18:24	07:02 20:23	05:54 21:19	05:09 22:06	05:14 22:13	05:59 21:30	06:54 20:20	07:48 19:05	07:48 16:56	08:41 16:18
7	08:57 16:33	08:17 17:30	07:15 18:26	06:59 20:25	05:52 21:21	05:09 22:07	05:15 22:12	06:00 21:28	06:56 20:17	07:50 19:03	07:50 16:54	08:43 16:17
8	08:56 16:35	08:15 17:32	07:13 18:28	06:57 20:27	05:50 21:22	05:08 22:08	05:16 22:11	06:02 21:26	06:58 20:15	07:52 19:00	07:52 16:53	08:44 16:17
9	08:56 16:36	08:13 17:34	07:11 18:30	06:54 20:28	05:48 21:24	05:07 22:09	05:17 22:11	06:04 21:24	07:00 20:12	07:54 18:58	07:54 16:51	08:45 16:16
10	08:55 16:38	08:11 17:36	07:08 18:32	06:52 20:30	05:46 21:26	05:07 22:10	05:18 22:10	06:06 21:22	07:01 20:10	07:56 18:55	07:56 16:49	08:46 16:16
11	08:55 16:39	08:09 17:38	07:06 18:34	06:49 20:32	05:44 21:28	05:07 22:11	05:19 22:09	06:07 21:20	07:03 20:07	07:58 18:53	07:58 16:47	08:48 16:16
12	08:54 16:41	08:07 17:40	07:03 18:36	06:47 20:34	05:42 21:30	05:06 22:11	05:20 22:08	06:09 21:18	07:05 20:05	08:00 18:51	08:00 16:45	08:49 16:16
13	08:53 16:42	08:05 17:42	07:01 18:38	06:45 20:36	05:40 21:31	05:06 22:12	05:21 22:07	06:11 21:16	07:07 20:02	08:02 18:48	08:02 16:44	08:50 16:16
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:39 21:33	05:05 22:13	05:23 22:06	06:13 21:13	07:09 20:00	08:03 18:46	08:04 16:42	08:51 16:15
15	08:51 16:46	08:01 17:46	06:56 18:41	06:40 20:40	05:37 21:35	05:05 22:13	05:24 22:05	06:15 21:11	07:10 19:57	08:05 18:44	08:06 16:41	08:52 16:16
16	08:50 16:47	07:59 17:48	06:53 18:43	06:38 20:42	05:35 21:36	05:05 22:14	05:25 22:04	06:16 21:09	07:12 19:55	08:07 18:41	08:08 16:39	08:53 16:16
17	08:49 16:49	07:57 17:50	06:51 18:45	06:35 20:43	05:34 21:38	05:05 22:15	05:27 22:02	06:18 21:07	07:14 19:52	08:09 18:39	08:09 16:37	08:54 16:16
18	08:48 16:51	07:55 17:52	06:49 18:47	06:33 20:45	05:32 21:40	05:05 22:15	05:28 22:01	06:20 21:05	07:16 19:50	08:11 18:37	08:11 16:36	08:54 16:16
19	08:47 16:53	07:52 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 22:15	05:30 22:00	06:22 21:02	07:17 19:47	08:13 18:34	08:13 16:35	08:55 16:16
20	08:46 16:55	07:50 17:56	06:44 18:51	06:28 20:49	05:29 21:43	05:05 22:16	05:31 21:59	06:24 21:00	07:19 19:45	08:15 18:32	08:15 16:33	08:56 16:17
21	08:44 16:56	07:48 17:58	06:41 18:53	06:26 20:51	05:27 21:45	05:05 22:16	05:32 21:57	06:25 20:58	07:21 19:42	08:17 18:30	08:17 16:32	08:56 16:17
22	08:43 16:58	07:46 18:00	06:39 18:55	06:24 20:53	05:26 21:46	05:05 22:16	05:34 21:56	06:27 20:56	07:23 19:40	08:19 18:27	08:19 16:31	08:57 16:17
23	08:42 17:00	07:44 18:02	06:36 18:57	06:21 20:55	05:24 21:48	05:06 22:16	05:35 21:54	06:29 20:53	07:25 19:37	08:21 18:25	08:21 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:34 18:58	06:19 20:57	05:23 21:49	05:06 22:16	05:37 21:53	06:31 20:51	07:26 19:35	08:23 18:23	08:22 16:28	08:58 16:19
25	08:39 17:04	07:39 18:06	06:31 19:00	06:17 20:58	05:22 21:51	05:06 22:16	05:39 21:51	06:33 20:49	07:28 19:32	08:25 17:21	08:24 16:27	08:58 16:19
26	08:38 17:06	07:37 18:08	06:29 19:02	06:15 21:00	05:20 21:52	05:07 22:16	05:40 21:50	06:34 20:46	07:30 19:30	08:27 17:19	08:26 16:26	08:58 16:20
27	08:36 17:08	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:54	05:07 22:16	05:42 21:48	06:36 20:44	07:32 19:27	08:28 17:16	08:27 16:25	08:59 16:21
28	08:35 17:10	07:32 18:12	06:24 19:06	06:10 21:04	05:18 21:55	05:08 22:16	05:43 21:46	06:38 20:42	07:34 19:25	08:29 17:14	08:29 16:24	08:59 16:22
29	08:33 17:12		07:21 20:08	06:08 21:06	05:17 21:56	05:08 22:16	05:45 21:45	06:40 20:39	07:36 19:22	08:31 17:12	08:31 16:23	08:59 16:22
30	08:31 17:14		07:19 20:10	06:06 21:08	05:16 21:58	05:09 22:16	05:47 21:43	06:42 20:37	07:37 19:20	08:32 17:10	08:32 16:22	08:59 16:23
31	08:30 17:16		07:16 20:12		05:15 21:59		05:48 21:41	06:43 20:34		08:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	496	512	514	461	382	328	258	231
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:

10889_Oweninny Wind Farm_Model_200_TH

Licensed user:

Tobin Consulting Engineers
Block 10-4, Blanchardstown, Corporate Park
IE-DUBLIN 15
+353 1 80304 01
michael.nolan / michael.nolan@tobin.ie
Calculated:
26/05/2022 12:56/3.3.294

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T54 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (49)

Assumptions for shadow calculations

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

Table with columns for months (January to December) and rows for days (1 to 31). Columns contain time ranges (e.g., 08:59-16:26) and summary rows for 'Potential sun hours' and 'Sum of minutes with flicker'.

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

Matrix with 2 rows and 3 columns: Day in month, Sun rise (hh:mm) / Sun set (hh:mm), First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker.



Project:

10889_Oweninny Wind Farm_Model_200_TH

Licensed user:

Tobin Consulting Engineers
Block 10-4, Blanchardstown, Corporate Park
IE-DUBLIN 15
+353 1 80304 01
michael.nolan / michael.nolan@tobin.ie
Calculated:
26/05/2022 12:56/3.3.294

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T55 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (50)
Assumptions for shadow calculations

- 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

Table with 13 columns for months (January to December) and rows for days (1-31). Each cell contains a range of times (e.g., 08:59 | 08:28 | 07:30 17:28-17:46/18) representing shadow periods. Summary rows at the bottom show 'Potential sun hours' and 'Sum of minutes with flicker' for each month.

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

Matrix with 2 rows and 3 columns: Day in month, Sun rise (hh:mm) / Sun set (hh:mm), First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker.



SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T66 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (53)

Assumptions for shadow calculations

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	08:59 16:26	08:28 16:00-16:36/36 17:18	07:30 18:14	07:14 20:13	06:04 21:10	05:14 22:00
2	08:59 16:27	08:26 16:01-16:36/35 17:20	07:27 18:16	07:11 20:15	06:02 21:11	05:13 22:02
3	08:58 16:28	08:24 16:03-16:37/34 17:22	07:25 18:18	07:09 20:17	06:00 21:13	05:12 22:03
4	08:58 16:29	08:23 16:05-16:37/32 17:24	07:23 18:20	07:06 20:19	05:58 21:15	05:11 22:04
5	08:58 16:31	08:21 16:07-16:37/30 17:26	07:20 18:22	07:04 20:21	05:56 21:17	05:10 22:05
6	08:57 16:32	08:19 16:11-16:37/26 17:30	07:18 18:24	07:01 20:23	05:54 21:19	05:09 22:06
7	08:57 16:33	08:17 16:12-16:37/25 17:30	07:15 18:26	06:59 20:25	05:52 21:21	05:09 21:30-21:32/2 22:07
8	08:56 16:35	08:15 16:12-16:37/25 17:32	07:13 18:28	06:57 20:27	05:50 21:22	05:08 21:28-21:32/4 22:08
9	08:56 16:36	08:13 16:13-16:36/23 17:34	07:11 18:30	06:54 20:28	05:48 21:24	05:07 21:28-21:33/5 22:09
10	08:55 16:38	08:11 16:14-16:36/22 17:36	07:08 18:32	06:52 20:30	05:46 21:26	05:07 21:27-21:33/6 22:10
11	08:54 15:58-16:02/4 16:39	08:09 16:16-16:35/19 17:38	07:06 18:34	06:49 20:32	05:44 21:28	05:06 21:27-21:34/7 22:11
12	08:54 15:56-16:04/8 16:41	08:07 16:17-16:33/16 17:40	07:03 18:36	06:47 20:34	05:42 21:29	05:06 21:27-21:35/8 22:11
13	08:53 15:55-16:06/11 16:42	08:05 16:20-16:32/12 17:42	07:01 18:37	06:45 20:36	05:40 21:31	05:06 21:26-21:35/9 22:12
14	08:52 15:55-16:08/13 16:44	08:03 16:23-16:26/3 17:44	06:58 18:39	06:42 20:38	05:39 21:33	05:05 21:26-21:36/10 22:13
15	08:51 15:54-16:10/16 16:46	08:01 16:26-16:29/6 17:46	06:56 18:41	06:40 20:40	05:37 21:35	05:05 21:26-21:37/11 22:13
16	08:50 15:54-16:12/18 16:47	07:59 16:29-16:32/3 17:48	06:53 18:43	06:37 20:42	05:35 21:36	05:05 21:26-21:37/11 22:14
17	08:49 15:53-16:13/20 16:49	07:57 16:32-16:35/0 17:50	06:51 18:45	06:35 20:43	05:34 21:38	05:05 21:27-21:38/11 22:14
18	08:48 15:53-16:15/22 16:51	07:55 16:35-16:38/0 17:52	06:48 18:47	06:33 20:45	05:32 21:40	05:05 21:27-21:38/11 22:15
19	08:47 15:54-16:17/23 16:53	07:52 16:38-16:41/0 17:54	06:46 18:49	06:30 20:47	05:30 21:41	05:05 21:27-21:39/12 22:15
20	08:46 15:53-16:18/25 16:54	07:50 16:41-16:44/0 17:56	06:44 18:51	06:28 20:49	05:29 21:43	05:05 21:27-21:39/12 22:16
21	08:44 15:53-16:19/26 16:56	07:48 16:44-16:47/0 17:58	06:41 18:53	06:26 20:51	05:27 21:45	05:05 21:27-21:39/12 22:16
22	08:43 15:53-16:19/26 16:58	07:46 16:47-16:50/0 18:00	06:39 18:55	06:24 20:53	05:26 21:46	05:05 21:28-21:40/12 22:16
23	08:42 15:54-16:21/27 17:00	07:43 16:50-16:53/0 18:02	06:36 18:56	06:21 20:55	05:24 21:48	05:06 21:28-21:40/12 22:16
24	08:40 15:53-16:21/28 17:02	07:41 16:53-16:56/0 18:04	06:34 18:58	06:19 20:57	05:23 21:49	05:06 21:28-21:39/11 22:16
25	08:39 15:54-16:28/34 17:04	07:39 16:56-16:59/0 18:06	06:31 19:00	06:17 20:58	05:22 21:51	05:06 21:29-21:40/11 22:16
26	08:37 15:54-16:30/36 17:06	07:37 16:59-17:02/0 18:08	06:29 19:02	06:15 21:00	05:20 21:52	05:07 21:28-21:40/12 22:16
27	08:36 15:55-16:31/36 17:08	07:34 17:02-17:05/0 18:10	06:26 19:04	06:12 21:02	05:19 21:54	05:07 21:29-21:40/11 22:16
28	08:34 15:55-16:32/37 17:10	07:32 17:05-17:08/0 18:12	06:24 19:06	06:10 21:04	05:18 21:55	05:08 21:29-21:39/10 22:16
29	08:33 15:57-16:34/37 17:12		07:21 20:08	06:08 21:06	05:17 21:56	05:08 21:30-21:40/10 22:16
30	08:31 15:57-16:35/38 17:14		07:19 20:10	06:06 21:08	05:16 21:58	05:09 21:30-21:39/9 22:16
31	08:30 15:58-16:36/38 17:16		07:16 20:12		05:15 21:59	
Potential sun hours	248	272	367	421	495	512
Sum of minutes with flicker	523	338	0	0	0	229

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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T66 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (53)

Assumptions for shadow calculations

- 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	05:09 21:31-21:39/8 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 15:44-16:05/21 17:06	08:34 15:40-15:44/4 16:21
2	05:10 21:32-21:39/7 22:15	05:52 21:37	06:47 20:29	07:41 19:15	07:40 15:43-16:06/23 17:04	08:35 16:20
3	05:11 21:32-21:38/6 22:14	05:53 21:36	06:49 20:27	07:43 19:12	07:42 15:42-16:06/24 17:02	08:37 16:19
4	05:12 21:33-21:38/5 22:14	05:55 21:34	06:51 20:25	07:45 19:10	07:44 15:41-16:07/26 17:00	08:38 16:19
5	05:13 21:35-21:37/2 22:13	05:57 21:32	06:52 20:22	07:47 19:07	07:46 15:41-16:07/26 16:58	08:40 16:18
6	05:14 22:13	05:59 21:30	06:54 20:20	07:48 19:05	07:48 15:38-16:08/30 16:56	08:41 16:18
7	05:15 22:12	06:00 21:28	06:56 20:17	07:50 19:03	07:50 15:35-16:08/33 16:54	08:43 16:17
8	05:16 22:11	06:02 21:26	06:58 20:15	07:52 19:00	07:52 15:34-16:07/33 16:52	08:44 16:17
9	05:17 22:10	06:04 21:24	06:59 20:12	07:54 18:58	07:54 15:32-16:07/35 16:51	08:45 16:16
10	05:18 22:10	06:06 21:22	07:01 20:10	07:56 18:55	07:56 15:30-16:07/37 16:49	08:46 16:16
11	05:19 22:09	06:07 21:20	07:03 20:07	07:58 18:53	07:58 15:29-16:06/37 16:47	08:48 16:16
12	05:20 22:08	06:09 21:18	07:05 20:05	08:00 18:51	08:00 15:28-16:06/38 16:45	08:49 16:16
13	05:21 22:07	06:11 21:15	07:07 20:02	08:01 18:48	08:02 15:28-16:06/38 16:44	08:50 16:15
14	05:23 22:06	06:13 21:13	07:08 20:00	08:03 18:46	08:04 15:28-16:05/37 16:42	08:51 16:15
15	05:24 22:05	06:15 21:11	07:10 19:57	08:05 18:43	08:06 15:28-16:04/36 16:40	08:52 16:15
16	05:25 22:03	06:16 21:09	07:12 19:55	08:07 18:41	08:07 15:27-16:03/36 16:39	08:53 16:16
17	05:27 22:02	06:18 21:07	07:14 19:52	08:09 18:39	08:09 15:27-16:01/34 16:37	08:53 16:16
18	05:28 22:01	06:20 21:05	07:16 19:50	08:11 18:36	08:11 15:27-15:55/28 16:36	08:54 16:16
19	05:29 22:00	06:22 21:02	07:17 19:47	08:13 18:34	08:13 15:28-15:55/27 16:35	08:55 16:16
20	05:31 21:58	06:24 21:00	07:19 19:45	08:15 18:32	08:15 15:28-15:54/26 16:33	08:56 16:16
21	05:32 21:57	06:25 20:58	07:21 19:42	08:17 18:30	08:17 15:28-15:54/26 16:32	08:56 16:17
22	05:34 21:56	06:27 20:55	07:23 19:40	08:19 18:27	08:19 15:29-15:54/25 16:30	08:57 16:17
23	05:35 21:54	06:29 20:53	07:25 19:37	08:21 18:25	08:20 15:30-15:53/23 16:29	08:57 16:18
24	05:37 21:53	06:31 20:51	07:26 19:35	08:23 18:23	08:22 15:30-15:52/22 16:28	08:58 16:18
25	05:39 21:51	06:33 20:48	07:28 19:32	08:24 17:21	08:24 15:31-15:51/20 16:27	08:58 16:19
26	05:40 21:49	06:34 20:46	07:30 19:30	08:26 17:19	08:26 15:32-15:50/18 16:26	08:58 16:20
27	05:42 21:48	06:36 20:44	07:32 19:27	08:28 17:16	08:27 15:34-15:49/15 16:25	08:59 16:21
28	05:43 21:46	06:38 20:41	07:34 19:25	08:30 15:51-15:57/6 17:14	08:29 15:35-15:48/13 16:24	08:59 16:21
29	05:45 21:45	06:40 20:39	07:35 19:22	08:32 15:48-16:01/13 17:12	08:31 15:36-15:47/11 16:23	08:59 16:22
30	05:47 21:43	06:42 20:37	07:37 19:20	08:34 15:46-16:03/17 17:10	08:32 15:37-15:45/8 16:22	08:59 16:23
31	05:48 21:41	06:43 20:34	07:38 19:18	08:36 15:45-16:04/19 17:08	08:33 15:37-15:45/8 16:22	08:59 16:24
Potential sun hours	514	461	382	328	258	231
Sum of minutes with flicker	28	0	0	55	806	4

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

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T79 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (54)

Assumptions for shadow calculations

- 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	08:59 16:26	08:28 17:18	07:30 18:14	07:14 20:13	06:04 21:10	05:14 22:00	05:10 22:15	05:50 21:39	06:45 20:32	07:39 19:17	07:38 17:06	08:34 16:21
2	08:59 16:27	08:26 17:20	07:27 18:16	07:11 20:15	06:02 21:11	05:13 22:02	05:10 22:15	05:52 21:37	06:47 20:29	07:41 19:15	07:40 17:04	08:36 16:20
3	08:59 16:28	08:24 17:22	07:25 18:18	07:09 20:17	06:00 21:13	05:12 22:03	05:11 22:14	05:54 21:36	06:49 20:27	07:43 19:12	07:42 17:02	08:37 16:20
4	08:58 16:29	08:23 17:24	07:23 18:20	07:06 20:19	05:58 21:15	05:11 22:04	05:12 22:14	05:55 21:34	06:51 20:25	07:45 19:10	07:44 17:00	08:39 16:19
5	08:58 16:31	08:21 17:26	07:20 18:22	07:04 20:21	05:56 21:17	05:10 22:05	05:13 22:13	05:57 21:32	06:52 20:22	07:47 19:08	07:46 16:58	08:40 16:18
6	08:57 16:32	08:19 17:28	07:18 18:24	07:02 20:23	05:54 21:19	05:09 22:06	05:14 22:13	05:59 21:30	06:54 20:20	07:48 19:05	07:48 16:56	08:41 16:18
7	08:57 16:33	08:17 17:30	07:15 18:26	06:59 20:25	05:52 21:21	05:09 22:07	05:15 22:12	06:00 21:28	06:56 20:17	07:50 19:03	07:50 16:54	08:43 16:17
8	08:56 16:35	08:15 17:32	07:13 18:28	06:57 20:27	05:50 21:22	05:08 22:08	05:16 22:11	06:02 21:26	06:58 20:15	07:52 19:00	07:52 16:53	08:44 16:17
9	08:56 16:36	08:13 17:34	07:11 18:30	06:54 20:28	05:48 21:24	05:08 22:09	05:17 22:11	06:04 21:24	07:00 20:12	07:54 18:58	07:54 16:51	08:45 16:16
10	08:55 16:38	08:11 17:36	07:08 18:32	06:52 20:30	05:46 21:26	05:07 22:10	05:18 22:10	06:06 21:22	07:01 20:10	07:56 18:55	07:56 16:49	08:46 16:16
11	08:55 16:39	08:09 17:38	07:06 18:34	06:49 20:32	05:44 21:28	05:07 22:11	05:19 22:09	06:08 21:20	07:03 20:07	07:58 18:53	07:58 16:47	08:48 16:16
12	08:54 16:41	08:07 17:40	07:03 18:36	06:47 20:34	05:42 21:30	05:06 22:11	05:20 22:08	06:09 21:18	07:05 20:05	08:00 18:51	08:00 16:46	08:49 16:16
13	08:53 16:42	08:05 17:42	07:01 18:38	06:45 20:36	05:40 21:31	05:06 22:12	05:22 22:07	06:11 21:16	07:07 20:02	08:02 18:48	08:02 16:44	08:50 16:16
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:39 21:33	05:06 22:13	05:23 22:06	06:13 21:13	07:09 20:00	08:03 18:46	08:04 16:42	08:51 16:16
15	08:51 16:46	08:01 17:46	06:56 18:41	06:40 20:40	05:37 21:35	05:05 22:13	05:24 22:05	06:15 21:11	07:10 19:57	08:05 18:44	08:06 16:41	08:52 16:16
16	08:50 16:47	07:59 17:48	06:54 18:43	06:38 20:42	05:35 21:36	05:05 22:14	05:25 22:04	06:16 21:09	07:12 19:55	08:07 18:41	08:08 16:39	08:53 16:16
17	08:49 16:49	07:57 17:50	06:51 18:45	06:35 20:44	05:34 21:38	05:05 22:14	05:27 22:02	06:18 21:07	07:14 19:52	08:09 18:39	08:09 16:38	08:54 16:16
18	08:48 16:51	07:55 17:52	06:49 18:47	06:33 20:45	05:32 21:40	05:05 22:15	05:28 22:01	06:20 21:05	07:16 19:50	08:11 18:37	08:11 16:36	08:54 16:16
19	08:47 16:53	07:52 17:54	06:46 18:49	06:31 20:47	05:30 21:41	05:05 22:15	05:30 22:00	06:22 21:02	07:17 19:47	08:13 18:34	08:13 16:35	08:55 16:16
20	08:46 16:55	07:50 17:56	06:44 18:51	06:28 20:49	05:29 21:43	05:05 22:16	05:31 21:58	06:24 21:00	07:19 19:45	08:15 18:32	08:15 16:33	08:56 16:17
21	08:44 16:56	07:48 17:58	06:41 18:53	06:26 20:51	05:27 21:45	05:05 22:16	05:33 21:57	06:25 20:58	07:21 19:42	08:17 18:30	08:17 16:32	08:56 16:17
22	08:43 16:58	07:46 18:00	06:39 18:55	06:24 20:53	05:26 21:46	05:05 22:16	05:34 21:56	06:27 20:56	07:23 19:40	08:19 18:27	08:19 16:31	08:57 16:17
23	08:42 17:00	07:44 18:02	06:36 18:57	06:21 20:55	05:24 21:48	05:06 22:16	05:36 21:54	06:29 20:53	07:25 19:37	08:21 18:25	08:20 16:29	08:57 16:18
24	08:40 17:02	07:41 18:04	06:34 18:58	06:19 20:57	05:23 21:49	05:06 22:16	05:37 21:53	06:31 20:51	07:27 19:35	08:23 18:23	08:22 16:28	08:58 16:19
25	08:39 17:04	07:39 18:06	06:31 19:00	06:17 20:58	05:22 21:51	05:06 22:16	05:39 21:51	06:33 20:49	07:28 19:32	08:24 17:21	08:24 16:27	08:58 16:19
26	08:38 17:06	07:37 18:08	06:29 19:02	06:15 21:00	05:20 21:52	05:07 22:16	05:40 21:50	06:34 20:46	07:30 19:30	08:26 17:19	08:26 16:26	08:58 16:20
27	08:36 17:08	07:34 18:10	06:26 19:04	06:12 21:02	05:19 21:54	05:07 22:16	05:42 21:48	06:36 20:44	07:32 19:27	08:28 17:17	08:27 16:25	08:59 16:21
28	08:35 17:10	07:32 18:12	06:24 19:06	06:10 21:04	05:18 21:55	05:08 22:16	05:43 21:46	06:38 20:42	07:34 19:25	08:29 17:14	08:29 16:24	08:59 16:22
29	08:33 17:12		07:21 20:08	06:08 21:06	05:17 21:56	05:08 22:16	05:45 21:45	06:40 20:39	07:36 19:22	08:31 17:12	08:31 16:23	08:59 16:22
30	08:31 17:14		07:19 20:10	06:06 21:08	05:16 21:58	05:09 22:16	05:47 21:43	06:42 20:37	07:37 19:20	08:32 17:10	08:32 16:22	08:59 16:23
31	08:30 17:16		07:16 20:12		05:15 21:59		05:48 21:41	06:43 20:34		07:36 17:08		08:59 16:24
Potential sun hours	248	272	367	421	495	512	514	461	382	328	258	231
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:

10889_Oweninny Wind Farm_Model_200_TH

Licensed user:

Tobin Consulting Engineers
Block 10-4, Blanchardstown, Corporate Park
IE-DUBLIN 15
+353 1 80304 01
michael.nolan / michael.nolan@tobin.ie
Calculated:
26/05/2022 12:56/3.3.294

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T81 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (56)

Assumptions for shadow calculations

- 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

Table with 12 columns for months (January-December) and 31 rows for days. Each cell contains a time range (e.g., 08:59-18:14) representing shadow periods. Summary rows at the bottom show potential sun hours and sum of minutes with flicker per month.

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

Matrix with 2 rows and 3 columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm); First time (hh:mm) with flicker, Last time (hh:mm) with flicker, Minutes with flicker.

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T88 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (59)
Assumptions for shadow calculations

- 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

Table with columns for months (January-December) and rows for days (1-31). Contains sunrise and sunset times in hh:mm format. Summary rows include 'Potential sun hours' and 'Sum of minutes with flicker'.

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

Matrix showing columns: Day in month, Sun rise (hh:mm), Sun set (hh:mm), First time (hh:mm) with flicker, Last time (hh:mm) with flicker, Minutes with flicker.

SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T91 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (62)

Assumptions for shadow calculations

- 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	08:59 16:26	08:28 17:18	07:30 17:36-17:46/10 18:14	07:14 19:10-19:20/10 20:13	06:04 21:10	05:14 20:54-21:19/25 22:00
2	08:59 16:27	08:26 17:20	07:27 17:35-17:48/13 18:16	07:11 20:15	06:02 21:11	05:13 20:53-21:19/26 22:01
3	08:58 16:28	08:24 17:22	07:25 17:34-17:51/17 18:18	07:09 20:17	06:00 21:13	05:12 20:53-21:19/26 22:03
4	08:58 16:29	08:23 17:24	07:23 17:33-17:52/19 18:20	07:06 20:19	05:58 21:15	05:11 20:53-21:19/26 22:04
5	08:58 16:31	08:21 17:26	07:20 17:33-17:53/20 18:22	07:04 20:21	05:56 21:17	05:10 20:54-21:20/26 22:05
6	08:57 16:32	08:19 17:28	07:18 17:32-17:52/20 18:24	07:02 20:23	05:54 21:19	05:09 20:53-21:20/27 22:06
7	08:57 16:33	08:17 17:30	07:15 17:32-17:52/20 18:26	06:59 20:25	05:52 21:21	05:09 20:54-21:21/27 22:07
8	08:56 16:35	08:15 17:32	07:13 17:32-17:51/19 18:28	06:57 20:27	05:50 21:22	05:08 20:53-21:20/27 22:08
9	08:56 16:36	08:13 17:34	07:11 17:32-17:51/19 18:30	06:54 20:28	05:48 21:24	05:08 20:54-21:21/27 22:09
10	08:55 16:38	08:11 17:36	07:08 17:33-17:49/16 18:32	06:52 20:30	05:46 21:26	05:07 20:54-21:21/27 22:10
11	08:54 16:39	08:09 17:38	07:06 17:34-17:48/14 18:34	06:49 20:32	05:44 21:28	05:07 20:54-21:21/27 22:11
12	08:54 16:41	08:07 17:40	07:03 17:36-17:45/9 18:36	06:47 20:34	05:42 21:29	05:06 20:55-21:22/27 22:11
13	08:53 16:42	08:05 17:42	07:01 18:37	06:45 20:36	05:40 21:31	05:06 20:54-21:21/27 22:12
14	08:52 16:44	08:03 17:44	06:58 18:39	06:42 20:38	05:39 21:33	05:06 20:54-21:22/28 22:13
15	08:51 16:46	08:01 17:46	06:56 18:41	06:40 20:40	05:37 21:35	05:05 20:55-21:22/27 22:13
16	08:50 16:47	07:59 17:48	06:53 18:43	06:37 20:42	05:35 21:36	05:05 20:55-21:22/27 22:14
17	08:49 16:49	07:57 17:50	06:51 18:45	06:35 20:43	05:34 21:38	05:05 20:55-21:23/28 22:14
18	08:48 16:51	07:55 17:52	06:48 18:47	06:33 20:45	05:32 21:40	05:05 20:55-21:23/28 22:15
19	08:47 16:53	07:52 17:54	06:46 18:14-18:22/8 18:49	06:30 20:47	05:30 21:41	05:05 20:56-21:23/27 22:15
20	08:46 16:55	07:50 17:56	06:44 18:11-18:24/13 18:51	06:28 20:49	05:29 21:43	05:05 20:56-21:23/27 22:15
21	08:44 16:56	07:48 17:58	06:41 18:10-18:26/16 18:53	06:26 20:51	05:27 21:03-21:06/3 21:44	05:05 20:56-21:23/27 22:16
22	08:43 16:58	07:46 18:00	06:39 18:08-18:27/19 18:55	06:24 20:53	05:26 21:00-21:10/10 21:46	05:05 20:57-21:24/27 22:16
23	08:42 17:00	07:43 18:02	06:36 18:07-18:28/21 18:56	06:21 20:55	05:24 20:58-21:12/14 21:48	05:06 20:57-21:24/27 22:16
24	08:40 17:02	07:41 18:04	06:34 18:06-18:28/22 18:58	06:19 20:56	05:23 20:57-21:13/16 21:49	05:06 20:56-21:24/28 22:16
25	08:39 17:04	07:39 18:06	06:31 18:06-18:28/22 19:00	06:17 20:58	05:22 20:57-21:14/17 21:51	05:06 20:57-21:25/28 22:16
26	08:37 17:06	07:37 18:08	06:29 18:05-18:28/23 19:02	06:15 21:00	05:20 20:55-21:14/19 21:52	05:07 20:57-21:24/27 22:16
27	08:36 17:08	07:34 18:10	06:26 18:05-18:27/22 19:04	06:12 21:02	05:19 20:54-21:15/21 21:54	05:07 20:58-21:25/27 22:16
28	08:34 17:10	07:32 17:39-17:45/6 18:12	06:24 18:05-18:26/21 19:06	06:10 21:04	05:18 20:54-21:16/22 21:55	05:08 20:57-21:25/28 22:16
29	08:33 17:12		07:21 19:06-19:26/20 20:08	06:08 21:06	05:17 20:54-21:17/23 21:56	05:08 20:58-21:25/27 22:16
30	08:31 17:14		07:19 19:07-19:25/18 20:10	06:06 21:08	05:16 20:53-21:17/24 21:58	05:09 20:58-21:25/27 22:15
31	08:30 17:16		07:16 19:08-19:22/14 20:12		05:15 20:54-21:18/24 21:59	
Potential sun hours	248	272	367	421	495	512
Sum of minutes with flicker	0	6	435	10	193	810

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

Day in month	Sun rise (hh:mm) Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
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SHADOW - Calendar per WTG

Calculation: 10889_Oweninny_200m Tip H_Shadow Analysis_Worst CaseWTG: PH2_T91 - NORDEX N117 2400 117.0 !O! hub: 117.5 m (TOT: 176.0 m) (62)

Assumptions for shadow calculations

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	05:10 20:58-21:26/28 22:15	05:50 21:39 05:52 20:32	06:45 20:29 06:47 20:29	07:39 18:18-18:23/5 19:17	07:38 17:06 07:40 16:21	08:34 16:20
2	05:10 20:59-21:26/27 22:15	05:52 21:37 05:53 20:29	06:47 20:29 06:49 20:27	07:41 18:13-18:25/12 19:15	07:40 17:04 07:42 16:20	08:35 16:20
3	05:11 20:59-21:26/27 22:14	05:53 21:36 05:55 20:27	06:49 20:27 06:51 20:25	07:43 18:11-18:27/16 19:12	07:42 17:02 07:44 16:20	08:37 16:19
4	05:12 20:59-21:26/27 22:14	05:55 21:34 05:57 20:25	06:51 20:25 06:52 20:22	07:45 18:10-18:28/18 19:10	07:44 17:00 07:46 16:18	08:38 16:18
5	05:13 20:59-21:26/27 22:13	05:57 21:32 05:59 20:22	06:52 20:22 06:54 20:20	07:47 18:09-18:28/19 19:08	07:46 16:58 07:48 16:18	08:40 16:18
6	05:14 20:59-21:26/27 22:13	05:59 21:30 06:00 20:20	06:54 20:20 06:56 20:17	07:48 18:08-18:28/20 19:05	07:48 16:56 07:50 16:17	08:41 16:17
7	05:15 21:00-21:26/26 22:12	06:00 21:28 06:02 20:17	06:56 20:17 06:58 20:15	07:50 18:08-18:28/20 19:03	07:50 16:54 07:52 16:17	08:43 16:17
8	05:16 21:00-21:26/26 22:11	06:02 21:26 06:04 20:15	06:58 20:15 07:00 20:12	07:52 18:08-18:28/20 19:00	07:52 16:53 07:54 16:16	08:44 16:16
9	05:17 21:00-21:27/27 22:10	06:04 21:24 06:06 20:12	07:00 20:12 07:03 19:03-19:12/9	07:54 18:08-18:28/20 18:58	07:54 16:51 07:56 16:16	08:45 16:16
10	05:18 21:01-21:26/25 22:10	06:06 21:22 06:07 20:10	07:01 20:10 07:03 19:03-19:14/14	07:56 18:08-18:26/18 18:55	07:56 16:49 08:00 16:16	08:46 16:16
11	05:19 21:01-21:26/25 22:09	06:07 21:20 06:09 20:07	07:03 20:07 07:05 19:00-19:14/14	07:58 18:09-18:24/15 18:53	07:58 16:47 08:00 16:16	08:48 16:16
12	05:20 21:01-21:26/25 22:08	06:09 21:18 06:11 20:05	07:05 20:05 07:07 18:58-19:15/17	08:00 18:09-18:22/13 18:51	08:00 16:45 08:02 16:16	08:49 16:16
13	05:21 21:02-21:26/24 22:07	06:11 21:15 06:13 20:02	07:07 20:02 07:08 18:56-19:16/20	08:01 18:11-18:19/8 18:48	08:02 16:44 08:04 16:16	08:50 16:16
14	05:23 21:02-21:25/23 22:06	06:13 21:13 06:15 20:00	07:08 20:00 07:10 18:55-19:16/21	08:03 18:14-18:17/3 18:46	08:04 16:42 08:06 16:16	08:51 16:16
15	05:24 21:03-21:26/23 22:05	06:15 21:11 06:16 19:57	07:10 19:57 07:12 18:55-19:17/22	08:05 18:43 08:07 18:39	08:06 16:41 08:07 16:16	08:52 16:16
16	05:25 21:04-21:25/21 22:03	06:16 21:09 06:18 19:55	07:12 19:55 07:14 18:53-19:16/23	08:07 18:41 08:09 18:39	08:07 16:39 08:09 16:16	08:53 16:16
17	05:27 21:04-21:24/20 22:02	06:18 21:07 06:20 19:52	07:14 19:52 07:16 18:53-19:16/23	08:09 18:39 08:11 18:36	08:09 16:37 08:11 16:16	08:53 16:16
18	05:28 21:05-21:24/19 22:01	06:20 21:04 06:22 19:50	07:16 19:50 07:17 18:53-19:16/23	08:11 18:36 08:13 18:34	08:11 16:36 08:13 16:16	08:54 16:16
19	05:30 21:06-21:23/17 22:00	06:22 21:02 06:24 19:47	07:17 19:47 07:19 18:53-19:15/22	08:13 18:34 08:15 18:32	08:13 16:35 08:15 16:16	08:55 16:16
20	05:31 21:07-21:22/15 21:58	06:24 21:00 06:25 19:45	07:19 19:45 07:21 18:53-19:13/20	08:15 18:32 08:17 18:30	08:15 16:33 08:17 16:17	08:56 16:17
21	05:32 21:09-21:21/12 21:57	06:25 20:58 06:27 19:42	07:21 19:42 07:23 18:54-19:11/17	08:17 18:30 08:19 18:27	08:17 16:32 08:19 16:17	08:56 16:17
22	05:34 21:11-21:19/8 21:56	06:27 20:55 06:29 19:40	07:23 19:40 07:25 18:55-19:09/14	08:19 18:27 08:21 18:25	08:19 16:31 08:20 16:18	08:57 16:18
23	05:35 21:54 21:54	06:29 20:53 06:31 19:37	07:25 19:37 07:26 18:57-19:07/10	08:21 18:25 08:23 18:23	08:20 16:29 08:22 16:19	08:57 16:19
24	05:37 21:53 21:53	06:31 20:51 06:33 19:35	07:26 19:35 07:28 19:02-19:03/1	08:23 18:23 07:24 17:21	08:22 16:28 08:24 16:27	08:58 16:19
25	05:39 21:51 21:51	06:33 20:48 06:34 19:32	07:28 19:32 07:30 19:30	07:24 17:21 07:26 17:19	08:24 16:27 08:26 16:20	08:58 16:19
26	05:40 21:49 21:49	06:34 20:46 06:36 19:32	07:30 19:30 07:32 19:27	07:26 17:19 07:28 17:16	08:26 16:26 08:27 16:25	08:58 16:21
27	05:42 21:48 21:48	06:36 20:44 06:38 19:27	07:32 19:27 07:34 19:25	07:28 17:16 07:30 17:14	08:27 16:25 08:29 16:24	08:59 16:22
28	05:43 21:46 21:46	06:38 20:41 06:40 19:25	07:34 19:25 07:36 19:23	07:30 17:14 07:32 17:12	08:29 16:24 08:31 16:23	08:59 16:22
29	05:45 21:44 21:44	06:40 20:39 06:42 19:22	07:36 19:22 07:37 19:20	07:34 17:12 07:36 17:10	08:31 16:23 08:32 16:22	08:59 16:22
30	05:47 21:43 21:43	06:42 20:37 06:43 19:20	07:37 19:20 07:39 19:18	07:34 17:10 07:36 17:08	08:32 16:22 08:34 16:21	08:59 16:24
31	05:48 21:41 21:41	06:43 20:34 06:44 19:18	07:39 19:18 07:41 19:16	07:36 17:08 07:38 17:06	08:34 16:21 08:36 16:20	08:59 16:24
Potential sun hours	514	461	382	328	258	231
Sum of minutes with flicker	499	0	256	207	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