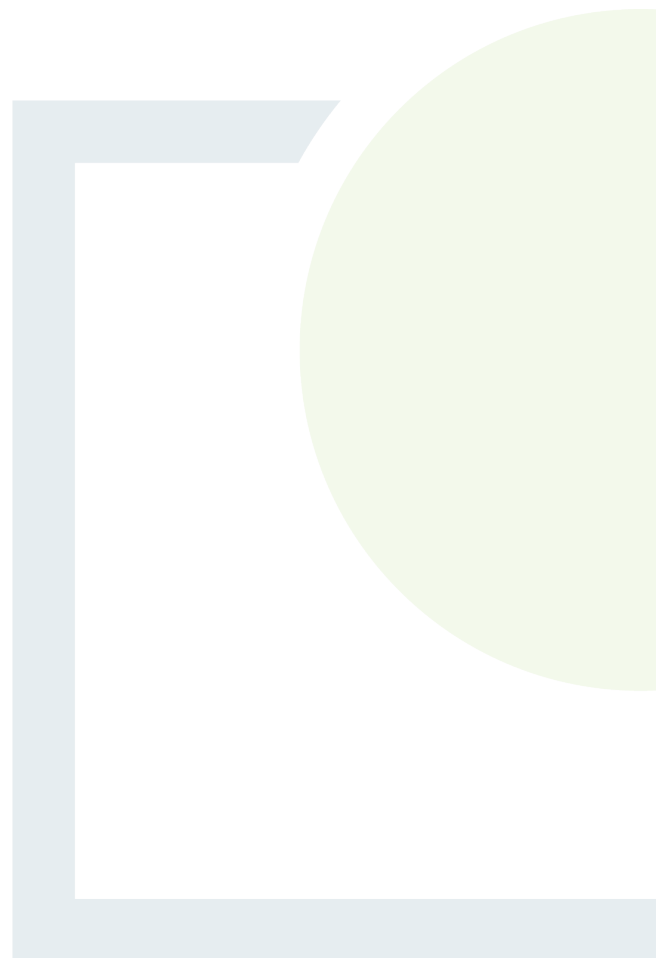




CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 13.3

Theoretical Shadow Flicker Times



**APPENDIX 13-3: Calculated Shadow Flicker Times that could occur on a turbine by turbine basis
Total Theoretical Shadow Flicker Times in UTC**

Turbine 1

Day-Month	Start Time	End Time	Duration
01-Jan	11:18:10	11:40:00	00:21:50
01-Jan	12:04:22	13:04:13	00:59:52
02-Jan	11:18:19	11:40:45	00:22:26
02-Jan	12:05:02	13:04:34	00:59:32
03-Jan	11:18:27	11:41:29	00:23:02
03-Jan	12:05:43	13:04:53	00:59:09
04-Jan	11:18:35	11:42:13	00:23:38
04-Jan	12:06:27	13:05:10	00:58:43
05-Jan	11:18:43	11:42:56	00:24:13
05-Jan	12:07:13	13:05:25	00:58:12
06-Jan	11:18:51	11:43:38	00:24:47
06-Jan	12:08:01	13:05:37	00:57:36
07-Jan	11:18:59	11:44:19	00:25:19
07-Jan	12:08:53	13:05:47	00:56:54
08-Jan	11:19:08	11:44:58	00:25:49
08-Jan	12:09:48	13:05:53	00:56:06
09-Jan	11:19:18	11:45:35	00:26:17
09-Jan	12:10:47	13:05:57	00:55:09
10-Jan	11:19:29	11:46:11	00:26:42
10-Jan	12:11:53	13:05:56	00:54:04
11-Jan	11:19:41	11:46:45	00:27:04
11-Jan	12:13:05	13:05:51	00:52:46
12-Jan	11:19:54	11:47:16	00:27:22
12-Jan	12:14:28	13:05:41	00:51:14
13-Jan	11:20:08	11:47:45	00:27:36
13-Jan	12:16:06	13:05:26	00:49:20
14-Jan	11:20:24	11:48:10	00:27:46
14-Jan	12:18:12	13:05:03	00:46:51
15-Jan	10:58:20	11:06:13	00:07:53
15-Jan	11:20:43	11:48:33	00:27:50
15-Jan	12:21:56	12:29:10	00:07:14
15-Jan	12:33:12	13:04:31	00:31:19
16-Jan	10:56:26	11:08:38	00:12:11
16-Jan	11:21:03	11:48:52	00:27:49
16-Jan	12:34:57	13:03:48	00:28:51
17-Jan	10:55:04	11:10:25	00:15:21
17-Jan	11:21:26	11:49:07	00:27:41
17-Jan	12:37:03	13:02:49	00:25:46
18-Jan	10:54:05	11:11:55	00:17:50
18-Jan	11:21:51	11:49:17	00:27:26
18-Jan	12:40:18	12:46:17	00:05:59
18-Jan	12:46:35	13:01:26	00:14:51
19-Jan	10:53:19	11:13:12	00:19:53
19-Jan	11:22:20	11:49:24	00:27:04
19-Jan	12:49:09	12:59:09	00:09:59

20-Jan	10:52:42	11:14:19	00:21:37
20-Jan	11:22:52	11:49:25	00:26:32
21-Jan	10:52:13	11:15:19	00:23:06
21-Jan	11:23:29	11:49:22	00:25:54
22-Jan	10:51:50	11:16:11	00:24:21
22-Jan	11:24:10	11:49:14	00:25:04
23-Jan	10:51:32	11:16:57	00:25:25
23-Jan	11:24:57	11:48:58	00:24:01
24-Jan	10:51:18	11:17:37	00:26:19
24-Jan	11:25:51	11:48:34	00:22:43
25-Jan	10:51:10	11:18:13	00:27:03
25-Jan	11:26:54	11:47:59	00:21:05
26-Jan	10:51:06	11:18:42	00:27:36
26-Jan	11:28:09	11:47:11	00:19:02
27-Jan	10:51:07	11:19:06	00:27:59
27-Jan	11:29:42	11:46:04	00:16:22
28-Jan	10:51:12	11:19:24	00:28:12
28-Jan	11:31:45	11:44:24	00:12:39
29-Jan	10:51:21	11:19:35	00:28:14
29-Jan	11:35:21	11:41:07	00:05:45
30-Jan	10:51:36	11:19:40	00:28:04
31-Jan	10:51:56	11:19:38	00:27:42
01-Feb	10:52:23	11:19:29	00:27:06
02-Feb	10:52:55	11:19:11	00:26:16
03-Feb	10:53:36	11:18:44	00:25:08
04-Feb	10:54:26	11:18:06	00:23:41
05-Feb	10:55:27	11:17:15	00:21:48
06-Feb	10:56:44	11:16:06	00:19:22
07-Feb	10:58:25	11:14:32	00:16:06
08-Feb	11:00:53	11:12:19	00:11:26
01-Nov	10:31:53	10:40:19	00:08:27
02-Nov	10:28:50	10:43:06	00:14:16
03-Nov	10:26:57	10:44:58	00:18:01
04-Nov	10:25:36	10:46:21	00:20:45
05-Nov	10:24:35	10:47:26	00:22:51
06-Nov	10:23:49	10:48:18	00:24:29
07-Nov	10:23:15	10:48:59	00:25:45
08-Nov	10:22:50	10:49:33	00:26:43
09-Nov	10:22:34	10:49:59	00:27:25
10-Nov	10:22:26	10:50:20	00:27:54
11-Nov	10:22:25	10:50:35	00:28:10
12-Nov	10:22:31	10:50:46	00:28:15
12-Nov	11:04:29	11:14:24	00:09:56
13-Nov	10:22:43	10:50:52	00:28:09
13-Nov	11:02:17	11:16:54	00:14:37
14-Nov	10:23:01	10:50:53	00:27:52
14-Nov	11:00:53	11:18:36	00:17:43
15-Nov	10:23:26	10:50:50	00:27:24
15-Nov	10:59:54	11:19:56	00:20:02
16-Nov	10:23:56	10:50:43	00:26:47

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

08-Dec	11:06:21	11:29:13	00:22:51
08-Dec	11:53:27	12:52:46	00:59:19
09-Dec	11:07:08	11:29:23	00:22:15
09-Dec	11:53:40	12:53:21	00:59:41
10-Dec	11:07:55	11:29:34	00:21:39
10-Dec	11:53:57	12:53:55	00:59:59
11-Dec	11:08:42	11:29:46	00:21:04
11-Dec	11:54:15	12:54:29	01:00:14
12-Dec	11:09:29	11:29:58	00:20:30
12-Dec	11:54:35	12:55:02	01:00:28
13-Dec	11:10:15	11:30:12	00:19:57
13-Dec	11:54:56	12:55:35	01:00:39
14-Dec	11:10:59	11:30:27	00:19:27
14-Dec	11:55:19	12:56:07	01:00:48
15-Dec	11:11:44	11:30:44	00:19:01
15-Dec	11:55:44	12:56:39	01:00:55
16-Dec	11:12:26	11:31:03	00:18:37
16-Dec	11:56:09	12:57:11	01:01:01
17-Dec	11:13:06	11:31:24	00:18:18
17-Dec	11:56:36	12:57:42	01:01:06
18-Dec	11:13:44	11:31:47	00:18:02
18-Dec	11:57:03	12:58:13	01:01:09
19-Dec	11:14:20	11:32:12	00:17:52
19-Dec	11:57:32	12:58:43	01:01:11
20-Dec	11:14:52	11:32:39	00:17:47
20-Dec	11:58:01	12:59:13	01:01:12
21-Dec	11:15:22	11:33:09	00:17:47
21-Dec	11:58:31	12:59:43	01:01:12
22-Dec	11:15:49	11:33:42	00:17:53
22-Dec	11:59:02	13:00:13	01:01:11
23-Dec	11:16:13	11:34:16	00:18:03
23-Dec	11:59:33	13:00:42	01:01:09
24-Dec	11:16:35	11:34:53	00:18:18
24-Dec	12:00:05	13:01:10	01:01:05
25-Dec	11:16:54	11:35:32	00:18:38
25-Dec	12:00:38	13:01:38	01:01:01
26-Dec	11:17:10	11:36:12	00:19:02
26-Dec	12:01:11	13:02:06	01:00:54
27-Dec	11:17:25	11:36:54	00:19:29
27-Dec	12:01:46	13:02:32	01:00:47
28-Dec	11:17:38	11:37:37	00:19:59
28-Dec	12:02:21	13:02:58	01:00:37
29-Dec	11:17:49	11:38:20	00:20:31
29-Dec	12:02:57	13:03:23	01:00:26
30-Dec	11:17:59	11:39:05	00:21:06
30-Dec	12:03:34	13:03:46	01:00:12

Turbine 2

Day-Month	Start Time	End Time	Duration
01-Jan	11:01:59	11:10:44	00:08:45

02-Jan	11:00:57	11:11:39	00:10:42
03-Jan	10:59:46	11:12:33	00:12:47
04-Jan	10:58:26	11:13:26	00:15:01
05-Jan	10:56:56	11:14:19	00:17:23
06-Jan	10:55:17	11:15:10	00:19:53
07-Jan	10:53:34	11:15:59	00:22:25
08-Jan	10:53:13	11:16:53	00:23:40
09-Jan	10:51:53	11:17:46	00:25:53
10-Jan	10:51:54	11:18:37	00:26:43
11-Jan	10:51:55	11:19:25	00:27:30
12-Jan	10:51:58	11:20:11	00:28:13
13-Jan	10:51:26	11:20:54	00:29:28
14-Jan	10:50:42	11:21:34	00:30:53
15-Jan	10:47:59	11:22:12	00:34:13
16-Jan	10:45:06	11:22:47	00:37:41
17-Jan	10:42:01	11:23:19	00:41:18
18-Jan	10:40:32	11:23:47	00:43:14
19-Jan	10:38:20	11:24:11	00:45:51
20-Jan	10:38:07	11:24:31	00:46:24
21-Jan	10:37:58	11:24:47	00:46:49
22-Jan	10:37:53	11:24:58	00:47:05
23-Jan	10:37:53	11:25:05	00:47:12
24-Jan	10:37:56	11:25:06	00:47:10
25-Jan	10:38:03	11:25:01	00:46:57
26-Jan	10:38:15	11:24:49	00:46:34
27-Jan	10:38:31	11:24:30	00:45:59
28-Jan	10:38:53	11:24:02	00:45:10
29-Jan	10:39:19	11:23:24	00:44:05
30-Jan	10:39:52	11:22:33	00:42:40
31-Jan	10:40:32	11:21:29	00:40:56
01-Feb	10:41:21	11:20:04	00:38:43
02-Feb	10:42:21	11:17:59	00:35:38
03-Feb	10:43:35	11:15:25	00:31:50
04-Feb	10:45:10	11:14:48	00:29:38
05-Feb	10:47:25	11:14:00	00:26:35
06-Feb	10:49:52	11:12:58	00:23:06
07-Feb	10:51:31	11:11:37	00:20:06
08-Feb	10:53:29	11:09:46	00:16:17
09-Feb	10:56:30	11:06:50	00:10:20
31-Oct	10:28:25	10:33:51	00:05:25
01-Nov	10:24:02	10:38:07	00:14:05
02-Nov	10:21:47	10:40:19	00:18:32
03-Nov	10:20:11	10:41:54	00:21:44
04-Nov	10:18:39	10:43:09	00:24:29
05-Nov	10:15:53	10:44:09	00:28:16
06-Nov	10:14:10	10:44:58	00:30:48
07-Nov	10:12:58	10:46:23	00:33:25
08-Nov	10:12:03	10:49:21	00:37:18
09-Nov	10:11:23	10:51:15	00:39:52
10-Nov	10:10:53	10:52:41	00:41:47

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

Turbine 4

There are no shadows cast by this turbine

Turbine 5

There are no shadows cast by this turbine

Turbine 6

There are no shadows cast by this turbine

Turbine 7

There are no shadows cast by this turbine

Turbine 8

There are no shadows cast by this turbine

Turbine 10

There are no shadows cast by this turbine

Turbine 11

Day-Month	Start Time	End Time	Duration
27-Apr	06:48:26	07:00:04	00:11:38
28-Apr	06:45:31	07:02:39	00:17:08
29-Apr	06:43:28	07:04:24	00:20:56
30-Apr	06:41:52	07:05:42	00:23:50
01-May	06:40:30	07:06:45	00:26:15
02-May	06:39:08	07:07:36	00:28:29
03-May	06:37:55	07:08:19	00:30:24
04-May	06:36:54	07:08:54	00:31:59
05-May	06:36:03	07:09:21	00:33:18
06-May	06:34:32	07:09:43	00:35:11
07-May	06:31:20	07:10:00	00:38:40
08-May	06:22:53	07:10:13	00:47:20
09-May	06:20:20	07:10:21	00:50:01
10-May	06:18:36	07:10:25	00:51:49
11-May	06:17:18	07:10:26	00:53:08
12-May	06:12:48	07:10:24	00:57:36
13-May	06:10:31	07:10:18	00:59:47
14-May	06:09:00	07:10:10	01:01:10
15-May	06:07:52	07:09:59	01:02:07
16-May	06:06:44	07:09:45	01:03:01
17-May	06:05:44	07:09:29	01:03:45
18-May	06:04:56	07:09:10	01:04:13
19-May	06:04:18	07:08:48	01:04:30
20-May	06:03:48	07:08:31	01:04:42
21-May	06:03:25	07:08:11	01:04:46
22-May	06:03:07	07:07:50	01:04:43
23-May	06:02:54	07:07:26	01:04:32
24-May	06:02:46	07:06:59	01:04:14
25-May	06:02:41	07:06:32	01:03:51
26-May	06:02:40	07:06:01	01:03:21
27-May	06:02:42	07:05:28	01:02:46
28-May	06:02:46	07:04:52	01:02:05
29-May	06:02:54	07:04:13	01:01:19
30-May	06:03:04	07:03:30	01:00:26
31-May	06:03:15	07:02:42	00:59:26
01-Jun	06:03:29	07:01:48	00:58:19
02-Jun	06:03:44	07:00:44	00:57:00
03-Jun	06:04:01	06:59:26	00:55:25
04-Jun	06:04:19	06:57:50	00:53:31

05-Jun	06:04:37	06:55:57	00:51:19
06-Jun	06:04:57	06:55:54	00:50:57
07-Jun	06:05:17	06:55:51	00:50:34
08-Jun	06:05:38	06:55:49	00:50:11
09-Jun	06:05:59	06:55:50	00:49:51
10-Jun	06:06:20	06:55:52	00:49:32
11-Jun	06:06:41	06:55:54	00:49:14
12-Jun	06:07:01	06:55:58	00:48:56
13-Jun	06:07:22	06:56:02	00:48:40
14-Jun	06:07:41	06:56:07	00:48:26
15-Jun	06:08:00	06:56:14	00:48:13
16-Jun	06:08:19	06:56:21	00:48:02
17-Jun	06:08:36	06:56:30	00:47:54
18-Jun	06:08:52	06:56:39	00:47:47
19-Jun	06:09:07	06:56:50	00:47:43
20-Jun	06:09:21	06:57:03	00:47:42
21-Jun	06:09:33	06:57:16	00:47:43
22-Jun	06:09:45	06:57:31	00:47:46
23-Jun	06:09:55	06:57:47	00:47:52
24-Jun	06:10:04	06:58:04	00:47:59
25-Jun	06:10:12	06:58:22	00:48:10
26-Jun	06:10:19	06:58:41	00:48:22
27-Jun	06:10:25	06:59:00	00:48:36
28-Jun	06:10:29	06:59:21	00:48:51
29-Jun	06:10:33	06:59:42	00:49:08
30-Jun	06:10:37	07:00:03	00:49:26
01-Jul	06:10:39	07:00:24	00:49:45
02-Jul	06:10:42	07:00:46	00:50:05
03-Jul	06:10:43	07:01:11	00:50:27
04-Jul	06:10:45	07:01:35	00:50:50
05-Jul	06:10:47	07:01:59	00:51:12
06-Jul	06:10:48	07:03:45	00:52:57
07-Jul	06:10:50	07:05:41	00:54:51
08-Jul	06:10:52	07:07:26	00:56:34
09-Jul	06:10:55	07:08:51	00:57:56
10-Jul	06:10:59	07:10:05	00:59:06
11-Jul	06:11:03	07:11:11	01:00:08
12-Jul	06:11:09	07:12:12	01:01:03
13-Jul	06:11:16	07:13:07	01:01:51
14-Jul	06:11:24	07:13:58	01:02:34
15-Jul	06:11:34	07:14:45	01:03:11
16-Jul	06:11:46	07:15:29	01:03:43
17-Jul	06:12:00	07:16:09	01:04:08
18-Jul	06:12:17	07:16:45	01:04:28
19-Jul	06:12:37	07:17:19	01:04:42
20-Jul	06:13:01	07:17:49	01:04:48
21-Jul	06:13:29	07:18:16	01:04:48
22-Jul	06:14:01	07:18:40	01:04:39
23-Jul	06:14:40	07:19:05	01:04:25
24-Jul	06:15:25	07:19:28	01:04:03

25-Jul	06:16:21	07:19:48	01:03:27
26-Jul	06:17:27	07:20:04	01:02:38
27-Jul	06:18:34	07:20:17	01:01:43
28-Jul	06:19:51	07:20:25	01:00:35
29-Jul	06:21:36	07:20:30	00:58:54
30-Jul	06:24:42	07:20:30	00:55:48
31-Jul	06:27:52	07:20:27	00:52:34
01-Aug	06:29:14	07:20:18	00:51:04
02-Aug	06:31:07	07:20:05	00:48:58
03-Aug	06:34:27	07:19:47	00:45:20
04-Aug	06:42:03	07:19:24	00:37:21
05-Aug	06:44:59	07:18:54	00:33:55
06-Aug	06:45:33	07:18:18	00:32:45
07-Aug	06:46:15	07:17:35	00:31:21
08-Aug	06:47:06	07:16:44	00:29:38
09-Aug	06:48:09	07:15:43	00:27:34
10-Aug	06:49:15	07:14:33	00:25:18
11-Aug	06:50:21	07:13:08	00:22:47
12-Aug	06:51:47	07:11:24	00:19:37
13-Aug	06:53:43	07:09:08	00:15:25
14-Aug	06:56:53	07:05:36	00:08:43

Turbine 12

There are no shadows cast by this turbine